Business Economy in India

Current Scenario and Future Prospects

Edited by

Dr. Pranesh Debnath

Biplab Kumar Dey

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1

Entrepreneurship and its Sustainability Phenomena: Way Forward

Subhendu Mukherjee* Runumi Das& Anjan Bhuyan*****

Abstract

The Covid-19 pandemic has changed the whole world and it also impact the business environment of whole world. This pandemic witnessed for a worst livelihood of human beings and their profession. This exploratory study targets the entrepreneurship scenario of states of India on the basis of some initiatives taken by the appropriate authorities with the help of some institutions. In India institutions like IIE (Indian Institute of Entrepreneurship), NIESBUD (National Institute of Entrepreneurship and Small Business Development), SIDC (Small Industries Development Corporations), MSME (Micro Small Medium Enterprises) etc continuously pushing entrepreneurs from various aspects and help them to sustain for a longer time period. But from the period 2020 to 2024 the activities started to back on track after the pandemic vanishes. Still some issues are facing by these institutions, and despite of having these they are trying to provide adequate support to entrepreneurs. This study takes only secondary data in account from authorized sources to explore the entrepreneurship scenario

* Research Scholar, Department of Business Administration, Tezpur University

** Associate Professor, Department of Business Administration, Tezpur University

*** Professor, Department of Business Administration, Tezpur University

after covid-19 and help to know about present status in line with the time. It provide insight towards the initiatives in from of schemes, programs, trainings awareness activities for the entrepreneurs in India through this exploration.

Keywords: *Entrepreneurship, Sustainability, Programmes, Phenomena, Pandemic, Theoretical.*

Introduction

Entrepreneurship is the process of starting a new business, it matters not only towards the people who basically start these, but also for towards the society. New business is basically identifying the potentially raw materials and try to convert these into a finished goods and which ultimately prefer by the society and other businesses. Entrepreneurship introduces some structural changes in the economy, introduce some resources into the society for its optimum use and also pull out those which are not valuable for the end consumption. This type of modification in the environment also help in the increase the standard of living and introduce some sustainability, so for this it can be said that entrepreneurship is the key aspect to introduce some meaningful upgrade and overall development. The decision to start a business is dependent to person to person but ultimately it is influenced by the surroundings (GEM report 2023-24). In the disaster situations social, sustainable, rural and micro, small entrepreneurs have suffered most. The concept of social entrepreneurs is very popular and a developing country like India also witnessed regarding livelihood improvement. Further national level authorities along is also having some responsibilities towards these entrepreneurs for their development as well as human capital skills upgrade (Onyx & Leonard, 2010). Administration can easily influence the works of social entrepreneurs and help them to sustain and made a identity (Bozhikin et al., 2019). The concept of entrepreneurial organizations in the social system shapes both local and regional economies, which also ensures to build a good business environment for them and serve the society (Esteves et al., 2021). To sustain for a longer time a proper business model for entrepreneurship is required and which can be made with the help of various supports from several authorities, further an

efficient model also help to fight in some uncertain situations (Dahle et al., 2023). Along with the entrepreneurship development the authority is also need to take into account the growth of the area like build a good city with smarter innovation and technologies. It will ultimately help both the parties (Dolmans et al., 2023). Now the sustainable entrepreneurship and its impact on society is a concerned topic and this function through digital platform and latest technology entrepreneurs growing fast and capturing market after facing several unfavorable business cycles (Gregori et al., 2024). Further in collaborating with universities, technological institutions the new way for executing business is now become a trend specially after a dark night like pandemic (Hasche & Linton, 2021). The digital social entrepreneurship is the new area of business and after covid-19 pandemic this becomes more important for most of the enterprises and it also express that the government support in uncertain situations is required (Ibanez et al., 2022).

Along with the entrepreneurship development its sustainability and impact on livelihood is also important aspect. The development of entrepreneurship through various initiatives is the key important areas and authorities are trying to push these for the overall growth. Further their impacts on livelihood are needs to be studied. There is a need to more entrepreneurial orientation specially among university youths and further it will create a positive attitude towards sustainable development (Pacheco et al., 2024). Basically, sustainable entrepreneurship is focus towards livelihood and its main aspects are poverty reduction and application into rural areas, semi urban areas and (Tabares et al., 2022). In order to create a good business environment and to support entrepreneurs, the institutional partnership is a viable one to offer strategic ways to overcome all uncertainties and social problems (Battisti, 2019). The social capital and strategies with the institutional partnership basically helps important solution to cater the problems of post COVID-19 scenario (Al-Omoush et al., 2020). The support from public authority is different from that private one and they take temporary problems rather than supportive initiative only, further their contribution is difficult to measure and they basically work for holistic development (Van Lunenburg, 2024). So, by this exploration an idea can be generated regarding the execution process of some appropriate authorities regarding entrepreneurship environment.

Review of Literature

Entrepreneurs are really capable in making significant influence in own and neighbor countries and the new entrances in the business world with a positive motivation are highly appreciable. The main difference is found in the level of motivation with respect to educational, process regarding how to operate and dissatisfaction after the failure (Zalkat et al., 2024). To do something for the society entrepreneurs perform activities like corporate social responsibilities irrespective of any aspect, but sometimes the religion factors influence more entrepreneurs to stay away from those and by doing this the support and link between business and society is disrupted completely, after that their family and community face some obstacles (Vu et al., 2024). The support system towards entrepreneurs by public sector is much different than a private institutions, it was also found that the management of public sectors are good and they are also having support from surroundings to stand behind entrepreneurship process (Van Lunenburg, 2024). The proper learning regarding entrepreneurship among youths is required, then some awareness can be created. There is a positive relationship exists between know how and entrepreneurship for upcoming generation (Somià et al., 2024). Entrepreneurship for society and its support is necessary, in this regard the link between public administration and social entrepreneurs is very strong and these institutes are also required to provide assurance in several business uncertainties (Schin et al., 2023). Entrepreneurship development through training in innovative way is much required, the visual narrative training also for women entrepreneurs definitely help to grow and sustain. The visual narrative tool is not only helpful for new strategies but also it motivates the prospects and influence towards the entrepreneurship (Rivo-López et al., 2022). Gender based entrepreneurship is also got attention in recent times and in some studies it was found that women entrepreneurs get more subsidized supports from the authorities which help them to move and create an identity in the society. Women entrepreneurs are basically survive through establishing and building strategies for them (Hendratmi et al., 2022).

The reforms by the governments results in changing the attitudes of entrepreneurs and prospect startups regarding new venture

development and also for upcoming entrepreneurs it open the paths to fully contribute towards the profession (Mitchell & Dino, 2011). Especially the student towards the venture creation is the new era of entrepreneurship, the proper support with adequate technological initiatives will result in creating good business and creative industry (Hasche & Linton, 2021). The entrepreneurial training is useful for developing skills, knowledge, know how, exposure towards business etc and after receiving various training programs it help entrepreneurs to become strong psychologically and commit towards more entrepreneurial action (Morris et al., 2023). The sustainability of the entrepreneurs also backed by digital connectivity, the new era of IT has created an network in virtual world and it contribute towards the all efforts and strategies of entrepreneurs (Gregori et al., 2024). The role of incubators is also important and the institutes along with financial support provide this service especially for young entrepreneurs. Business incubators work as the seed for prospects and this help them to become full fledged survivor in the competitive environment (Rosado-Cubero et al., 2024). The business perspectives in system form through new initiatives is also required for new as well as established business then it will result a positive outcome (Cechvala & Ganson, 2024).

Conceptual Framework

The entrepreneurship in a nation can be treated as the new changing era from time to time and its influence over society is significant important to judge the success rate. Business is a complex process and it always have some fluctuations in its operation, in certain times some uncontrollable events hits this very adversely and all ultimately suffer. The same thing also can be observed from recently pandemic in worldwide that is corona virus (Covid-19) which almost changed the world operation. Several people lost life, family, business, profession, in nutshell it can be said that the society's livelihood is completely destroyed by this pandemic. The business environment, economy completely got down for this and after this pandemic it was also not very easy for the countries to revive back their old situation, various countries still fighting to get stand up again in world economy though these processes is not observable quickly.

In India entrepreneurship is the growing aspect of business and compare to the prior time, the whole scenario of entrepreneurship has already change with the help of initiatives and cooperation of concerned authorities. There are some institutions which specially established for entrepreneurship development, and this research completely focused on those and their recent initiatives for the entrepreneurship. These institutions are can also be called as development organizations which provide supports but that pandemic make them weak for sometimes to perform well for the entrepreneurs. The activities of those institutions include various training programs, workshops, introducing schemes etc for established and new entrepreneurs. These development institutions include Indian institute of entrepreneurship, national institute of entrepreneurship and small business development, small industrial development organizations, entrepreneurship development institute of India, small industries service institutes, national small industries corporation, institute of rural management and administration etc and these are established by both central and state governments. There is a need to explore the impact of entrepreneurship-specific courses/education on entrepreneurship engagement and not just the role of formal education and previous experience (Dvouletý & Orel, 2020) The main theme of this study is the focus on Indian institute of entrepreneurship among others and their initiatives for development of entrepreneurs. The various initiatives by these authorities after the horrible pandemic is assessed through this study and some important theoretical conclusion is drawn.

Research Objectives

The broad purpose of this study is to throw light towards entrepreneurship environment with the help of authorities and observe the sustainable development. The entrepreneurship scenario is highly related with the terms livelihood, economic development, holistic development, nation growth, community development etc and all of these must gain sustainability for the future purposes.

Objective 1: To explore the recent initiatives regarding entrepreneurship development by appropriate authority for having an idea after horrible pandemic.

Objective 2: To made interpretation on initiatives related to entrepreneurship development.

Methodology

Research is also a reporting procedure and by this an idea of the phenomena can be understandable easily. To conduct this theoretical exploration data are collected only from secondary sources. Specially, the annual report which is the most latest of IIE is considered for the reporting of whole scenario. This theoretical study is in the form of exploration of the phenomena and present the detail information regarding initiatives/programmes of the institute and an interpretation of those and for this purpose easily understanding.

Findings & Discussion

Major activities of IIE are entrepreneurship development programmes/skill development programmes, entrepreneurship education programmes, area approach programmes, research and consultancy, incubation centers, csr programmes, other project schemes, innovative initiative.

Table 1: Details of state wise number of programmes and its participants

States	Total Participants	Total Programmes
Assam	966	26764
Oddisa	27	722
Manipur	23	606
Bihar	17	502
Nagaland	14	307
Karnataka	10	462
Tripura	9	218
Meghalaya	8	248
Arunachal Pradesh	5	115
Mizoram	2	48
Sikkim	1	30

Source: Compiled from IIE annual report 2022-2023

Assam is the highest number of participants and in the state highest number of programmes have been conducted. Further it is followed by Oddisa, Manipur, Bihar, Nagaland, Karnataka etc. Bihar and Karnataka also showing acceptable number of programmes despite from outside of North-East, but the number of participants is not proportionate as compare to training programmes.

Table 2: The details of programmes/training organized for the year 2022-23

Programmes	Achievement	Number of persons trained	Schdule Cast	Schedule Tribe	Other Backward Class	Women	Minority	Others
EDPs	46	1710	193	142	1036	841	71	1710
SDP/ ESDP	981	26466	657	23602	1543	25410	119	26466
MDP	16	399	134	119	59	233	0	399
Others	40	1473	139	593	476	1100	59	1473
Total	1083	30048	1123	24456	3114	27584	249	30048

Source:- Compiled from IIE annual report 2022-23

Above table explaining various training programmes achieved and its recipient details, among all programmes SDP (Skill development programmes) having highest number of persons attained this and out of these schedule tribe got more focused. Women got priority in that programme. EDP (Entrepreneurship development programmes) attained by 1710 persons and among these OBC category trainees are maximum and it also focused on women individuals. Further, in MDP (Management development programmes) it undertake with 233 participants which are also women, though this programmes didn't able to get

so much attention but despite having this still some participants contributed.

Table 3: Details of sponsors regarding various programmes 2022-23

Sponsors	Participants	Programmes
Tribal Co-Operative Marketing Development Federation of India Limited (TRIFED) Through APTDC Ltd	23927	872
Ministry of Skill Development and Entrepreneurship	2292	67
North Eastern Council (NEC)	354	14
Ministry of Rural Development	32	1
TEA BOARD	14	1
Directorate of Employment, Skill Development and Entrepreneurship (DESDE), Government of Nagaland, Kohima	30	2
Ministry of Small and Medium Enterprises (MSME)	143	5
Director of Agriculture, BTC	67	3
Schoolnet India Limited	21	1
DC-Ministry of Small and Medium Enterprises (MSME)	1548	62
NBCFDC	615	20
NSFDC	120	4
NSKFDC	60	2
Commissioner of Industries and Commerce, Government of Assam	352	11
Digital India Corporation under Textile Sector Skill Council (Digi-Bunai)	180	6
Directorate of Employment and Craftsmen Training (DECT)	101	3
ONGC	23	1
Total	29879	1075

Source:- Compiled from IIE annual report 2022-23

Above table reveals the various sponsors who are found to be associated with programmes of IIE. The maximum number of programmes are conducted by "Tribal Co-Operative Marketing Development Federation of India Limited (TRIFED) Through APTDC Ltd" with highest participants, under these initiatives participants were given training of marketing of indigenous tribal products, and how to create its legacy before artificial products by others.Above are just an overview of what development institute is use to execute and like IIE all other institutes are trying to do their best specially after the horrible pandemic. The main aspect of any programme is to provide maximum benefits to the stakeholders and help them for uplifting their existing working phenomena. Specially, in India with having huge population and infinity demands from the end consumers leads to creation of more and more entrepreneurial environment and for this individuals also getting tremendous opportunity for self employment. This helps from both the sides like consumers as well as sellers. The institutions offer education, training and various kinds of supports initiatives to the entrepreneurs for enhancing skills. It also connects various entrepreneurs to those who can help them by showing the right way and issue the finance in required standards directly or indirectly, in nutshell institutions for the entrepreneurial development play an significant role for uplifting entrepreneurial ventures. Economy of India has benefit of demographic dividend for the large number of population and it also suffering from high rate of unemployment. In this case, entrepreneurship is the only available solution as it also provides the solutions to cater unemployment and problems of society. The present theoretical exploration is only an attempt to identify the activities of the Indian Institute of Entrepreneurship after covid-19 pandemic, on the basis of last annual report of the institute after horrible pandemic the details of various initiatives/ programmes carried out by the institute. From the report it can be seen that skill development programmes able to attract high number of participants and women are the most benefited, tribal groups and the marketing of their ethnic products programmes also are higher in side. There is the need to provide attention to other initiatives in upcoming days for an holistic development and need to be taken for increasing the number of participants in other programmes and help them to move foreward towards their entrepreneurial desire.

Conclusion

Entrepreneurs are the change agent of the society and they are responsible for the shaping of surroundings. The several contribution of entrepreneurs are really not measureable and its still continuing from prior times. But it is basically very much interesting to know about the role of appropriate authorities regarding the entrepreneurship uplift and take it towards the peak. And after the horrible pandemic situation in the world the whole business scenario has been changed, some countries are still suffering its consequences and it almost destroyed the business environment. The whole global scenario applied in a local context to see the status of appropriate authority's role towards the entrepreneurship. In India several schemes are available but all got some distraction for that horrible pandemic and now it is moving towards the stable stage gradually. This theoretical exploration of entrepreneurship and its sustainability is just throw light towards the scenario after the pandemic and it only give an idea about the execution on the basis of one authority. The aim of this exploration is to encourage more deep analysis through analytical tools which can conclude on the basis of some quantitative information in future.

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2

An Impact of Farmers Producer Organisation to Produce Climate Resilient Paddy Seed in the North-Eastern State Tripura

Kiran Bhowmik* & Srijan Debnath**

Abstract

The rainfall patterns have been erratic, and spatial and temporal distribution has been noticed in the last few years due to a gradual and adverse change in climate in Tripura. Climate change has adversely affected paddy area coverage, production, and productivity during the Aush and Aman seasons. To combat the climate change situation, the Indian Council of Agricultural Research (ICAR) in Tripura has released varieties of rice viz., Gomati Dhan, Tripura Hakuchuk-2, Tripura Nirog, and Tripura Chikan Dhan, which have constituted more than seventy-three percent of the total breeder seed indent from the Government of Tripura. To increase climate change-resilient seed production for paddy in the state of Tripura, the National Bank for Agriculture and Rural Development (NABARD)-sponsored FPO has positively impacted paddy seed productivity for the varieties of rice Gomati Dhan and Tripura Nirog. NABARD's intervention has significantly increased farmers' income, highlighting its effectiveness in enhancing agricultural profitability and rural livelihoods. The estimated results of

* Research Scholar of Department of Economics and Research Associate, Study on Evaluation of Finances of State of Tripura, Tripura University (A Central University), Suryamaninagar, West Tripura

** Reaserch Assistant, Study on Evaluation of Finances of State of Tripura, Department of Economics, Tripura University (A Central University), Suryamaninagar, West Tripura

the Cobb-Douglas Production Function for Paddy Seed Productivity have suggested that the inputs provided by FPO viz., manure and nitrogen have positively influenced yield or productivity of paddy; therefore, farmers should be encouraged to use balanced organic and chemical fertilisers to sustain soil fertility. Soil testing and precision nutrient management have been promoted. It is also important to enhance labour efficiency through hands-on training with the help of ICAR scientists by FPO because labour input has significantly contributed to productivity. The positive impact of Integrated Pest Management (IPM) suggests that integrated pest control strategies should be expanded, reducing dependency on chemical pesticides and improving sustainability. The seed certification process has needs to be shortened in order to optimise farmers' profits and expedite approvals. For more storage and processing facilities, post-harvest infrastructure has to be strengthened in order to preserve seed quality and minimise losses. In order to guarantee farmers, receive higher rates for their certified seeds, the FPO has helped them establish direct market linkages.

Keywords: *Climate Change, Seed, Productivity, FPO and Income.*

Introduction

The state has become a surplus producer of certified HYV paddy and mustard seeds. The seed replacement rate (SRR) of HYV-certified paddy has been maintained at the optimum level of 33 per cent for the last few years. In the case of mustard, the SRR has reached 50 per cent. Steps have been taken to achieve self-sufficiency in HYV pulses, groundnuts, and sesamum seeds. The HYV paddy seed replacement rate has been recorded at 39 per cent. The production of HYV-certified paddy seeds reached 1435.30 MT during 2022-23.

The farm sector has played a key role in strengthening the economy, improving inclusive growth, ensuring sustainable development, and addressing climate change. Poverty reduction has occurred with investment in agriculture, focusing on improved agricultural practices. These practices have included improving the efficacy of farmland by halting and reversing deteriorating

soil health, encouraging crop diversification, promoting the usage of certified seeds, practising sustainable water management with rainwater harvesting and preservation of rainwater, developing local agricultural marketing, and using technology.

A special initiative has been taken to make the state self-sufficient in HYV seed production. Now, the state has produced a surplus quantity of HYV seeds of paddy and mustard. The surplus production has been marketed to the North Eastern States through the National Seed Corporation (NSC).

Fig. 1 presents the month-wise variation of high temperatures from 2001 to 2023. Each month has recorded different high temperatures over this period, reflecting seasonal changes and climate patterns.

January has recorded a high temperature of 3.35 square degree Celsius, while February has slightly decreased, reaching 2.75 square degree Celsius. March has witnessed a rise, with a high of 3.59 square degree Celsius, and April has continued this trend, recording 4.05 square degree Celsius. May has experienced a decline in temperature, with a recorded high of 1.90 square degree Celsius. June also showed a slight decrease, reaching 1.70 square degree Celsius. However, July recorded the highest temperature at 6.11 square degree Celsius, marking a significant peak.

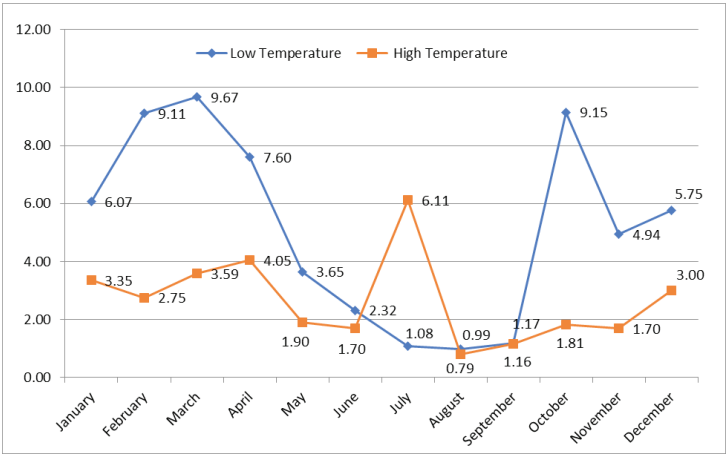
August saw a drop in temperature, with a high of 0.79 square degree Celsius, while September saw a slight increase, reaching 1.16 square degree Celsius. October has shown a further rise, with a high temperature of 1.81 square degree Celsius. November has maintained a similar trend, recording a high of 1.70 square degree Celsius. Finally, December has increased again, with a high temperature of 3.00 square degree Celsius.

The data has indicated significant fluctuations in low temperatures throughout the year, highlighting seasonal variations and long-term climate trends over the analysed period from the year 2001 to 2023. Each month has recorded different low temperatures over this period, reflecting seasonal changes and climatic patterns.

January has recorded a low temperature of 6.07 square degree Celsius. February has increased, reaching 9.11 square degree Celsius, while March has witnessed a further rise, recording 9.67 square degree Celsius. April has experienced a slight decrease, with a low temperature of 7.60 square degree Celsius.

May has recorded a significant drop in temperature, reaching 3.65 square degree Celsius. June has continued this trend, with a low temperature of 2.32 square degree Celsius. July has witnessed the lowest temperature of the year at 1.08 square degree Celsius, indicating the coldest month.

Fig. 1. Month-wise variation of temperature during the year 2001 to 2023 (in degree Celsius)



Source: Insert based on data collected from https://www.indiastat.com/

August has maintained a similar trend, recording a low temperature of 0.99 square degree Celsius, while September has slightly increased, reaching 1.17 square degree Celsius. October has shown a sharp rise, with a low temperature of 9.15 square degree Celsius. November has declined, with a low temperature of 4.94 square degree Celsius, while December has witnessed a slight increase, reaching 5.75 square degree Celsius.

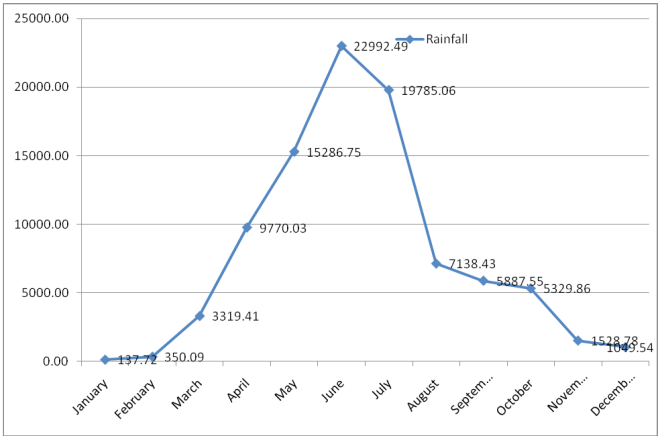
Fig. 2 clearly shows a distinct seasonal variation in rainfall, with the highest levels having occurred between May and July. This trend has been crucial for understanding water resource management, agricultural planning, and climate patterns. Such data analysis has helped prepare for droughts, floods, and water conservation strategies, ensuring sustainable environmental and economic development.

Rainfall has played a crucial role in maintaining ecological balance and supporting agriculture, water resources, and

biodiversity. The given data has presents a month-wise variation in rainfall recorded over a period of 22 years, from 2001 to 2023. This information has provided insights into seasonal patterns and trends in precipitation across different months of the year.

January has received 137.72 square mm of rainfall, marking a relatively dry start to the year. February has recorded a slight increase, reaching 350.09 square mm. However, March has witnessed a notable rise, with rainfall reaching 3319.41 square mm, signalling the transition to a wetter season. April has seen further growth in rainfall, recording 9770.03 square mm. The trend continued in May, which experienced 15286.75 square mm, reflecting the onset of monsoon activity.

Fig. 2. Month-wise variation of rainfall during the year 2001 to 2023 (in millimetre)



Source: Insert on the basis of data collected from https://www.indiastat.com/

June has recorded the highest rainfall, reaching an impressive 22992.49 square mm. July has followed closely with 19785.06 square mm, highlighting the peak of the monsoon season. These months have contributed significantly to annual water availability. August has recorded a decrease in rainfall, measuring 7138.43 square mm. The declining trend has continued in September, which has received 5887.55 square mm, and October, which has recorded 5329.86 square mm. This period has marked the gradual retreat of monsoon rains.

The dry season began to take effect in November, with rainfall reduced having reduced to 1528.78 square mm. By December, the precipitation has further decreased to 1049.54 square mm, marking the end of the rainy period for the year.

Literature Reviews

There has been a significant decline in rice productivity due to climate change. Adopting Direct Seeded Rice (DSR) options has significantly improved rice productivity and resilience, providing the additional benefit of advancing the seeding of succeeding crops by 15 days compared to the mechanically transplanted rice system. The DSR option has sustained food security and crop resilience under adverse climatic conditions (Jat et al., 2022). In order to meet future rice demands, it is now crucial to breed climate-robust rice types. In the upcoming years, rice output has had to be maintained because of the crop's heightened vulnerability to severe biotic and abiotic problems, including unexpected drought and submergence brought on by shifting climatic conditions. Inland salinity, seawater intrusions, and increased drought and submersion events have all presented significant risks to rice production. Along with modern breeding methods for climate-resilient rice, it has become necessary to address the impending challenges to long-term sustainable rice production in the face of global climate change (Suresh et al., 2024). It has been important to follow technological, infrastructural, and policy-level suggestions to increase productivity, profitability, climate resilience, and sustainability of rice production through research and re-orientation with farmers' participatory approach (Pathak et al., 2018). Systems genetics is a new field that can speed up the identification of novel alleles to create rice varieties with better grain quality and resistance to environmental factors (Sreenivasulu et al., 2015). With the help of Climate Change-Resilient Rice Production Technology (CRRPT), rice seedlings can now be kept in the seedbed for a longer time to coincide with the arrival of monsoon rains. Moreover, it has been profitable, water-efficient, climate change-resistant, and simple for farmers to implement (Biswas et al., 2019). Adopting resilient rice production systems has improved rice productivity and yield potential, especially in rice-growing areas where water scarcity has already prevailed. The successful transition from the traditional flooded system to

improved resilient rice production has been necessary to increase production. Resilient rice production systems, such as aerobic rice, SRI, GCRPS, AWD system, DSR, and drum-seeded rice, have been found to be very effective in water-stressed areas and for resource-poor farmers (Yadav et al., 2015). Climate-resilient cultivars can guarantee increased productivity and climate risk adaptation if they are widely introduced and popularised in Bangladesh (Nayak et al., 2022). The seed dormancy of local landraces has exhibited variation, and high-dormancy genotypes, such as Bari Mota and Tulsimala, have been cultivated in disaster-prone coastal areas of Bangladesh (Bristy et al., 2025). In eastern India, rice fields have been inundated by recent cyclonic storms with heavy rainfall during the October–November grain maturity period, which has had a major impact on rice yield. The market worth of produce has decreased due to viviparous germination, which has compromised the food quality of rain-soaked seeds. The introduction of wild seed dormant traits into high-yielding, non-dormant rice varieties has helped maintain rice production's stability in light of the growing frequency of these calamities (Mohapatra & Kariali, 2016). Improved production techniques, including crop establishment techniques, water and weed control, nutrient management, and the use of microbial resources that increase cropping systems' resistance to extreme weather events, have been followed, and the effects of climate change on rice crops have been understood. Using climate-resilient production technology has improved the resilience of rice production systems (Shahid., 2021).

In light of climate change, the study's emphasis on how Farmers' Producer Organizations (FPOs) may increase the yield of climate-resilient rice cultivars like Gomati Dhan and Tripura Nirog is essential. Significant obstacles to agriculture are presented by climate change, such as a rise in the frequency of extreme weather events, changes in rainfall patterns, and increased susceptibility to diseases and pests. To lessen these difficulties and guarantee food security, it is crucial to develop and promote rice varieties that are climate resilient. Successful adoption of climate-resilient techniques can be facilitated and hindered by examining the variables that affect changes in agricultural productivity among farmers connected to FPOs. Knowing this information is

essential for creating focused interventions that tackle the unique difficulties faced by farmers in the northeastern Indian state and other comparable areas.

Objectives of the Study:

The present study mainly focuses on two aspects: the impact of Farmers' Producer Organizations (FPOs) on increasing the productivity of climate-resilient rice seeds, viz. Gomati Dhan and Tripura Nirog. The objective of the study also focused on the change in farmers' income in Tripura because of climate-resilient rice seed production in the North Eastern state of India. One more objective is to study the factors that influence changes in agricultural productivity among farmers associated with FPOs. These farmers benefit from modern technology and various support from the NABARD-sponsored project under the Farm Sector Promotion Fund (FSPF) to improve their agricultural activities for climate-resilient rice seed production.

This study is significant because it examines how economic consequences, agricultural innovation, and community organisation interact with climate change. Its conclusions can help create plans to strengthen rice farming systems' resilience, guaranteeing food security and long-term livelihoods in areas that are at risk.

Methodology of the Study:

This study uses two types of methodology: data collection and data analysis, followed by policy decisions to benefit the farming community in Tripura, a northeastern agrarian state of India. The data comes from farmers who receive benefits from the National Bank for Agriculture and Rural Development (NABARD) sponsored FPO, Bagma Agri Producer Company Limited (BAPCL), located in Bagma Village under Tepania Rural Development Block in Gomati District, Tripura. The beneficiary list has been taken from BAPCL, an FPO that benefits farmers under a sponsored project by Seed Village.

The primary data has been collected from farmers with the help of scheduled questionnaires designed for the study in accordance with the study's objectives. The data was collected from eighty-three farmers who received benefits from the NABARD-sponsored

project. The NABARD project has been funded under the Farm Sector Promotion Fund (FSPF) to enhance the productivity of agriculture and allied sectors and create market sectors.

Primary data were collected using purposive sampling from the beneficiaries in West Khupilong and Dakshin Bagma Gram Panchayat. To know about the impact of the NABARD-sponsored project, apart from the field survey, a focus group discussion was held at the village level in the presence of beneficiaries.

Table 1. Sampling design in accordance with the category of the beneficiaries

Name of the Patches	Name of the Villages under Tepania R.D Block of Gomati District in Tripura	Varieties of Rice Seed Produced	Beneficiaries among Farmers [in Nos.]
Patch-I	Dakshin Bagma	Gomati Dhan	16
Patch-II	Dakshin Bagma		13
Patch-III	Dakshin Bagma		11
Patch-IV	Dakshin Bagma		12
Patch-V	West Khupilong	Tripura Nirog	31
Total	2 Nos. Villages		83

Source: Bagma Agri Producer Company Limited (BAPCL)

The total sampling design is shown in Table 1.1. The respondents are selected similarly to beneficiaries from Dakshin Bagma and West Khupilong villages under the Udaipur Subdivision of Gomati District. The beneficiaries are selected for the paddy seed production under the Seed Village project of NABARD, which BAPCL implements in two different village areas with five patches. The beneficiaries in Dakshin Bagma village are Patch-I (16), Patch-II (13), Patch-III (11), Patch-IV (12), and in West Khupilong, Patch-V (31). A total of 83 beneficiaries responded with their observations during data collection.

Methodology for Data Analysis:

In the case of data analysis, advanced statistical and econometric techniques were used. To examine the impact of the project

sponsored by NABARD under the farm sector promotion fund in view of enhancing the productivity of agriculture and allied sectors and creating market access, the paired t-test is used. The hypotheses are constructed for the present study in accordance with the following:

Null Hypothesis: $H_0: \mu_1 - \mu_2 = 0$, there is no difference in the average productivity of paddy and farmers' income before and after receiving the benefit of the NABARD-sponsored project with the help of the FPO-based company Bagma Agri Producer Company Limited (BAPCL).

Alternative Hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$, there is a difference in the average productivity of paddy and farmers' income before and after receiving the benefit of the Seed Village Project under the NABARD Farm Sector Promotion Fund with the help of the FPO-based company BAPCL in Tripura.

Where, μ_1 and μ_2 are the average productivity of paddy and farmers' income before and after receiving the benefit of the Seed Village Project under the NABARD.

In this case, the test statistic is written with the help of the following structure;

$$t = \frac{(\overline{X}_1 - \overline{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n} + \frac{s_2^2}{n}}} \sim t_{(n-1)+(n-1)}$$

Where, $s_j^2 = \frac{\sum_{i=1}^{n}(X_i - \overline{X}_j)^2}{(n-1)}$, for all j=1 and 2 in case of two samples and for all i=1,2, 3……. n

In the case of the present discussion, $\overline{X}_1\overline{X}_1$ and $\overline{X}_2\overline{X}_2$ are the average sample parameters of the productivity of paddy and the average income of the beneficiaries before and after getting benefits from the sponsored scheme by BAPCL.

Where, s_1^2 and s_2^2 are the sample variance of paddy productivity and the beneficiaries' average income before and after receiving the benefits in the NABARD-sponsored project.

In this case, the decision to be taken with the direction is that, if the observed value of the paired t-test exceeds the table value of the t-distribution with (2n-2) degrees of freedom, then the null hypothesis is rejected, which means the test is significant. The test is significant, which means there is a difference in productivity and average annual income before and after receiving the benefits of NABARD sponsored project. If the observed value is less than the table value of the t-distribution (2n-2) degrees of freedom, the null hypothesis is accepted, and the test is insignificant.

Factors like seed, labour, manure, and fertiliser are important for the productivity of paddy among farmers associated with FPOs. These factors influence changes in agricultural productivity among these farmers. They benefit from modern technology and various supports from the NABARD-sponsored project under the Farm Sector Promotion Fund (FSPF) to improve their agricultural activities.

To identify the determinants of paddy productivity under the NABARD-sponsored project with the financial outlay of the Farm Sector Promotion Fund (FSPF), the study analyses the dependence of the dependent variable on the independent variables. It aims to predict the elasticity for a one per cent change in independent variables and uses the expected value of dependent variables. The factors considered important for paddy productivity are mentioned in Table 2.

Table 2. Details of the study variables used for the analysis

Variables	Code	Unit	Description
Paddy Productivity	lnyield	Kg/ Kani	Average paddy production
Labour	lnlabour	Person	Paddy production is still labour-intensive in the state Tripura
Seed	lnseed	Kg	ICAR quality seeds used by farmers in the Seed Village project

Manures	lnmanures	Kg	Manures used are important for paddy productivity.
Nitrogen	lnnitrogen	Kg	Proper nitrogen application improves grain quality and overall crop productivity.
Phosphorus	lnphosphorus	Kg	Phosphorus also plays a key role in energy transfer and nutrient uptake, which improves flowering, grain formation, and overall yield.
Potassium	lnpotassium	Kg	Potassium is important for increasing paddy productivity because it helps strengthen plant cells, improve drought resistance, and enhance disease resistance.
Integrated Pest Management (IPM)	lnipm	ml	IPM is important for paddy productivity because it helps control pest populations in an environmentally sustainable way.

Source: Author's Estimation

Table 2 shows various variables related to paddy productivity. The variables lnyield, lnlabour, lnseed, lnmanures, lnnitrogen, lnphosphorus, lnpotassium and lnipm are variable that likely represent logarithm of paddy productivity (lnyield), logarithm of labour (lnlabour), logarithm of seed (lnseed), logarithm of manures (lnmanures), logarithm of nitrogen (lnnitrogen), logarithm of phosphorus (lnphosphorus), logarithm of potassium (lnpotassium) and logarithm of integrated pest management (lnipm).

The data is collected from eighty-three beneficiaries through a survey, and Table 3 presents descriptive statistics for the selected variables in the study. The study focuses on understanding the

factors influencing paddy productivity and the impact of various inputs on farmers' output. It examines labour, seed quality, manures, fertilisers, and pest management practices. The results help analyse the relationship between these factors and paddy production, providing insights into ways to improve agricultural productivity in the region.

The descriptive statistics of the collected data have provided valuable insights into various agricultural factors. The mean values have shown that the average yield has been 395.94 units, while labour usage has averaged 24. The mean seed usage has been 4 Kg, and manure application has reached 976 Kg. The application of nitrogen, phosphorus, and potassium has averaged 25.02 Kg, 31.42 Kg, and 8.64 Kg, respectively. Integrated Pest Management (IPM) implementation has an average value of 337.83 ml.

Table 3. Descriptive statistics of the various agricultural factors, including productivity

Descriptive Statistics	Yield	Labour	Seed	Manures	Nitrogen	Phosphorus	Potassium	IPM
Mean	395.94	23.602	4.23	976.39	25.02	31.42	8.64	337.83
Median	400	20	3	1000	22.5	25	7.5	300
Maximum	545	72	15	486.96	60	80	20	800
Minimum	50	5	1	110	3	6	2.5	80
Std. Dev	84.45	14.36	3.17	2000	15.17	17.7	4.2	184.7
Skewness	-0.671	1.279	1.243	0.504	0.801	0.927	0.884	0.83
Kurtosis	4.741	4.656	4.33	2.18	2.762	2.965	2.872	2.68
Observations	83	83	83	83	83	83	83	83

Source: Calculated from the data collected by field survey

The maximum recorded values have shown a peak yield of 545, a labour usage of 72, and a maximum seed usage of 15. The highest manure application has reached 486.96, while the maximum application of nitrogen, phosphorus, and potassium has been 60, 80, and 20, respectively. The adoption of IPM has reached a maximum of 800.

Conversely, the minimum values have indicated that some farms have had a yield as low as 50, with labour usage as low as five and seed application at only one. The minimum manure application has been 110, and the lowest nitrogen, phosphorus, and potassium application levels have been recorded at 3, 6, and 2.5, respectively. The adoption of IPM has been as low as 80 in some cases.

The standard deviation has highlighted variations across different parameters, with yield deviating by 84.45, labour usage by 14.36, and seed application by 3.17. The manure application has shown a high deviation of 2000, while nitrogen, phosphorus, and potassium application levels have deviated by 15.17, 17.7, and 4.2, respectively. IPM adoption has varied by 184.7 units.

The skewness values have revealed that yield has been negatively skewed. At the same time, other variables such as labour, seed usage, and nutrient applications have exhibited positive skewness, indicating a tendency for higher values in the distribution. The kurtosis values have suggested that most distributions have been moderately peaked, with yield and labour usage exhibiting higher kurtosis than other variables.

The study has analysed 83 observations for each parameter, ensuring a comprehensive understanding of agricultural inputs and their distribution across the surveyed farms.

Econometric Modelling:

This study used the log-log model to determine the change in independent variables labour, seed, manures, nitrogen, phosphorus, potassium, integrated pest management, and the expected change in paddy productivity.

The functional form of the model is given below;

$$Yield_i = ALabour_i^{\beta_1} Seed_i^{\beta_2} Manures_i^{\beta_3} Nitrogen_i^{\beta_4} Phosphorus_i^{\beta_5} Potassium_i^{\beta_6} IPM_i^{\beta_7}$$

The log-log regression equation can be rewritten by taking the log on both sides with the following technique;

$$lnyield_i = \beta_0 + \beta_1 lnlabour_1 + \beta_2 lnseed_2 + \beta_3 lnmanures_3 + \beta_4 lnnitrogen_4 + \beta_5 lnphosphorus_5 + \beta_6 lnpotassium_6 + \beta_7 lnipm_7 + \varepsilon_i$$

where, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7 are the coefficients in the log-log regression equation mode, and log A= β_0 intercept. The error term in the model is ε_i.

Results and Discussions

The table has shows that the NABARD-sponsored FPO has positively impacted paddy productivity across all patches. The improvements have been statistically significant, as indicated by the t-test and probability values. Across all patches, the mean productivity has risen from 1039.16 kg to 1181.69 kg. The overall t-test value (10.097) and p-value (0.000) confirm a significant positive impact of the NABARD-sponsored FPO intervention.

Table 4. Patch-wise and overall impact of NABARD sponsored FPO on paddy productivity

Name of the Patches	Name of the Villages	Mean Productivity of Paddy before (in kg)	Mean Productivity of Paddy after (in kg)	t-test	Prob.
Patch-I	Dakshin Bagma	825	983.75	9.116	0.000
Patch-II		1384.62	1590	7.287	0.000
Patch-III		1363.64	1575.46	8.168	0.000
Patch-IV		837.5	938.33	7.623	0.000
Patch-V	West Khupilong	967.741	1067.097	3.23	0.001
Overall		1039.16	1181.69	10.097	0.000

Source: Calculated from the data collected by field survey

Table 4 presents the impact of the NABARD-sponsored Farmers Producer Organizations (FPOs) on paddy productivity in different patches (regions). The data compares the mean productivity of paddy (in kg) before and after the intervention. The t-test values and probability (p-values) indicate the statistical significance of the changes.

In Patch-I under Dakshin Bagma village, the mean of paddy productivity has increased from 825 kg to 983.75 kg, with a t-test value of 9.116 and a p-value of 0.000, showing a significant impact. A t-test value of 7.287 and a p-value of 0.000 confirm a significant improvement in mean productivity, which rises from 1384.62 kg to 1590 kg in the case of Patch-II. The paddy yield increases from 1363.64 kg to 1575.46 kg in Patch-III, indicating a statistically significant influence with a t-test value of 8.168 and a p-value of 0.000. There is a significant change as the productivity increases from 837.5 kg to 938.33 kg, with a t-test value of 7.623 and a p-value of 0.000 in Patch-IV. There is a statistically significant increase in rice productivity from 967.741 kg to 1067.097 kg in Patch-V under West Khupilong, as indicated by a t-test value of 3.23 and a p-value of 0.001.

Table 5 presents a structured timeline of activities implemented by the NABARD-sponsored FPO to support paddy cultivation and seed certification. The process has been systematically designed to ensure high-quality seed production and efficient farm management.

Table 5. Structured Timeline of Activities Implemented by the NABARD-Sponsored FPO

Sl. No.	Activities	Duration from Trans Plantation
1	Pre-Season Training	Before Plantation
2	Demo-cum-Training at the time of planting sowing	20 to 25 Days
3	Organising visits by technical experts during the programme from KVK/ICAR/ Department of Agriculture	26 to 40 Days
4	Demo-cum-Training on Plan Protection	41 to 50 Days

5	Inspection by Seed Certification Officer from Seed Register Office (SRO)	51 to 70 Days
6	Demo-cum-Training at the time of rouging	71 to 90 Days
7	Extension materials include an information brochure, field display boards, etc.	91 to 130 Days
8	Visit of Seed Certification Officer	131 to 150 Days
9	Demo-cum-Training at the time of harvest, post-harvest handling and processing by ICAR, KVK and agriculture expert	151 to 160 Days
10	Harvesting by Farmers	161 to 170 Days
11	Sending a sample of seed to get approval for seed certification by farmers from SRO	171 to 185 Days
12	Certification received by farmers from SRO	186 to 210 Days
13	Selling seeds to government authority at Rs. 24 Per Kg	211 to 220 Days
14	Received money from government authority as a return	221 to 310 Days

Source: BAPCL Office at Bagma under Gomati District in Tripura

Training on pre-seasonal activities has been conducted before the plantation to equip farmers with essential knowledge. At this stage, plants have established themselves, and farmers need practical guidance on nutrient management, irrigation, and pest control. Farmers have learned firsthand about proper techniques for weeding, fertiliser application, and disease management. Farmers have been introduced to new technologies, such as bio-fertilisers, mulching, and precision farming tools. Demo-Cum Training 20–25 days after transplantation has ensured that farmers have received timely, practical, and hands-on guidance to enhance crop productivity, reduce losses, and adopt sustainable farming practices. The visits by technical experts from Krishi Vigyan Kendra (KVK), the Indian Council of Agricultural Research (ICAR) and the Agriculture Department have been organised between 26 to 40 days, providing farmers with expert insights on

crop management. Demo-cum training on plant protection has been conducted over 41 to 50 days, ensuring farmers adopt the best pest and disease control measures.

Inspection by the Seed Certification Officer from the Seed Register Office (SRO) has occurred between 51 to 70 days, verifying the quality of crops. A demo-cum training during rouging has been carried out from 71 to 90 days, helping farmers remove undesirable plants to maintain seed purity. The extension materials like leaflets, brochures, and field display boards have been distributed between 91 to 130 days, providing farmers with additional learning resources. A second visit by the Seed Certification Officer has been scheduled between 131 to 150 days to assess seed quality further. The demo-cum training during harvest and post-harvest handling has been organised from 151 to 160 days, ensuring proper storage and processing.

Farmers have started harvesting the crops between 161 to 170 days, completing the primary cultivation phase. Seed samples were sent for certification approval from the SRO between 171 and 185 days. Farmers have received seed certification from the SRO within 186 to 210 days, marking the official recognition of seed quality. Certified seeds have been sold to the government authority at Rs. 24 per kg from 211 to 220 days. Farmers have received payments from the government authority between 221 to 310 days, ensuring financial returns from their certified seed production.

As pre-season and ongoing training have played a crucial role, more specialised training programs should be introduced to improve farmers' technical knowledge. Efforts should be made to reduce the seed certification timeline, allowing farmers to receive approvals faster and maximise their earnings. The FPO should facilitate direct market connections to ensure farmers get better prices for their certified seeds. It is important to strengthen post-harvest infrastructure for more storage and processing facilities to maintain seed quality and prevent losses.

Table 6 presents the patch-wise and overall impact of the NABARD-sponsored Farmer Producer Organisation (FPO) on increasing farmers' income. It has shown the mean income of farmers before and after the programme's implementation across different patches and villages.

Table 6. Patch-wise and overall impact of NABARD-Sponsored FPO to increase farmers' income

Name of the Patches	Name of the Villages	Mean income of farmers before (in Rs.)	Mean income of farmers after (in Rs)	t-test	Prob.
Patch-I	Dakshin Bagma	15675	23610	9.345	0.000
Patch-II		26307.69	38160	8.010	0.000
Patch-III		25909	37810.91	8.124	0.000
Patch-IV		15912	22520	8.959	0.000
Patch-V	West Khupilong	18387	25610	7.584	0.000
Overall		19744	28360	15.751	0.000

Source: Calculated from the data collected by field survey

According to the table, NABARD's intervention has significantly increased farmers' income in all patches. For instance, in Patch-I (Dakshin Bagma), the mean income has risen from Rs. 15,675 to Rs. 23,610, while in Patch-V (West Khupilong), it has increased from Rs. 18,387 to Rs. 25,610.

Similarly, Patch-II, Patch-III, and Patch-IV have also witnessed substantial growth in farmers' earnings, as reflected in their t-test values, which indicate statistically significant improvements. The probability (Prob.) values of 0.000 have confirmed that the changes in income are highly significant.

The NABARD-sponsored FPO initiative has boosted farmers' income from Rs. 19,744 to Rs. 28,360, highlighting the prograsquare mme's effectiveness in enhancing agricultural profitability and rural livelihoods.

The Cobb-Douglas production function estimation for paddy productivity is shown in Table 7, which also illustrates how different inputs affect yield. The findings have shown that some factors have significantly impacted paddy productivity, including labour, manure, nitrogen, phosphorus, and integrated pest management (IPM).

Table 7. Estimation of the Cobb-Douglas Production Function for Paddy Productivity

lnyield	Coef.	Std. Err.	t	P>|t|
lnlabour	0.24222*	0.07451	3.25	0.002
lnseed	0.0652***	0.03828	1.7	0.093
lnmanures	0.11399*	0.04074	2.8	0.007
lnnitrogen	0.18337*	0.05225	3.51	0.001
lnphosphorus	0.24335*	0.05803	4.19	0.000
lnpotassium	-0.9608*	0.08874	-10.83	0.000
lnipm	0.33893*	0.12034	2.82	0.006
Constant	3.0677*	0.38262	8.02	0.000

Source: Calculated from the Data through Field Survey

Note: The symbols *, ** and *** have been used to denote the level of significance at 1%, 5% and 10% level respectively.

The labour (lnlabour) coefficient has been estimated at 0.24222, indicating a positive and statistically significant impact at the one per cent level. This suggests that increasing labour input has contributed to higher productivity. Similarly, the use of manures (lnmanures) and nitrogen (lnnitrogen) has also shown a significant positive effect, with coefficients of 0.11399 and 0.18337, respectively.

Phosphorus (lnphosphorus) has emerged as the most influential nutrient, with a coefficient of 0.24335, which suggests that its application has strongly enhanced paddy yield. The impact of integrated pest management (lnipm) has also been significant, showing a positive relationship with productivity.

However, potassium (lnpotassium) has a negative coefficient of -0.9608, indicating that its excessive application has reduced productivity. This suggests that farmers may have been overusing potassium, potentially leading to nutrient imbalances affecting crop growth.

The estimated results of the Cobb-Douglas production function have provided valuable insights into the key determinants of paddy productivity, enabling policymakers and farmers to make informed decisions for sustainable agricultural growth.

It is important to concentrate on the use of chemical fertiliser because potassium has shown a negative impact on yield. Farmers have been advised to reassess and optimise its application to prevent overuse. Soil testing and precision nutrient management should be promoted.

As manure and nitrogen have positively influenced yield, farmers should be encouraged to use balanced organic and chemical fertilisers to sustain soil fertility. The positive impact of IPM suggests that integrated pest control strategies should be expanded, reducing dependency on chemical pesticides and improving sustainability.

It is important to enhance labour efficiency because labour input has significantly contributed to productivity; efforts should be made to train farmers in efficient labour utilisation and mechanization to maximise output. The combined effects of nitrogen, phosphorus, and potassium should be carefully managed through customised fertiliser recommendations based on soil and crop needs.

Table 8 presents the ANOVA results of the Cobb-Douglas production function estimation for paddy productivity, showing the model's overall significance and explanatory power.

Table 8. ANOVA Results of the Cobb-Douglas Production Function estimation for paddy

Source	**SS**	**df**	**MS**	**Number of obs. =**	**83**
				F (7, 75) =	**75.7**
				Prob > F=	**0.000**
Model	6.331	7	0.9045	R-squared=	0.876
Residual	0.896	75	0.0119	Adj R-squared=	0.8644
Total	7.227	82	0.08814	Root MSE=	0.10931

Source: Calculated from the data through field survey

The F-statistic value of 75.7 indicates that the model is highly significant, as confirmed by the p-value of 0.000, which suggests that the independent variables included in the regression have jointly explained a substantial portion of the variation in paddy yield.

The R-squared value of 0.876 shows that the model has explained 87.6 per cent of the variation in paddy productivity. Additionally, the Adjusted R-squared value of 0.8644 has confirmed the strong explanatory power of the model even after adjusting for the number of predictors.

The model's Mean Square (MS) value has been estimated at 0.9045. At the same time, the Residual Mean Square has remained low at 0.0119, suggesting that the model has achieved a good fit with minimal unexplained variation. Furthermore, the Root Mean Squared Error (RMSE) of 0.10931 indicates that the model's predictions have been reasonably accurate.

The ANOVA results have confirmed that the Cobb-Douglas production function has been an effective model for assessing paddy productivity, providing valuable insights for farmers and policymakers in optimising agricultural practices.

Conclusion with Suggestions:

Effective community-based approaches to agricultural adaptation are revealed by the study's analysis of the effects of FPOs on the uptake and yield of these resilient rice seeds. FPOs can help farmers better handle climatic stressors by creating support networks, facilitating access to improved seed types, and sharing best practices. A better understanding of FPOs' function in this setting can help develop programs and policies that increase agricultural resilience.

The NABARD-sponsored FPO has positively impacted paddy productivity in the state of Tripura. NABARD's intervention has significantly increased farmers' income, highlighting its effectiveness in enhancing agricultural profitability and rural livelihoods.

As manure and nitrogen have positively influenced yield, farmers should be encouraged to use balanced organic and chemical fertilisers to sustain soil fertility. Soil testing and precision

nutrient management should be promoted. It is important to enhance labour efficiency because labour input has significantly contributed to productivity; efforts should be made to train farmers in efficient labour utilisation and mechanization to maximise output. The positive impact of IPM suggests that integrated pest control strategies should be expanded, reducing dependency on chemical pesticides and improving sustainability.

More specialised training programs are necessary to enhance farmers' technical expertise, as pre-season and continuous training have been essential. The seed certification process should be shortened to optimise farmers' profits and expedite approvals. To guarantee farmers receive higher rates for certified seeds, the FPO should help them establish direct market linkages. Post-harvest infrastructure must be strengthened for more storage and processing facilities to preserve seed quality and minimise losses.

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3

The Hegemony of Currency War

Biraj Dey* Pinak Pratim Das & Sandip Rudra Paul*****

Abstract

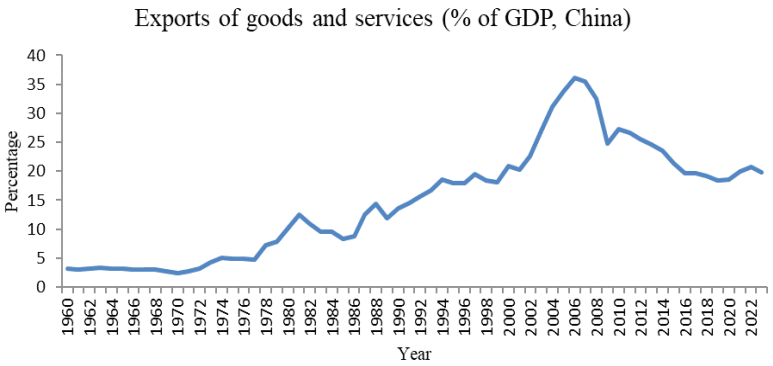
The dominance of a global reserve currency significantly influences economic dynamics, job creation, and geopolitical power. The US dollar has long served as the primary reserve currency, reinforcing American economic stability and global influence. However, the emergence of the BRICS nations (Brazil, Russia, India, China, and South Africa) and their initiative to establish an alternative system presents a potential challenge to this dominance. This paper examines the role of reserve currencies in shaping economic outcomes, with a focus on Asia, and analyzes the implications of a proposed BRICS-led multi-polar barter framework. It further explores how such developments may disrupt the prevailing supremacy of the US dollar and Euro, offering insights into emerging shifts in global economic power and the associated challenges and opportunities.

Keywords: *Dollar, BRICS Currency, Supremacy, Bharat, & West.*

* PH.D Research Scholar, Assam University, Silchar
** PH.D Research Scholar, Assam University, Silchar
*** PH.D Research Scholar, Assam University, Silchar

Introduction

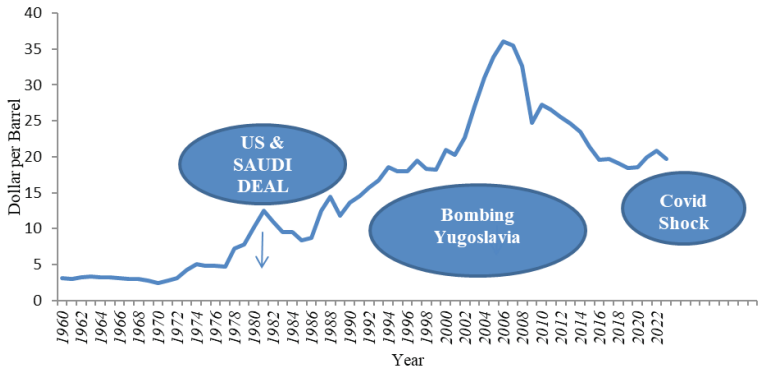
After World War II, the U.S. emerged as the dominant global power, with its economy largely intact, while much of Europe and Asia had to rebuild. The Bretton Woods Agreement in 1944 established the U.S. dollar as the world's primary reserve currency, backed by gold, and set up institutions like the IMF and World Bank to support global economic stability. This created a dollar centric global financial system where the U.S. had a central role in international trade and investment. In the year 1980s marked the beginning of a significant shift toward globalization. The adoption of neoliberal economic policies under leaders like Ronald Reagan (U.S.) and Margaret Thatcher (U.K.) pushed for deregulation, privatization, and a more globalized financial system. At the same time, there were major changes in the global manufacturing landscape. Financialization became a core characteristic of the global economy. Financial markets, including stock exchanges and derivatives, expanded rapidly, becoming increasingly detached from physical production. Western economies, especially the U.S., began relying more on financial services (banking, insurance, asset management, etc.) and less on manufacturing. Meanwhile, China and India began to open up to foreign investment and trade. China, in particular, saw an influx of Western companies seeking cheap labor for manufacturing. This was a result of China's "open-door policy" and its move towards market socialism under Deng Xiaoping in the late 1970s and early 1980s.



Source: world Bank, 2025

Moreover, The WTO accession of China in 2001 was a landmark event, formally integrating China into the global economic system. As China's economy grew rapidly, it became the dominant centre of manufacturing and low-cost production for Western companies. Multinational corporations set up vast supply chains to take advantage of China's low labour costs and its growing infrastructure. Financialization in the West accelerated, with U.S. companies' off shoring production to countries like China, Vietnam, and India. Manufacturing was increasingly decoupled from the financial world, with Western firms generating revenue from intellectual property, branding, and financial engineering and finally, the tech sector also became more prominent, with companies like Apple, Microsoft, and Google benefiting from the ability to produce and assemble products cheaply abroad while controlling design, branding, and distribution from the West. The U.S. financial system provided the capital for these firms to expand globally through the stock market, private equity, and venture capital. In addition, the removal of the gold standard from the US dollar by President Nixon in 1971 was indeed a pivotal moment in modern monetary history. This move effectively transitioned the world's currencies to fiat currencies, which are not backed by a physical commodity like gold. The agreement between the United States and Saudi Arabia in 1973, which ensured that OPEC oil trades would be conducted in US dollars, is often seen as the start of the "petrodollar" system. This agreement, sometimes referred to as the "Nixon-Saudi deal," was beneficial for both parties.

Figure.2: U.S. Crude Oil First Purchase Price (Dollars per Barrel)

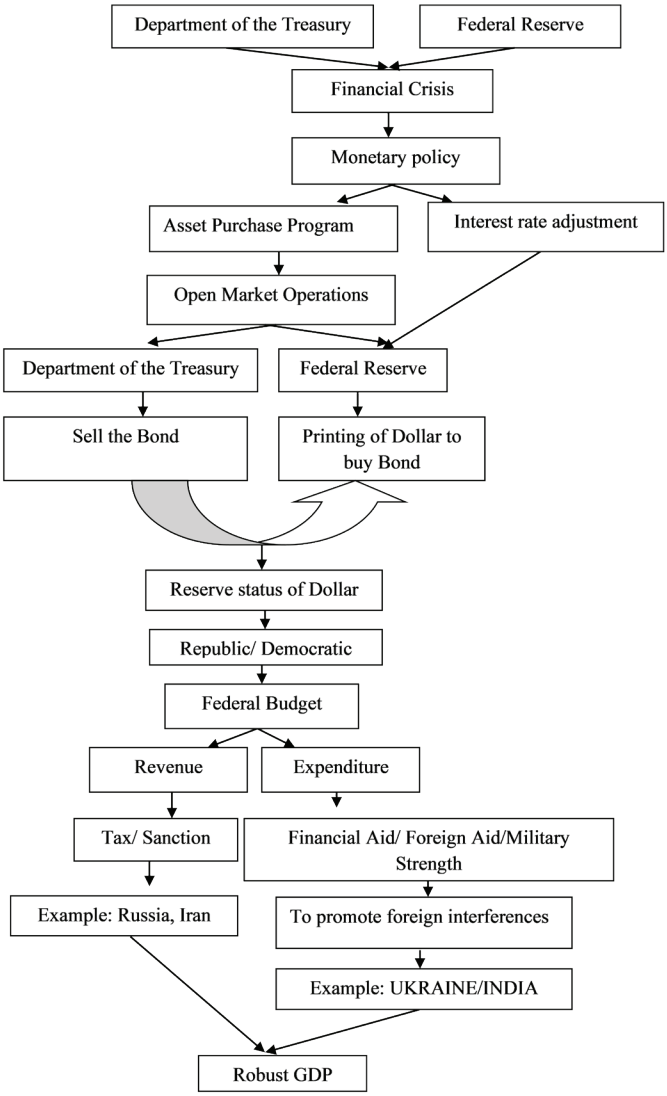


Source: U.S. Energy Information Administration (EIA), 2022

For the United States, it helped maintain the dollar's status as the world's reserve currency, as countries needed to hold US dollars to purchase oil. This increased global demand for the dollar, reinforcing its dominance in international trade and finance. For Saudi Arabia and other oil-producing countries, the agreement provided a stable and secure market for their oil, as well as access to US military protection in the region. This arrangement also helped strengthen the geopolitical influence of the United States in the Middle East. On other side, this dynamic has led to a division of labor where the West, with its financial power, controls much of the capital and investment flows, while the East, with its lower labor costs and manufacturing capabilities, serves as the production hub. This arrangement has contributed to a global economic imbalance, where Western countries have benefited from financial activities and intellectual property rights, while Eastern countries have often faced challenges in achieving equitable growth and technological advancement. The dominance of the U.S. dollar as the global reserve currency has had far-reaching effects on various sectors.

Finally, in the uni-polar dollar world, Western nations have often dominated the Financialization of real production and manufacturing, while many Eastern countries, including India, have been locations for actual production and manufacturing processes. For example, companies like Apple have designed their products in the United States but outsourced manufacturing primarily to China. While Apple's headquarters is in Cupertino, the bulk of its production happens in factories in China which provide the labor, raw materials, and logistics to assemble the products.

Figure: 3. Conceptual Framework



Source: Linkage from different research papers

Meanwhile, Apple retains control over the financial aspects financing, marketing, and global distribution often raising capital

through bonds and stock offerings that are heavily influenced by the US financial system. In information technology, for example, the financial infrastructure that supports global transactions and trade is largely denominated in dollars. This has led to the development of sophisticated IT systems to manage and process these transactions, creating jobs in software development, data analysis, and cyber security. In the banking sector, the use of the dollar as a reserve currency has facilitated the expansion of international banking services and the development of complex financial products. This has led to the creation of jobs in banking operations, risk management, and financial regulation. Similarly, in the investments sector, the dollar's status as the reserve currency has fuelled the growth of financial markets and investment opportunities. This has led to the creation of jobs in investment management, financial analysis, and asset pricing. While the dominance of the dollar has certainly played a role in the growth of these sectors, it's important to note that other factors, such as technological innovation and globalization, have also contributed to their development.

The flow chart highlights how monetary policy is not just a tool for economic stability but also a mechanism for geopolitical influence. By maintaining the U.S. dollar as the world's reserve currency, the U.S. ensures that global transactions, oil trade, and foreign reserves remain dependent on it (Obstfeld & Rogoff, 2022). This status allows the U.S. to borrow at lower interest rates and fund deficits without facing immediate financial crises, a privilege known as "exorbitant privilege" (Eichengreen, 2019). However, countries like China and Russia are actively working to reduce their reliance on the dollar by promoting alternative payment systems and accumulating gold reserves (World Bank, 2023). While sanctions can cripple economies like Russia's, excessive use of this tool risks pushing nations toward alternative financial systems, weakening U.S. influence (Stiglitz, 2021). Similarly, continuous dollar printing may lead to debt accumulation, currency devaluation, and inflationary pressures, as seen in the post-pandemic era (Federal Reserve, 2023). Despite these risks, the U.S. maintains economic dominance through strategic financial policies, trade agreements, and military alliances.

On the contrary, one of the sectors most impacted by this shift was agriculture. Traditionally, agriculture in many Asian societies was often organized around joint family systems, where land and resources were shared among family members. This system had its advantages, such as pooling resources and sharing risks, but it also limited individual ownership and decision-making. As the wave of individualism took hold, people began to assert their individual rights to land and resources, leading to the fragmentation of landholdings and the breakup of joint family systems. This had several consequences for the agricultural sector. Firstly, the breakup of joint families meant that smaller and fragmented landholdings were less efficient to cultivate, leading to lower agricultural productivity. Secondly, as people began to demand their share of the family corpus, resources that were previously invested in agricultural development were diverted elsewhere. This, coupled with the migration of people from rural to urban areas in search of better opportunities, further weakened the agricultural sector. The shift towards individualism also had broader societal implications. As people migrated to cities, traditional social structures and support systems were disrupted, leading to the breakdown of community ties and the erosion of traditional values. Overall, while the wave of individualism brought with it the promise of personal freedom and economic prosperity, its impact on the agricultural sector and traditional social structures in post-colonial Asia was profound and far-reaching.

The dollar's status has led to a situation where the value of Asian exports and the wages of Asian workers are often indirectly linked to the policies of the U.S. Federal Reserve and the broader economic conditions in the West. One consequence of this arrangement is that Asian economies have become, to some extent, "price-takers" in the global economy. The prices of their exports, denominated in dollars, are influenced by factors such as exchange rates and demand in Western markets, rather than solely by domestic supply and demand dynamics. This can lead to a situation where Asian economies are more vulnerable to fluctuations in the global economy and less able to control their own economic destinies. Furthermore, the reliance on the dollar as a reference currency can also create distortions in the valuation of goods and services

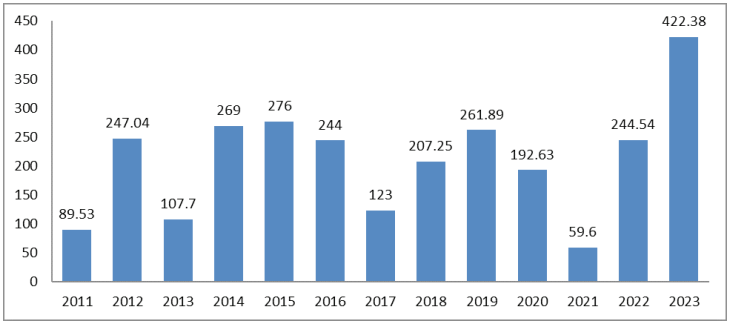
produced in Asia. Because the dollar is the global standard, the value of Asian exports is often determined by how much they are worth in dollars, rather than in local currency terms. This can create situations where the true value of Asian goods and services is not fully reflected in their dollar-denominated prices. Largely, while the dollar's status as the global reserve currency has brought benefits to Asia in terms of facilitating trade and investment, it has also created challenges and vulnerabilities that Asian economies must navigate. The current global economic order, dominated by the US dollar and institutions like the UN, World Bank, IMF, and WTO, has long been criticized for perpetuating inequalities and favoring the interests of developed Western nations. On the other side, for Asia, which has a rich history and a significant share of the world's population, there is a growing call for reform to break free from the perceived suppression of the past and to fully realize its economic potential.

In this regard, De-dollarization is crucial for addressing the importance of maintaining global stability, as well as mitigating its severe consequences. It is increasingly viewed as a critical step toward restoring balance in the global sphere. By reducing reliance on the US dollar, countries in Asia can mitigate the impact of external economic shocks and have more autonomy in monetary policy. This shift could also lead to a more balanced global currency system, with multiple currencies playing a significant role in international trade and finance. Reforming multilateral institutions is another key aspect of this transformation. These institutions have often been seen as promoting Western interests and imposing conditions on developing countries that hinder their development. To truly empower Asia and other developing regions, these institutions need to be reformed to be more inclusive, representative, and responsive to the needs of all member countries. Furthermore, for Asia to re-emerge as a global economic powerhouse there is a need to rebalance the economy away from the overemphasis on services and towards a more robust manufacturing and agricultural sector. This shift would not only create more jobs but also ensure a more sustainable and equitable growth path. Overall, the push for de-dollarization and reform of multilateral institutions is part of a broader movement towards a more multi polar world order, where power and

influence are more evenly distributed among nations. For Asia, this represents an opportunity to break free from historical constraints and shape its own destiny in the global economy. Finally, the upcoming BRICS digital currency indeed represents a significant step towards challenging the dominance of the US dollar and the Euro as reserve currencies. The plan of the BRICS (Brazil, Russia, India, China, South Africa) countries to create a currency pegged to commodities like gold, silver, oil, gas, wheat, rice, cotton, and others could indeed lead to the establishment of a very stable digital financial system. By backing their currency with tangible commodities, the BRICS nations would be creating a system less vulnerable to inflationary pressures and economic shocks. Commodities such as gold and silver have historically been seen as stores of value and hedges against inflation.

By pegging their currency to these commodities, the BRICS countries would ensure that the value of their currency remains relatively stable, even in the face of economic uncertainties. Additionally, pegging their currency to a basket of commodities diversifies the backing of the currency, reducing the risk associated with relying on a single commodity. In regards during the early 1990s India reserves remained relatively low and stable gold reserve, reflecting cautious reserve management post the 1991 economic crisis. A noticeable increase began around 2015, followed by a sharp rise between 2018 and 2019, likely influenced by rising global gold prices and strategic reserve accumulation. After some fluctuations, a steady upward trend resumed for gold reserve around 2020, with a particularly sharp surge post-2020. This growth signifies India's increasing focus on diversifying foreign exchange reserves and strengthening economic stability amid global uncertainties. This could make the BRICS multi currency more attractive to investors and traders, further enhancing its stability and credibility in the global financial system.

Figure.2: Value of silver imported into India (in billion Indian rupees)



Source: Directorate general of Commercial Intelligence and Statistics

Moreover, by creating a multi currency that can facilitate transactions within the BRICS nations (Brazil, Russia, India, China, and South Africa), these countries are aiming to reduce their dependence on the dollar and Euro, which could have far-reaching implications for global currency dynamics.

One key aspect you mentioned is the realization that conflicts in various regions might have been influenced by the desire to maintain the dominance of the dollar. Historically, the US dollar's status as the global reserve currency has given the United States significant economic and geopolitical advantages, including the ability to impose sanctions and influence global financial systems. The practice of invoicing transactions in dollars, even when the parties involved are not in the US, has also contributed to the dollar's dominance and allowed the US to effectively export its inflation. This has sometimes resulted in currency devaluation and economic challenges for other countries. The introduction of a BRICS multi currency could potentially disrupt this system by offering an alternative means of conducting international transactions. It could also lead to a shift in the balance of power, as the BRICS nations, along with other countries that might join them in adopting this currency, could gain more control over their financial systems and reduce their vulnerability to external economic pressures. Moreover, a multi- digital currency could facilitate trade and economic cooperation among BRICS countries, as it would reduce currency conversion costs and exchange rate risks. However, it's important to note that the success of the BRICS

multi digital currency will depend on various factors, including its adoption by other countries, its stability, and its ability to effectively compete with established currencies.

Conclusion:

In conclusion, the global currency dynamics are undergoing a significant transformation, with the rise of digital currencies and the potential challenge to the dominance of the US dollar and Euro as reserve currencies. The upcoming BRICS multi currency could potentially alter the landscape of international finance, offering an alternative to the traditional reserve currencies and potentially reducing the influence of the US and Euro-zone in global economic affairs. However, the impact of the BRICS digital currency will depend on several factors, including its adoption by other countries, its stability and reliability as a medium of exchange, and its ability to compete with existing digital currencies such as Central Bank Digital Currency. Additionally, geopolitical tensions and conflicts could also play a role in shaping the future of global currency dynamics, as countries seek to assert their economic power through currency manipulation and other means. Overall, while the BRICS multi currency represents a potential challenge to the dominance of the US dollar and Euro. The evolution of the global financial system is likely to be influenced by a complex interplay of economic, political, and technological factors, making it difficult to predict the future with certainty. However, it is clear that the hegemony of currency is a key aspect of international relations and will continue to be a topic of debate and discussion in the months to come.

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4

Exploring the Role of Government in Unlocking the Potential of Women Entrepreneurship in India

Bappaditya Biswas* & Rashmi Saha**

Abstract

Indian women entrepreneurs have increasingly provided a share to the economic development of India and employment opportunities' growth. Yet, women entrepreneurs in India today face various barriers due to limited finance accessibility, norms, and society-biased genders. Various initiatives have been stated by the Indian government that empower women entrepreneurs by providing the ambience with proper high-performance orientation. This paper analyses the initiatives undertaken by the government and how these have been working as catalysts to encourage women entrepreneurship in India. This paper reviews the effect of government policies regarding the provision and implementation of services and the main initiatives undertaken to help women entrepreneurs on the economy. The research methodology used here is descriptive in nature by reviewing secondary data, reports, research articles, publications of government, and analyses by industry in an effort to strike a balance while analysing the issue. The implementation of finance schemes, capacity-building programs, and entrepreneurial training provides a more favourable environment for women entrepreneurs. However, the problems

* Assistant Professor, University of Calcutta, Kolkata, West Bengal

** Assistant Professor, Brainware University, Kolkata, West Bengal

still remained, and focused interventions in other areas would have been required to remove the remaining barriers. So that ultimately government policies can support women entrepreneurs in a better way, but there is much to be achieved so that maximum exploitation for long-run prosperity in the Indian economy will come into its effective working condition.

Keywords: *Economic Development, Government Initiatives, Finance Accessibility, Entrepreneurial Training.*

1. Introduction

Women entrepreneurship takes part in entrepreneurial activities, such as formulating and managing a business firm. Women entrepreneurship has played an outstanding role both in economic growth and social development. It involves innovation and job creation in boosting economic activities. Hence, it presents opportunities for sustainable growth with the removal of the associated hardships to stereotypical thinking in society, among others. Today, women entrepreneurship is gaining immense importance in India, where women are dominating many technologies, manufacturing concerns, and other services. However, the number of women entrepreneurs in India remains relatively small when the entire entrepreneurial scenario is compared to this total scenario.

The current scenario of women entrepreneurship in India is one of progress with struggle. Women entrepreneurs in India is relatively very low in comparison with the men. Though the number of businesses owned by women is on the increase, these women entrepreneurs also face many crucial barriers that restrain their growth and development. Some of the tight boundaries include lack of access to capital, dominant social norms and stereotypes, poor mentorship, weak networking, and inapposite skill development programs. This even makes the liv of women entrepreneurs more challenging to serve the needs of their families apart from serving the business requirements, making the problems appear more complicated.

The Indian government has taken a few forward steps in supporting women entrepreneurship in the country. All these will be further extended into Udyogini and the National Policy

for Skill Development and Entrepreneurship that should provide training, mentorship, and capacity building to women. Mahila Coir Yojana, Stand-Up India Scheme, and Pradhan Mantri Mudra Yojana provide financial assistance to women entrepreneurs. From that viewpoint, apart from unlocking further economic opportunities for women, policy reforms and public awareness measures towards an even more facilitative environment for entrepreneurship from the Indian side, more importantly, have been undertaken by the government in the direction of promoting women's empowerment and gender equality in the entrepreneurial environment.

2. Literature Review

Desai & Chaudhari (2024) have discussed the constructive role of women entrepreneurs in sustainable development. This study identifies difficulties in their empowerment and development through training, counselling, and networking. Elimination of gender discrimination and entrepreneurship can lead to economic growth to empower women to take part equally through business and innovation.

Reen & Kour (2023) have pointed out that women's entrepreneurial prosperity in rural areas depends on consciousness and emotional empowerment in their study. Despite the technical skills, social and domestic pressures hinder their professional lives. Promoting women's entrepreneurship with a favourable cultural environment and favourable policies can translate into poverty elimination, economic development, and bringing untapped possibilities to fruition.

Priya & Lakshmi (2023) have focused on network building for women entrepreneurs based on the need for greater appreciation of business situations, affordable technology, and management capabilities. It suggested greater Single Window System development, providing collateral-free loans, ICT intervention promotion, and building strong infrastructure with the ability to sustain micro-businesses to foster socioeconomic empowerment.

Gupta & Shweta (2023) have analyzed the government's role in empowering women entrepreneurs in India with an emphasis on policy innovation and sustaining support. It discusses the

weaknesses of women in business and invites future policies to develop an entrepreneurial inclusive environment for economic and social growth.

Shambunath (2021) has concentrated on rural women entrepreneurship in India and recognizes unawareness, illiteracy, and limited confidence in handling money and legal intricacies as challenges. Capacity building in finance, marketing, and management is emphasized in research. A facilitative environment is needed to enhance self-employment and economic growth.

Subbarayudu & Rao (2021) have elaborated women entrepreneurship as one of the most significant economic growth drivers, employment, and innovation. Women, though they contribute to the economy, are underrepresented in business. Equal participation, government incentives, and pro-women entrepreneur policy have been cited by research as the causes of maintaining economic development and competitiveness globally.

Misra & Ghai (2020) have concerned with the new contribution of female entrepreneurs towards economic development, particularly in developing nations like India, during economic liberalization and globalization. It identifies the efforts by governments towards supporting women's enterprise through education and training but notes that most have failed, necessitating further strategic enhancements.

Arya et. al. (2017) have explained the important contribution of women entrepreneurs towards economic development, with a particular focus on their growing involvement in business. Gender bias and poor policies remain obstacles nonetheless. Research indicates the need for improving entrepreneurial ability and government intervention to make women competitive and sustainable in the global economy.

3. Objectives

- To evaluate the status of participation of women in the workforce and women entrepreneurship in India today.
- To understand different kinds of barriers and opportunities that Indian women entrepreneurs are facing along their path towards business growth and success.

- To study the various government policies framed for promoting and developing women entrepreneurship.

4. Research Methodology

This paper is based on a descriptive research approach, focusing on the analysis and synthesis of secondary data from various sources. The research is based on a detailed review of existing research papers, government reports, industry publications, and credible websites to understand the landscape of women entrepreneurship in India. This paper aims to describe and evaluate the current status and challenges of these women entrepreneurs and their future prospects along with government initiatives supporting them.

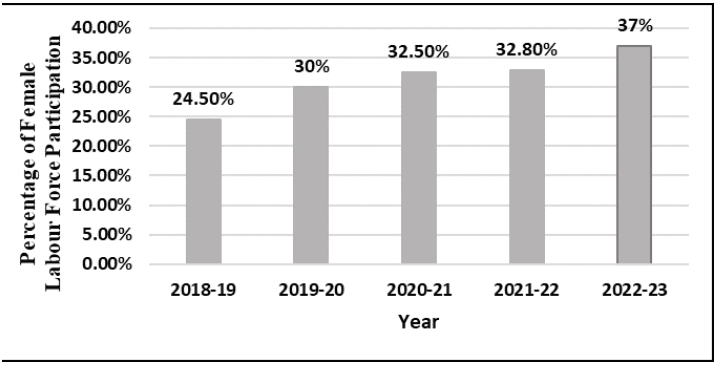
By reviewing the secondary data, it experiments with the key themes that would include barriers to accessing finance for women entrepreneurs, societal norms, and biases towards gender, among others, and a discussion about the government's various programs on these issues. This research method would encompass all the aspects in a holistic approach and throw light on how such initiatives have worked for the betterment of the growth and development of women entrepreneurship in India.

The descriptive nature of the research also allows for the overall trends and trends of government policies, the relative effectiveness of given programs, as well as any overall impact towards women entrepreneurs in general. Reviews of published literature are conducted according to the present methodology to ensure a basis on the established knowledge behind the findings themselves and provide perspective on the broader role of such government initiatives generally in fostering Indian women entrepreneurship.

5. Current Scenario of Escalating Female Workforce through Women Entrepreneurship in India

In recent years it has been seen that there is a significant growth in female labour force participation. In both urban and rural areas, females are taking initiatives to be involved in activities apart from the household work. As a result of that, the participation of women in the workforce is increasing year by year.

Figure 1: Female Labour Force Participation Rate

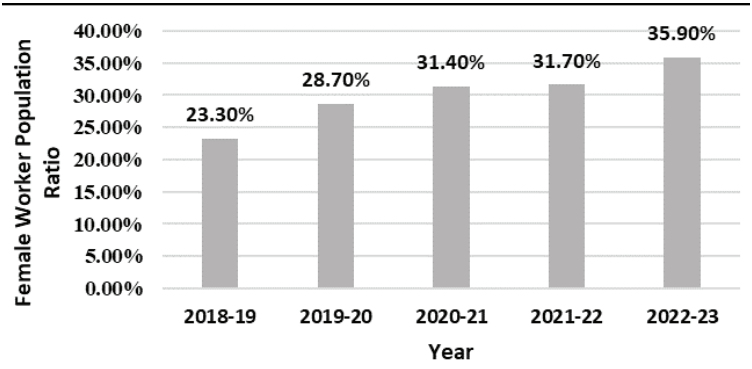


(Source: pib.gov.in)

From the graph shown above, in 2018-19 the female labour force participation rate was 24.50%, and it has made a significant growth over the few years, reaching 37% in the year 2022-2023. From 2021-22 to 2022-23, a huge jump of 4.2% indicates that women are more prone to getting into labour force.

In continuation with the female labour force participation, another thing that we need to have a look at is the female worker population ratio. From the last few years, it is also increasing day by day, which indicates the significant contribution of women to the economy of the country.

Figure 2: Female Worker Population Ratio



(Source: pib.gov.in)

From the above graph, a huge shift has been seen in the female worker population ratio from year 2018-19 to 2022-23, from 23.30% to 35.09%. So, an evident shift of 11.79% has been seen in the female worker population ratio. The contribution of women to growth and uplifting the economic condition of India is very crucial now.

India needs more participation of women in generating and sustaining the employment opportunity. An in-depth view of the current situation of women entrepreneurship and initiatives that are taken by the government to encourage and uplift the women to create something on their own. The landscape of women entrepreneurship in India has gradually developed with greater recognition of the role that women have played in furthering economic advancement. However, still a number of obstacles mar their way to entrepreneurship.

Government schemes such as "Stand-Up India," "Mudra Yojana," and "Start-Up India" offer women-owned businesses finances, mentorship, and training. This aspect of more numbers of women-owned businesses is witnessing a boost after a very short period of time. Further, it brings women to retail, IT, manufacturing, and services industries and promotes scalability in areas related to businesses, like tech start-ups and e-commerce that achieved market globally through low investments.

All these notwithstanding, there is still a lot to be achieved. Among the challenges that women face are less access to capital, inadequate networks, and socioeconomic prejudices. Due to patriarchal norms and family obligations, entrepreneurs are cut off from entrepreneurial opportunities. Women only constitute about 14% of the entrepreneurs in the country, which is significantly lower as compared to their male counterparts. Other significant funding agencies, such as venture capitals, are dominated by men, making it even worse for women's bottlenecks in that kind of financial sector. The Covid-19 pandemic has been a worse disaster, especially to women-led businesses in retail and hospitality industries. However, women proved to be resilient as they adapted their businesses towards digital platforms and e-commerce, and pivoted into new business models. The scenario of women entrepreneurship in India is improving gradually, but there are challenges, including limited funding and societal biases.

Therefore, financial inclusion, mentorship, and policy support for gender equality are required to make women entrepreneurs a significant contributor to the growth of India's economy.

5.1. Several Obstacles That Indian Women Entrepreneurs are Facing Nowadays

- **Restricted Financial Capital:** Most Indian women entrepreneurs are not bankable because they have no significant assets that could be used to secure bank loans. In addition, lending institutions will consider them not very creditworthy since family responsibilities increase the risks of business failure. This again limits their sources of capital necessary for the development of their businesses.
- **Poor Literacy Rates:** The factors most influential for the socio-economic problems in India are the low rates of female literacy. Even today, there is enough educational inequality, and the majority of the women remain unprepared to deal with technical and managerial challenges. Even though the government has started a few new steps in this regard - Beti Bachao Beti Padhao, Mahila Shakti Kendra, Mahila E-Haat, etc.There are still a lot of women who lack the required number of resources. These have been made worse by the fact that this pandemic is very online, preventing women from fully pursuing education and skill building.
- **Reduced Aid to the Family:** The pressure to balance work and family life on women entrepreneurs is much more stringent from society. Work-life balance is a neutral goal for everyone, but usually, women are expected to be working both at home and in the office. Moreover, these burdens with odd hours and traveling requirements make it even tougher for a woman.
- **Ignorance of marketing:** A deficiency in marketing skills and knowledge constrains women entrepreneurs from expanding their businesses and productivity. In most cases, it confines them to only identifying the markets for their products; thus, they let the marketing sector be at the mercy of the male entrepreneurs. Subsequently, women end up relying on middlemen, who charge high commissions, thereby making profitability low.

5.2. Various Initiatives Taken by Government to Uplift Women Entrepreneurship

The government has offered various schemes related to the empowerment of women entrepreneurs in different sectors. All these schemes offered financial aid, training, capacity building, etc., for the beginning and expansion of business among women. Easy access to credits, mentoring of women, and an opportunity for improving their skills through different programs should be there. Access and networking access in funding is posing very big challenges. Therefore, these programs will indirectly support the increased participation of more women in entrepreneurial ventures and eventually help boost the country's economic growth.

Stand Up India Scheme	Offers loans between Rs. 10 lakhs and Rs. 1 crore for fresh green projects with bank finance. Every branch of the bank should be having at least one loan meant for SC/ST customers and one for women. It focuses on green and sustainable, environmentally friendly projects and inclusion entrepreneurship.
Pradhan Mantri Mudra Yojana	It gives loans to small enterprises involving beauty parlours, retail shops, and coaching centers. Loans up to INR 10 lakhs and loan repayment tenure in minimum 3 years and maximum 5 years. No collateral is needed.
Women Entrepreneurship Platform	It is launched by NITI Aayog. Its approach is to back women in capital, tools, networking, and mentorship required for any woman to start, run, and scale their business.
Mahila Vikas Nidhi Scheme	To the women in distress, besides offering financial assistance, small-scale enterprise or livelihood-generating activities shall be provided. It must engage women in skill building and sustainable livelihood opportunities for the poorest.

Credit Guarantee Scheme for Micro and Small Enterprises	Maximum credit facility of INR 5 lakhs at an interest rate of 1% for units in the northeastern region, women, and microenterprises. Above INR 5 Lakhs and not exceeding INR 50 Lakhs credit facility to women, microenterprises, and northeastern units at the rate of 1.35%. Credit facility of over INR 50 lakhs up to INR 200 lakhs at the rate of interest of 1.80% to women, microunits and northeast region units.
Mahila Coir Yojana	Helps to empower the rural women artisans within the coir-producing regions. 75% cost of motorised Ratt/motorised traditional Ratt as one-time subsidy provided by the coir board, subject to a maximum of up to Rs. 7,500 for motorized Ratt and up to Rs. 3,200 for traditional and electronic Ratt. The goal of the coir industry is productivity, employment, and higher incomes.
Other Remarkable Schemes	Mahila E-Haat: This is an e-platform for women entrepreneurs. They will showcase their products on the website, which would enable selling to customers. The website presents a virtual market, in which all segments will be incorporated by adding women there for their development and growing on that virtual ground. Bharatiya Mahila Bank is a bank especially for all financial services and products designed or tailored to the needs of women entrepreneurs. Therefore, it offers loans, credits, and other banking services that empower women to start and expand their ventures; hence, making access to finance for women easier. Stree Shakti Package It is a scheme that provides financing and entrepreneurial help to women entrepreneurs. It gives loans at subsidized rates and develops them with skills so that they can successfully run the business on sustainable long terms. Annapurna Scheme The scheme specifically targets women interested in the food catering business. Such women are given loans to either start or expand the food catering business so that they can benefit from the high demand for food services.

6. Conclusion

All of these schemes have enabled women entrepreneurs in the Indian government and have contributed to economic growth, business development, and social change. Other initiatives, such as Mudra Yojana and Stand-Up India, have also allocated funds and relieved the access of credit so that women entrepreneurs may start or grow their businesses, thereby contributing toward their economic independence and competitiveness in the market. These have not only created direct employment but also stimulated local economic growth by creating jobs at the supply chains. On top of this, training has improved business management and technical skills, though high-level management and more advanced technology are increasingly needed.

Despite such successes, it has been said that challenges are still present: limited financial literacy, lending bias, and cultural biases. The main networks are still a challenge for women entrepreneurs because business circles are dominated by men. Though the government policies have challenged stereotyping and improved society's tolerance, it remains within the boundaries of rural and conservative settings, thus creating problems. Bureaucratic delays, unawareness, and inconsistent policy implementations all create issues in the achievement of the set targets. All of these initiatives must be scaled up, adapted, and implemented better across different regions and sectors to have broader and sustainable change in the long term.

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5

A Study on Consumer Attitudes toward Eco-Friendly Product in Gangtok District

Ghana Shyam Kafley*, Tapas Kumar Sahoo & Tshering Wangmo Bhutia*****

Abstract

The increasing awareness of environmental sustainability has led to a growing demand for eco-friendly products. This study explores the factors influencing consumers' purchasing decisions and their level of satisfaction with eco-friendly products among the citizens of Gangtok. Using a descriptive research design, primary data was collected from 160 respondents through a structured questionnaire. The study employed percentage analysis, independent t-tests, and ANOVA to analyse the data. Findings reveal that price, product quality, and environmental responsibility significantly impact consumer behaviour. Males exhibit a higher purchasing inclination compared to females, and younger consumers tend to be more satisfied with product safety. The internet serves as the primary source of awareness, and reusable bags and water bottles are the most commonly purchased eco-friendly products. Despite recognizing the benefits of eco-friendly products, consumers express concerns regarding affordability and availability. The study suggests that businesses and policymakers should focus on improving accessibility, affordability, and consumer trust to promote sustainable purchasing behaviour.

* Assistant Professor, Department of Commerce, SRM University, Sikkim
** Assistant Professor, Department of Commerce, SRM University, Sikkim
*** M.Com Student, Department of Commerce, SRM University, Sikkim

Keywords: *Eco-Friendly Products, Consumer Behaviour, Sustainability, Purchasing Decision, Environmental Awareness.*

Introduction:

Environmental sustainability has become a crucial concern in the modern world, where excessive resource consumption and pollution have led to significant ecological damage. The term "eco-friendly" refers to products, services, and activities that do not harm the environment and contribute to conserving natural resources such as energy and water (Thomson, 2020). Eco-friendly products are designed to minimize environmental impact throughout their lifecycle, from production to disposal. These products play a significant role in reducing pollution, conserving biodiversity, and promoting a sustainable future. The concept of eco-friendliness extends beyond products to encompass individual behavior and lifestyle choices. According to Jha et al. (2017), adopting environmentally friendly habits and products can lead to a significant reduction in pollution and energy consumption. With growing environmental concerns, consumers worldwide, including in India, have started realizing the benefits of eco-friendly products for their health, well-being, and sustainability.

The market for eco-friendly products has seen rapid growth in recent years. According to a report by TerraChoice, the demand for such products has increased by 73% in the past five to seven years. This trend is evident in India as well, where consumers are gradually shifting towards sustainable products, though at a slower pace compared to global trends. The increasing awareness of environmental issues, coupled with concerns over health hazards posed by conventional products, has driven this shift towards sustainability. Despite the growing demand, challenges remain in the widespread adoption of eco-friendly products. Limited availability, higher costs, and a lack of awareness among both consumers and marketers, particularly in regions such as Gangtok, hinder their adoption. Farmers and manufacturers are often hesitant to produce eco-friendly goods due to uncertainties in market demand. Consumer attitudes and behaviours play a crucial role in determining the success of eco-friendly products

in the market. If such products are perceived as affordable and beneficial, they are more likely to gain acceptance and support.

Sustainability is the guiding principle in environmental conservation efforts. Eco-friendly products contribute to reducing carbon footprints, minimizing greenhouse gas emissions, and ensuring the efficient use of scarce resources. Their biodegradable nature prevents long-term waste accumulation, promoting environmental health. Furthermore, eco-friendly products offer multiple advantages, including cost savings, improved public health, and enhanced quality of life for consumers. These benefits make them an attractive choice for individuals and businesses striving for sustainability. In the face of escalating environmental challenges, the adoption of eco-friendly products is imperative. Sustainable development ensures that the needs of the present generation are met without compromising the needs of future generations. By opting for eco-friendly alternatives, individuals and businesses can contribute to environmental preservation while reaping economic and health benefits.

Statement of the Problem

Despite growing awareness of eco-friendly products among the people of Gangtok, many consumers still prefer to pay a lower price for plastic bags rather than investing in reusable alternatives like jute bags. This indicates a gap between awareness and actual purchasing behaviour. This study aims to explore consumer attitudes toward eco-friendly products in the Gangtok district, focusing on the factors influencing their purchasing decisions. It seeks to understand why consumers hesitate to invest in sustainable alternatives despite their long-term benefits. Additionally, the study will emphasize the environmental and health advantages of using eco-friendly products, highlighting the need for greater consumer education and awareness. By addressing these issues, this research will contribute to promoting sustainable consumer behaviour and encouraging more informed purchasing decisions in Gangtok.

Literature Review

Numerous studies have explored consumer behavior towards green products and the factors influencing their purchase decisions. Laroche and Bergeron (2001) identified that environmentally

conscious consumers are more likely to be female, married, and with children, emphasizing ecological concerns in their purchasing decisions. Yang (2010) found that perceived quality mediates the relationship between brand awareness and purchase intention, while Morel and Kwayke (2012) highlighted the role of prior satisfaction and word-of-mouth in promoting eco-friendly purchases. Suki (2013) emphasized the importance of eco-labels in enhancing actual purchase behaviour, and Tilikidou (2013) noted that pro-environmental behavior was more common in large families rather than high-income households. Agyeman (2014) revealed that while consumers support green products, price remains a significant barrier. Kumar and Ghodeswar (2014) stressed that mere environmental consciousness does not translate into green purchases, whereas Maheshwari (2014) confirmed an environmental value-action gap. Altinigne and Bilgin (2015) found a strong correlation between environmental attitudes and behavior, and Omar et al. (2015) examined religiosity and perceived effectiveness in influencing green purchase intentions. Zheng and Chi (2015) underscored the need for strategic marketing to enhance positive attitudes towards environmentally friendly alternatives. Kirmani and Khan (2016) reinforced that environmental concern drives green product purchases, while Moser (2016) identified key drivers of green purchasing behavior, exposing gaps between attitude and actual behavior. Makhdoomi and Nazir (2016) found that younger consumers value green product quality but are discouraged by high prices. Ketelsen et al. (2020) discussed barriers to purchasing eco-friendly packaged foods, and Kalaiselvi and Dhinakaran (2021) examined demographic factors shaping green marketing awareness. Lastly, Machova and Ambrus (2022) analyzed Slovak consumer behavior regarding palm oil products, emphasizing the role of marketing and information dissemination. These studies collectively highlight the complexity of green consumerism, revealing gaps between awareness, intention, and actual purchasing behavior.

Objective of the Study

1. To study the level of attitude of consumers towards eco-friendly products in Gangtok.
2. To analyze the buying behavior of eco-friendly products among consumers based on gender and age groups in Gangtok.

3. To assess the level of consumer satisfaction with eco-friendly products across different gender and age groups in Gangtok.

Research Methodology

Research Design

This study employs an analytical research design to systematically examine the factors influencing consumer attitudes toward eco-friendly products in the Gangtok district. The research aims to identify key determinants affecting purchase decisions, assess consumer satisfaction levels, and explore demographic and behavioural variations in eco-friendly product adoption. By adopting a structured approach, the study provides an in-depth understanding of consumer preferences and behaviours concerning sustainable consumption.

Research Approach and Time Horizon

The study follows a quantitative research approach to obtain measurable insights into consumer attitudes. A survey-based methodology is utilized to collect primary data, ensuring objectivity and reliability in the findings. The research was conducted over a period of four months, allowing for adequate data collection and analysis within the given timeframe. This cross-sectional study captures consumer attitudes at a specific point in time, providing a snapshot of prevailing perceptions and behaviours toward eco-friendly products in Gangtok district.

Sampling Design

Target Population

The target population comprises residents of Gangtok district who are potential or existing consumers of eco-friendly products. The study focuses on individuals who are actively involved in purchase decisions related to environmentally friendly goods, ensuring relevance to the research objectives.

Sampling Technique and Sample Size

A combination of convenient sampling and random probability sampling techniques was adopted to ensure a diverse and representative sample. Given the time and resource constraints,

convenient sampling was used to reach respondents easily through digital means, while random probability sampling helped reduce selection bias and enhance the generalizability of findings. The study included a total of 160 respondents, who were selected based on their availability and willingness to participate. The sample size was determined to achieve a balance between statistical significance and feasibility within the research duration.

Data Collection Methods

The study primarily relies on primary data, which was collected through structured questionnaires. The survey was designed to gather information on consumer perceptions, purchasing behavior, satisfaction levels, and influencing factors regarding eco-friendly products. A Google Forms-based questionnaire was used to collect responses efficiently. The questionnaire was structured into different sections, covering demographic details, awareness and knowledge of eco-friendly products, factors influencing purchase decisions, satisfaction levels, and challenges faced in adopting sustainable consumption practices. The questionnaire consisted of close-ended and Likert scale-based questions to facilitate quantitative analysis.

Data Analysis Techniques

To analyse the collected data, a combination of statistical techniques was used to ensure comprehensive insights. Percentage analysis was employed to determine the distribution of responses across different categories, providing an overview of consumer attitudes and behaviours. To compare mean differences in consumer perceptions based on categorical variables such as gender and education level, the independent t-test was applied. Additionally, ANOVA (Analysis of Variance) was used to assess variations in consumer satisfaction and purchasing behaviour across multiple demographic groups, identifying significant differences among respondents. The collected responses were systematically coded and entered into statistical software (SPSS/ Excel) for further analysis, with descriptive statistics, frequency distributions, and inferential statistical tests applied to interpret the findings accurately.

Hypotheses of the study:

$H_{1:}$ There is no significant difference between opinion of male and female in respect to buying behaviour of eco-friendly product in Gangtok city.

H_2: There is no significant difference between opinions of different age groups in respect to buying behaviour of eco-friendly product in Gangtok city.

H_3: There is no significant difference between the opinion of male and female with respect to the level of satisfaction with eco-friendly products in Gangtok city.

H_4: There is no significant difference between the opinions of different age groups of people with respect to the level of satisfaction with eco-friendly products in Gangtok city.

Scope of the Study

The study focuses on understanding consumer attitudes within the Gangtok district, offering insights relevant to local businesses, policymakers, and marketers aiming to promote eco-friendly products. The findings contribute to the growing literature on sustainable consumption and consumer behaviour in emerging markets.

Analysis and Interpretation:

Demographic Profile and Attitude towards Eco-friendly Product:

The demographic profile and attitudes toward eco-friendly products among respondents in Gangtok, as depicted in Table 1, provide valuable insights into consumer behavior and preferences. The study involved 160 respondents, with a slightly higher representation of females (54.4%) compared to males (45.6%). The majority of respondents fell within the 18-24 age group (45.6%), followed by the 25-31 age group (37.5%), indicating a younger demographic with a growing interest in eco-friendly products. Older age groups, such as 32-42 (13.8%) and 43 and above (3.1%), were less represented, suggesting that younger consumers may be more inclined toward eco-conscious purchasing decisions. In terms of education, a significant portion of respondents were graduates (43.8%) and post-graduates (39.4%), highlighting a

correlation between higher education levels and awareness of eco-friendly products. Only a small percentage (2.5%) had no formal education, reinforcing the idea that education plays a crucial role in shaping environmental consciousness. Income levels revealed that the majority of respondents (66.3%) earned between Rs. 0-20,000 monthly, which may influence their purchasing power and preference for affordable eco-friendly options. Smaller percentages fell into higher income brackets, such as Rs. 20,000-25,000 (8.1%), Rs. 25,000-40,000 (14.4%), and Rs. 40,000-55,000 (11.3%), suggesting that eco-friendly product adoption is not limited to higher-income groups but is also accessible to middle- and lower-income consumers.

Awareness of eco-friendly products varied among respondents, with the majority reporting an average level of awareness (44.4%). A significant portion also reported high (29.4%) and very high (19.4%) awareness, indicating a growing familiarity with such products. However, a small percentage reported very low (0.6%) or low (6.3%) awareness, suggesting the need for targeted educational campaigns to bridge this gap. When it comes to the types of eco-friendly products purchased, reusable bags were the most popular (43.8%), followed by cloth napkins (17.5%) and reusable water bottles (17.5%). Other products, such as rechargeable batteries (6.9%), bamboo handle products (13.8%), and metal straws (0.6%), were less frequently purchased, possibly due to limited availability, higher costs, or lower perceived utility. The primary source of knowledge about eco-friendly products was the internet (63.1%), underscoring the role of digital platforms in disseminating information. Traditional media, such as newspapers and magazines (5.6%) and television (8.8%), played a lesser role, while family and friends contributed to 22.5% of respondents' knowledge, highlighting the influence of social networks in shaping consumer behaviour.

In terms of purchasing frequency, a significant portion of respondents reported buying eco-friendly products weekly (36.3%) or daily (33.1%), indicating a high level of engagement with such products. Monthly purchases accounted for 22.5%, while half-yearly purchases were less common (8.1%), suggesting that eco-friendly products are increasingly becoming a part of consumers' regular shopping habits. Overall, the data reveals

a positive trend toward the adoption of eco-friendly products, particularly among younger, educated, and digitally connected consumers. However, challenges such as limited awareness among certain groups, affordability concerns, and the availability of specific products need to be addressed to further promote sustainable consumption. These findings provide a foundation for policymakers, marketers, and environmental advocates to design targeted strategies that cater to the diverse needs and preferences of consumers in Gangtok, ultimately fostering a more sustainable and eco-conscious society.

Table 1: Demographic Profile and Attitude towards Eco-friendly Product of the Respondents

Particulars	No. of Respondents	Percentage
Gender		
Male	73	45.6
Female	87	54.4
Total	160	100.0
Age Group		
18-24	73	45.6
25-31	60	37.5
32-42	22	13.8
43 and Above	5	3.1
Total	160	100.0
Educational level		
High School Graduate	23	14.4
Graduate	70	43.8
Post Graduate	63	39.4
No Proper Education	4	2.5
Total	160	100.0
Income (monthly in Rs.)		
0-20000	106	66.3
20000-25000	13	8.1
25000-40000	23	14.4
40000-55000	18	11.3
Total	160	100.0

Awareness of the Eco-Friendly products		
very low	1	.6
Low	10	6.3
Average	71	44.4
High	47	29.4
Very High	31	19.4
Total	160	100.0
kind of Eco-Friendly products buy by respondents		
Reusable Bags	70	43.8
Rechargeable batteries	11	6.9
Cloth Napkins	28	17.5
Reusable Water Bottle	28	17.5
Metal Straws	1	.6
Bamboo handle products	22	13.8
Total	160	100.0
source of knowledge of the Eco-Friendly product		
Internet	101	63.1
Newspaper and Magazines	9	5.6
Television	14	8.8
From Family and Friends	36	22.5
Total	160	100
How often do you typically buy eco-friendly products		
Daily	53	33.1
Weekly	58	36.3
Monthly	36	22.5
Half Yearly	13	8.1
Total	160	100.0

Source: Primary Data

Analysis of opinion towards the buying behaviour of the eco-friendly product based on gender:

The independent t-test results presented in Table 2 reveal significant differences between the opinions of males and females regarding their buying behavior toward eco-friendly products in Gangtok. The analysis indicates that gender plays a role in shaping consumer attitudes and decisions related to eco-friendly purchases. For instance, males (Mean = 3.77, SD = 0.906) and females (Mean = 3.44, SD = 1.020) differ significantly in their belief that the price of eco-friendly products affects their purchasing decisions ($t = 2.147$, $p = 0.033$), with males showing a slightly higher sensitivity to price. Similarly, both genders agree that eco-friendly products contribute to health and enhance quality of life (Mean = 4.41, SD = 0.620), but the difference in their agreement levels is statistically significant ($t = 2.669$, $p = 0.008$). Furthermore, while both males and females strongly agree that using eco-friendly products is a responsibility toward environmental protection (Mean = 4.47, SD = 0.579), the t-test reveals a significant difference in their opinions ($t = 2.150$, $p = 0.033$). However, no significant differences were found in their trust toward the information provided on product packaging, with both genders showing moderate agreement (Mean = 3.49, SD = 0.915; $t = 1.256$, $p = 0.211$ and Mean = 3.89, SD = 0.737; $t = 0.738$, $p = 0.462$). Overall, the analysis of buying behavior shows a significant difference between males (Mean = 20.02, SD = 2.56) and females (Mean = 18.89, SD = 2.56) ($t = 2.718$, $p = 0.007$), suggesting that males exhibit a slightly higher inclination toward purchasing eco-friendly products compared to females. These findings highlight the influence of gender on consumer behavior and attitudes toward eco-friendly products, emphasizing the need for targeted marketing strategies that consider gender-specific preferences and perceptions. The study underscores the importance of addressing price sensitivity, health benefits, and environmental responsibility in promoting eco-friendly products, while also recognizing the nuanced differences in how males and females perceive and engage with such products.

Table 2: Independent t-test for significant differences between the opinion of Males and Female with respect to buying behaviour of the eco-friendly product

Buying Behaviour of eco-friendly product	Gender				t value	P value
	Male		Female			
	Mean	SD	Mean	SD		
Do you believe the price of eco-friendly products affects your decision to purchase them?	3.77	.906	3.44	1.020	2.147	0.033
Do you agree that eco-friendly products are good for your health and overall enhance your quality of life?	4.41	.620	4.41	.620	2.669	0.008
Do you agree that using eco-friendly products is environmental protection responsibility?	4.47	.579	4.47	.579	2.150	0.033
Do you agree the information given on the package of the products are always true?	3.49	.915	3.49	.915	1.256	0.211
Do you agree the information given on the package of the products are always true?	3.89	.737	3.89	.737	0.738	0.462
Overall Buying Behaviour	20.02	2.56	18.89	2.56	2.718	0.007

Source: Primary Data

Analysis of opinion towards the level of satisfaction with Eco-friendly products based on gander:

The independent t-test results presented in Table 3 reveal no statistically significant differences between the opinions of males and females regarding their level of satisfaction with eco-friendly products in Gangtok. For the statement, "Eco-friendly products are safe to use," males reported a slightly higher mean satisfaction score (Mean = 4.08, SD = 0.702) compared to females (Mean = 3.94,

SD = 0.705), but the difference was not statistically significant (t = 1.251, p = 0.213). Similarly, for the statement, "Quality and performance of eco-friendly products are better than non-eco-friendly products," males again showed a marginally higher mean satisfaction score (Mean = 3.85, SD = 0.828) than females (Mean = 3.76, SD = 0.715), but the difference was not significant (t = 0.744, p = 0.464). Regarding the availability of eco-friendly products, females reported a slightly higher mean satisfaction score (Mean = 3.37, SD = 0.978) compared to males (Mean = 3.32, SD = 0.926), but this difference was also not statistically significant (t = 0.348, p = 0.727). Finally, the overall satisfaction scores for males (Mean = 11.246, SD = 1.869) and females (Mean = 11.069, SD = 1.710) were nearly identical, with no significant difference (t = 0.678, p = 0.535). These findings suggest that gender does not play a significant role in influencing consumer satisfaction levels with eco-friendly products in Gangtok. Both males and females exhibit similar perceptions and satisfaction levels regarding the safety, quality, performance, and availability of eco-friendly products. This indicates that marketing strategies and product development for eco-friendly products do not need to be gender-specific in this context. Instead, efforts should focus on addressing broader consumer concerns, such as improving product availability, enhancing quality, and increasing awareness about the benefits of eco-friendly products, to boost overall satisfaction across all demographic groups. The results highlight the importance of understanding consumer behavior and satisfaction levels to design effective strategies that cater to the needs of all consumers, regardless of gender.

Table 3: Independent t-test for significant differences between the opinion of Males and Female with respect to the level of satisfaction with eco-friendly products

Level of satisfaction	Gender				t value	P value
	Male		Female			
	Mean	SD	Mean	SD		
"Eco-friendly products are safe to use.". Are You Satisfied with the above statement?	4.08	0.702	3.94	0.705	1.251	0.213

"Quality and Performance of eco-friendly products are better than non-eco-friendly products." Are you satisfied with the above statement	3.85	0.828	3.76	0.715	0.744	0.464
"Eco-Friendly Products are easily available." Are you satisfied with the above statement	3.32	0.926	3.37	0.978	0.348	0.727
Overall satisfaction	11.246	1.869	11.069	1.710	0.678	0.535

Source: Primary Data

Analysis of opinion towards the buying behaviour of the Eco-friendly product based on age group:

The ANOVA results presented in Table 4 reveal significant differences in the opinions of respondents across different age groups regarding their buying behavior toward eco-friendly products. The analysis indicates that age plays a significant role in shaping consumer perceptions and decisions related to eco-friendly products. For instance, the belief that the price of eco-friendly products affects purchasing decisions shows a statistically significant difference across age groups ($F = 3.911$, $p = 0.010$). Younger respondents (18-24 years) and older respondents (43-55 years) exhibited higher mean scores (3.47 and 3.77, respectively), suggesting that these groups are more sensitive to price considerations compared to the 32-42 age group, which had the lowest mean score (2.25). Similarly, the perception that using eco-friendly products is an environmental protection responsibility also varied significantly across age groups ($F = 3.007$, $p = 0.032$), with the 25-31 and 43-55 age groups showing stronger agreement (mean scores of 4.49 and 4.50, respectively). However, no significant differences were observed in the belief that eco-friendly products enhance health and quality of life ($F = 1.472$, $p = 0.224$) or in the trust toward information provided on product packaging ($F = 0.930$, $p = 0.428$ and $F = 1.646$, $p = 0.181$), indicating that these factors are perceived similarly across all age groups. Overall, the analysis of buying behavior ($F = 4.517$,

p = 0.005) demonstrates significant variation, with the 43-55 age group showing the highest overall mean score (20.13), followed by the 25-31 age group (20.01), suggesting that older consumers are more inclined toward eco-friendly purchasing behavior compared to younger age groups. These findings highlight the importance of age as a demographic factor influencing consumer attitudes and behaviors toward eco-friendly products, emphasizing the need for targeted marketing strategies that address the specific concerns and preferences of different age groups.

Table 4: ANOVA for significant differences between the opinions with respect to different age groups of people's for buying behaviour of the eco-friendly product

Buying Behaviour of Eco-friendly Product	Age group				F value	P value
	18-24	25-31	32-42	43-55		
Do you believe the price of eco-friendly products affects your decision to purchase them?	3.47 (0.944)	3.75 (0.90)	2.25 (0.500)	3.77 (1.152)	3.911	0.010
Do you agree that eco-friendly products are good for your health and overall enhance your quality of life?	4.15 (0.72)	4.38 (0.66)	4.00 (0.000)	4.32 (0.646)	1.472	0.224
Do you agree that using eco-friendly products is environmental protection responsibility?	4.16 (0.882)	4.49 (0.536)	4.00 (0.816)	4.50 (0.512)	3.007	0.032
Do you agree the information given on the package of the products are always true?	3.30 (1.009)	3.46 (0.867)	3.00 (0.000)	3.59 (0.796)	0.930	0.428

Do you agree the information given on the package of the products are always true?	3.77 (0.842)	3.93 (0.602)	3.25 (0.500)	3.95 (0.653)	1.646	0.181
Overall Buying Behaviour	18.84 (2.928)	20.01 (2.109)	16.50 (1.290)	20.13 (2.730)	4.517	0.005

Source: Primary Data

Analysis of opinion towards the level of satisfaction with eco-friendly products based on age group:

The ANOVA results presented in Table 5 reveal significant differences in the level of satisfaction with eco-friendly products across different age groups in Gangtok. The analysis indicates that there is a statistically significant difference in the satisfaction level regarding the statement, "Eco-friendly products are safe to use" ($F = 2.326$, $p = 0.007$). The mean satisfaction scores for this statement were highest among the 25-31 age group ($M = 4.17$, $SD = 0.587$), followed by the 32-42 age group ($M = 4.05$, $SD = 0.65$), the 18-24 age group ($M = 3.89$, $SD = 0.774$), and the 43-55 age group ($M = 3.60$, $SD = 0.894$). This suggests that younger consumers, particularly those aged 25-31, perceive eco-friendly products as safer compared to older age groups. However, no significant differences were observed in satisfaction levels regarding the statements, "Quality and performance of eco-friendly products are better than non-eco-friendly products" ($F = 0.812$, $p = 0.489$) and "Eco-friendly products are easily available" ($F = 0.316$, $p = 0.814$). The mean scores for these statements were relatively consistent across age groups, indicating that consumers generally share similar views on the quality, performance, and availability of eco-friendly products, regardless of age. Additionally, the overall satisfaction scores did not show significant variation across age groups ($F = 1.002$, $p = 0.394$), with the 32-42 age group reporting the highest overall satisfaction ($M = 11.45$, $SD = 1.85$), followed by the 25-31 age group ($M = 11.33$, $SD = 1.547$), the 18-24 age group ($M = 10.95$, $SD = 1.874$), and the 43-55 age group ($M = 10.40$, $SD = 2.509$). These findings suggest that while younger consumers, particularly those aged 25-31 and 32-42, exhibit slightly higher satisfaction levels with eco-friendly products, the differences are not substantial enough

to conclude that age is a major determinant of overall satisfaction. Instead, the results highlight that perceptions of safety are more influenced by age, whereas quality, performance, and availability are perceived similarly across all age groups. This implies that marketers and policymakers should focus on addressing safety concerns, particularly among older consumers, while continuing to emphasize the quality and availability of eco-friendly products to maintain satisfaction levels across all demographics.

Table 5: Anova for significant difference between the opinions of different age groups of people with respect to the level of satisfaction with eco-friendly products.

Level of satisfaction	Age group				F value	P value
	18-24	25-31	32-42	43-55		
"Eco-friendly products are safe to use.". Are You Satisfied with the above statement?	3.89 (0.774)	4.17 (0.587)	4.05 (0.65)	3.60 (0.894)	2.326	0.007
"Quality and Performance of eco-friendly products are better than non-eco-friendly products." Are you satisfied with the above statement	3.71 (0.82)	3.88 (0.73)	3.91 (0.68)	3.60 (0.54)	0.812	0.489
"Eco-Friendly Products are easily available." Are you satisfied with the above statement	3.36 (0.933)	3.28 (0.976)	3.50 (0.91)	3.20 (1.30)	0.316	0.814
Overall satisfaction	10.95 (1.874)	11.33 (1.547)	11.45 (1.85)	10.40 (2.509)	1.002	0.394

Source: Primary Data

Findings and Conclusion

The study aimed to explore consumer attitudes, buying behaviour, and satisfaction levels toward eco-friendly products in Gangtok, focusing on demographic factors such as gender and

age. The findings reveal several key insights into the perceptions and preferences of consumers regarding sustainable products, providing a comprehensive understanding of the factors influencing their adoption and satisfaction.

One of the primary findings of the study is the significant role of gender in shaping consumer attitudes and buying behaviour toward eco-friendly products. The independent t-test results indicate that males exhibit a slightly higher inclination toward purchasing eco-friendly products compared to females, particularly in terms of price sensitivity and the perception of environmental responsibility. Males were more likely to agree that the price of eco-friendly products affects their purchasing decisions, suggesting that affordability remains a critical factor for this group. On the other hand, both genders strongly agreed that eco-friendly products contribute to health and environmental protection, highlighting a shared recognition of the benefits of sustainable consumption. However, no significant gender-based differences were observed in satisfaction levels with eco-friendly products, indicating that both males and females perceive the safety, quality, and availability of these products similarly. This suggests that while gender influences purchasing behavior, it does not significantly impact overall satisfaction, emphasizing the need for gender-neutral marketing strategies that focus on universal benefits such as health, safety, and environmental protection.

Age also emerged as a significant factor influencing consumer behavior and satisfaction with eco-friendly products. The ANOVA results revealed that younger consumers, particularly those aged 25-31, perceive eco-friendly products as safer compared to older age groups. This age group reported the highest satisfaction levels regarding the safety of eco-friendly products, indicating a greater trust in their environmental and health benefits. However, no significant differences were observed across age groups in terms of perceptions of quality, performance, and availability, suggesting that these factors are universally valued regardless of age. Interestingly, older consumers (43-55 years) exhibited higher overall buying behavior scores, indicating a stronger inclination toward eco-friendly purchases compared to younger age groups. This finding challenges the common assumption that younger

consumers are more environmentally conscious and highlights the importance of targeting older demographics in sustainability campaigns. The study also found that price sensitivity varies across age groups, with younger and older consumers being more influenced by cost considerations. This underscores the need for pricing strategies that make eco-friendly products accessible to all age groups, particularly those with lower income levels.

The demographic profile of respondents further revealed that younger, educated, and digitally connected consumers are more likely to adopt eco-friendly products. The majority of respondents fell within the 18-31 age group and had higher education levels, indicating a correlation between education and environmental awareness. Additionally, the internet emerged as the primary source of information about eco-friendly products, emphasizing the role of digital platforms in promoting sustainable consumption. Despite the growing awareness and adoption of eco-friendly products, challenges such as limited availability, higher costs, and a lack of trust in product information persist. These barriers hinder the widespread adoption of sustainable products, particularly among lower-income and less-educated consumers.

The study's findings have important implications for policymakers, marketers, and environmental advocates. To promote eco-friendly products effectively, it is essential to address price sensitivity by offering affordable options and subsidies, particularly for lower-income consumers. Educational campaigns should focus on raising awareness about the long-term benefits of eco-friendly products, targeting both younger and older demographics. Marketers should leverage digital platforms to disseminate information and build trust in eco-friendly products, while also ensuring their widespread availability in local markets. Additionally, efforts should be made to enhance the quality and performance of eco-friendly products to meet consumer expectations and boost satisfaction levels across all demographic groups.

In conclusion, the study highlights the growing interest in eco-friendly products among consumers in Gangtok, driven by concerns for health, environmental protection, and sustainability. While gender and age influence consumer attitudes and buying behavior, satisfaction levels with eco-friendly products remain

consistent across demographic groups. The findings underscore the need for targeted strategies that address the specific concerns and preferences of different consumer segments, ensuring that eco-friendly products are accessible, affordable, and appealing to a broad audience. By addressing these challenges, stakeholders can foster a more sustainable and eco-conscious society, contributing to the global effort to combat environmental degradation and promote sustainable development. The study provides a foundation for future research on consumer behavior and sustainability, offering valuable insights for policymakers and businesses aiming to promote eco-friendly products in emerging markets.

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6

House Finance in New Income Tax Regime: A Perspective

Supriya Dam*

Abstract

The study examines the impact of the new income tax regime on housing finance in India, focusing on middle-income groups. Over the past few decades, home loans have made up a significant portion of the overall loans disbursed by financial institutions in India, largely due to an incentive-friendly old tax structure that benefited both bankers and borrowers. The old tax system is losing its strength due to the introduction of a new tax regime, which decreases the total tax payable to assessees. Middle-income salaried segments, comprising a significant portion of India's 7% taxpayers, often bear the brunt of accumulated direct taxes due to their economic solvency. In the 2025-26 budget, the zero tax ceiling was raised to 1,200,000 INR, and the highest tax bracket was increased to 2,400,001 INR, offering advantages to middle-class service holders. However, the new tax policy is hindering financial institutions' house lending plans by withdrawing tax incentives, which initially prompted salaried groups to avail themselves of home loans. In doing so, test findings indicate a decline in magnitude of home loans among high-income and middle-income groups, which counterbalances the gains observed for economically weaker and lower-income groups. The study also reveals that middle-income groups are increasingly shifting away from home loans following the introduction of the new tax system.

* Associate Professor, Commerce, Netaji Subhash Mahavidyalaya, Udaipur, Gomati, Tripura

Keywords: *Housing Finance, Financial Institutions, Lending Rates, Borrowers, Middle Income Groups.*

I. Introduction

Indian Diaspora faces significant housing challenges due to relocation to urban centers for better services, job opportunities, connectivity, and living conditions. Since India's independence, the government has implemented various housing policies to cater to several societal segments. For example, the Subsidized Housing Scheme for Industrial Workers & Economically Weaker Sections is designed to cater to this segment. The Housing & Urban Development Corporation (HUDCO) was established in 1970 as a specialized public housing finance agency to fund housing activities, provide financial resources to housing boards and cooperatives, and raise funds from the market. The Housing Development Finance Corporation (HDFC), founded in 1977 as India's first specialized mortgage company, is a major supplier of housing finance in the country, promoted by the Industrial Credit and Investment Corporation of India (ICICI). The National Housing Bank (NSB), established on 9 July 1988 under the National Housing Bank Act, 1987, is a regulatory body in India responsible for overseeing and licensing housing finance companies, under the Ministry of Finance's jurisdiction. Commercial banks and specialized institutions like the Life Insurance Corporation of India (LICI) have separate divisions for housing finance, offering services to potential customers seeking housing loans. The Indian "National Housing Policy 2022" aims to provide affordable housing to urban residents through the Pradhan Mantri Awas Yojana (Urban) (PMAY-U) scheme, constructing around one crore houses. The study investigates the correlation between financial institutions' housing finance schemes and tax incentives, relating to the New Tax regime, for middle-class serving personnel and present a case for them.

India's new tax regime, introduced in the 2020-21 fiscal year, did not significantly change in the FY21-22 budget. However, the 2022-23 budget received mixed responses, suggesting the government is seeking ways to make the new tax regime more appealing. The 2023-24 Union Budget introduced five key changes to the

existing income tax policy, including improving rebates, altering tax structures and slabs, reducing surcharges, increasing leave exemption for private sector retirees, and extending standard deductions in the old tax structure. The new tax regime, also referred to as "optional tax regime," allows taxpayers to retain the old one with all deductions and exemptions or opt for the new one.

In these budgets, the zero tax threshold for low-income taxpayers has been limited to 7 lakh INR, in addition to the standard deduction of 50,000-75,000 INR. The budget for 2025-26 heralded a new era by raising the zero tax ceiling to 1,200,000 INR and increasing the highest tax bracket from 1,500,001 INR to 2,400,001 INR, resulting in a windfall, particularly for the middle-class brethren. Despite rebates and exemptions, the old tax regime is gradually losing its luster due to higher tax rates than the new tax structure. However, the former tax framework was open to promoting house-building loans given by housing finance institutions, notably to government employees and salaried groups, via tax exemptions. The new tax policy seems to be hindering financial institutions' house lending plans by withdrawing tax incentives, which initially prompted salaried groups to avail of home loans.

Over the past few decades, home loans have accounted for a considerable share of overall loans disbursed in commercial banks in India, thanks to an incentive-friendly old tax structure that favored borrowers and bankers. Serving personnel who get house loans strikes a balance between short- or long-term investment prospects and housing requirements. The loan amount is determined by the property's worth, the applicant's pay structure, and the duration of service life on which EMI (Equated Monthly Installments) is computed. To qualify for a house loan, borrowers must have a good credit history, referred to as a CIBIL (Credit Information Bureau India Limited) score. Empirical evidence suggests public and private sector commercial banks often compete for consumers seeking home-building loans. Despite high interest rates, many borrowers prefer small or private banks to big government-owned banks because they provide better service and commitment.

Homeownership is a dream for many, but it requires significant investment and mobilization of funds from owned or borrowed

sources. With rising property prices, it's becoming unattainable for average earners, leading to dependence on borrowed funds from financial institutions. Housing finance companies, private and public sector banks, and foreign banks offer competitive home loans (Kumaraswamy & Divakar, 2020) backed by collateral support. Middle-class borrowers find it comfortable as housing loans reduce income taxes, leaving cash for EMIs. Banking concerns benefit from tax benefits for working-class individuals, making their jobs easier. However, the advent of a new tax regime, with scant relief for the salaried groups, makes housing loans difficult for employees and acts as a limiting factor for their choice. The recent budget for 2025-26 is likely to leave more funds for the middle class, particularly for the high-income segment, and a reduction in the REPO rate to 6.25% (Kadian, 2025) might reduce home loan EMIs. In such a scenario, the study explores the future of housing finance, which otherwise thrived in the old tax regime.

The study aims to analyze: i) India's housing finance market structure and competitive dynamics, ii) the performance of major market players with respect to economic units, and iii) interlinking the new income tax regime with housing finance and their contribution to growth of banker-borrower relationships.

The structure of the study is organized as follows: Section II provides a literature review, followed by the methodology and databases used. Section IV offers a detailed overview of the home loan landscape in India and discusses issues arising from both the banker and borrower perspectives. Finally, Section VI concludes the chapter by highlighting the major findings.

II. Literature Review

Mortgage financing markets are crucial for promoting affordable housing and improving housing quality in many countries. However, in India, these markets are still in their infancy, leading to lower homeownership rates and poor housing quality. The main issue is limited resources, and housing development heavily relies on financial institutions like banks, credit corporations, and development banks for finance (Piyush et al., 2016). By 2047, India's real estate business is predicted to generate 15.5% of GDP (Gross Domestic Product), up from 7.3%, positioning

itself as a substantial contributor to economic development. The Prime Minister Awas Yojana Urban (PMAYU) 2.0 is expected to cost Rs. 10 lakh crore and would cover the housing needs of one crore urban poor and middle-class families (IBEF, 2024). On the contrary, the allocation of government funds towards housing not only maintains residential activity but also exacerbates the overall welfare decline (Ferri & Herranz-Baez, 2024).

The Economic Survey 2021-2022 revealed that home prices remained stable despite a drop in housing transactions during Covid-19. Interest rates varied significantly among lenders, with banks experiencing repo rate drops sooner than Housing Finance Companies (HFCs), suggesting efficient transmission of rate cuts. However, HFCs have easier lending requirements than banks (Das & Anchalia, 2023), thereby reducing commercial banks home loan expansion. The budget includes a considerable rise in tax refunds for persons earning up to Rs 12 lakh per year, which reduces personal income tax. This approach increases disposable income, allowing people to save more for home investments. The reduced tax system also promotes middle-class liquidity, which boosts household consumption, savings, equity, and real estate investments (Sinha, 2025).

India's middle-class urban taxpayers, representing a sizeable section of 7% of those required to pay taxes, are mostly salaried and do not receive income support, employment help, or subsidized housing. Public policy has primarily focused on expanding welfare schemes for the poor and marginal, leading to feelings of a squeeze on earnings and savings. This has resulted in retrenchment, job losses, stagnant salary incomes, and high expenditures, affecting India's economic transition. Extending welfare packages to the unorganized sector is a pressing necessity that has been addressed in every government budget since independence, but it should not come at the expense of the middle class in every fiscal year. Fiscal support for the middle class is likely to have a long-term influence on consumption and GDP growth (Palit, 2025).

The housing issue is a social problem with economic, cultural, and social implications, threatening low- and middle-income households (Parrillo, 2002; Sheldon, 2007). The main issues faced by middle-income groups include housing prices, housing

loans, and housing schemes' policies (Baqutaya et al., 2016). The government budget 2019-20 focused on affordable housing, aligning the Income Tax Act's definition of affordable housing with the Goods and Service Tax (GST) Act. The limit on house costs at Rs. 45 lakh, in line with GST Acts, is expected to boost demand in the housing and construction sector activity (Sharma, 2022). India has used fiscal advantages and legislative initiatives to encourage private investment in the housing industry, notably through the old tax system. The policy allows exemptions for interest on owner-occupied property loans, deductions for principal and local body taxes, and deductions for 30% of annual value and housing loan interest (NHB, 2009). The paper investigates the impact of a new tax regime on housing finance institutions and middle-class home loan experiments.

III. Methodology

This descriptive and analytical study utilizes secondary data from reliable sources, including publications from the Government of India. It incorporates insights from regulatory bodies, such as the National Housing Bank (NHB) annual reports, the Reserve Bank of India's REPO rates, income tax structures, and various online resources relevant to the study. ANOVA tools were applied to analyze the hypotheses as required.

IV. Home Loan Scenario:

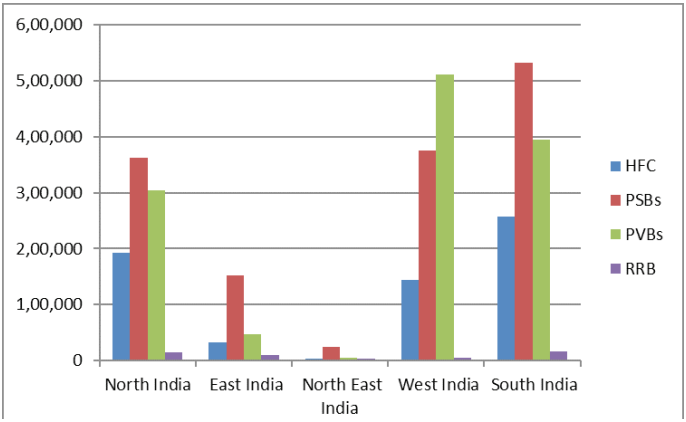
Table 1: Home Loan Details of Select Financial Institutions in India

Details	SBI	HDFC	PNB	Axis	IDFC	LIC HF	Canara	Kotak
Interest rate (%)	8.50-11.55	8.75 on	8.50-11.45	8.75-9.10	8.85+	8.5+	8.15-11	8.75+
Loan amount	Eligibility	Profile	Profile	Income	Profile	eligibility	eligibility	Income
Pre payment	Nil	0-2%	Nil	0-2%	0-2%	Nil	Nil	NA
Max tenure	30 years	30 years	30 yrs	30 yrs	30 yrs	30 yrs	30 yrs	20 yrs
Rate package	Flexible	Fixed/ flexible	Flexible	Fixed/ flexible	Fixed/ flexible	Flexible	Flexible	Flexible
Processing fees	0.35%	0.50%	0.35%	1%	3%	0.30%	0.50%	0.50%

Source: Compiled by Author

Table 1 displays house loan information from select Indian financial institutions. SBI Life, PNB, LIC Housing Finance, and Canara Bank are public-sector institutions among the eight home loan providers. HDFC, Axis Bank, IDFC, and Kotak Mahindra are private-sector financial organizations that provide home financing services. The interest rate structure for house finance shows that Canara Bank has the lowest rate among the eight financial institutions, while HDFC has the highest rate. Client profiles and income levels influence loan eligibility since the institutions offer various programs for government personnel, private sector job holders, and corporate divisions. The fiduciary limit for loan amounts is frequently defined by the age and service period of the clients. Except for Kotak Mahindra, the other home financing firms have set maximum loan repayment duration of 30 years. Unlike private operators, which charge 0-2% as a prepayment for housing financing, public sector home lending institutions do not have such requirements. Bankers often favor the variable rate package, while three of them provide fixed interest rates for the duration of the house loan repayments. Increased processing costs are likely to diminish home loan proceeds, whilst lowering them results in a higher amount for customers. LIC HF (0.30%) charges the lowest processing costs for housing finance transactions among the eight operators, whereas IDFC charges the highest among the select housing finance institutions.

Fig 1: Region-wise Individual Home Loan Outstanding of Housing Finance Institutions till 30th September, 2024 (in Crore)



Source: National Housing Bank

Figure 1 illustrates the region-wise individual home loans outstanding by HFCs, Public Sector Banks (PSBs), Private Sector Banks (PVBs), and Regional Rural Banks (RRBs) in India as of September 30, 2024. Data reveal that the public trusts PSBs when picking financial institutions for house finance. Altogether, 43.24% received home loans from PSBs, 36.98% from PVBs, 18.41% from HFCs, and 0.48% from RRBs. PSBs dominated four zones, except West India, where PVBs accounted for 49.4% of total loans outstanding. The total account of outstanding home loans suggests the West Zone (35.31%) has the most house loan recipients, followed by South India (30.45%), North India (25.65%), and East India (7.11%). Northeast India accounts for just 1.38% of all outstanding home loan deals.

Table 2: Income Slab-wise Distribution of Individual Housing Loan for HFCs (Crore)

Income Slabs	Disbursement (%)			Outstanding on 31st March (%)		
	2021-22	2022-23	2023-24	2022	2023	2024
Economically Weaker Section (EWS)	15,073 (5.77)	19,395 (6.23)	18,347 (10)	62,161 (7.72)	66,742 (7.19)	63,442 (11)
Low Income Group (LIG)	54,353 (20.79)	56,089 (18.02)	44,061 (24)	1,97,497 (24.52)	2,16,903 (23.36)	1,75,460 (29)
Middle Income Group (MIG)	1,11,626 (42.70)	1,34,121 (43.10)	81,872 (45)	3,38,855 (42.08)	4,03,516 (43.45)	2,59,292 (44)
High Income Group (HIG)	80,378 (30.75)	1,01,633 (32.65)	38,959 (21)	2,06,854 (25.68)	2,41,382 (26)	98,053 (16)
Total	261430	3,11,237	1,83,239	805367	9,28,542	5,96,247

Source: NHB-Annual Reports. HFCs: Housing Finance Companies.

Table 2 shows the income distribution of individual home loans from HFCs for three years ending on March 31, 2024. Economically weaker sections (EWSs) have the lowest disbursement and outstanding housing loans during 2021-22 to 2023-24. Low-income groups (LIGs) have seen an increase in disbursement from 20.79% in 2021-22 to 24% in 2023-24, while their share in outstanding home loans improved from 24.52% to 29%. Middle-income groups (MIGs) held the largest share in disbursement and

outstanding housing loans, the former increasing from 42.7% in 2021-22 to 45% in 2023-24. However, the outstanding home loans for MIGs marginally increased, indicating a reduction in the aggregate amount for the economic units. In 2023-24, the share of high-income groups (HIGs) in home loan disbursement and outstanding decreased significantly, relegating them to the third position. Economic units EWSs and LIGs have seen a progressive increase in housing loan disbursement and outstanding, while MIGs have experienced an incremental decline. The decline in HIGs and MIGs counterbalances the gains for EWSs and LIGs, suggesting a contradictory situation in housing loan disbursement and outstanding. Given this, let us hypothesize that the decline in housing loans for MIGs and HIGs counterbalances the gain for EPWs and LIGs.

Table 3: ANOVA Analysis

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
Groups (between groups)	5	183208.3384	36641.6677	0.438	0.82
Error (within groups)	53	4433978.234	83659.9667		
Total	58	4617186.572	79606.665		

Source: Author's Own Calculations

H_0 is accepted as the p-value is higher than α (0.82 > 0.05), indicating that the proposition is favorable outcome. In other words, the decrease in housing loans for MIGs and HIGs balances the increase for EPWs and LIGs under the stated conditions. It suggests that if we reject H_0, the risk of a type 1 mistake (rejecting a correct H_0) will be disproportionately high. The greater the p-value, the stronger the evidence for the null hypothesis.

Table 4: Slab-wise Individual Housing Loan (amount in Crore)

Slabs	Loan range	2019-20		2022-23		2023-24	
		Nos	Amount	Nos	Amount	Nos	Amount
I	Upto Rs. 2 Lakh	21970	224	2498	76.23	2231	29.55
II	Rs. 2 Lakh-Rs. 5 Lakh	18850	642	23616	873.78	26863	740.22

III	Rs. 5 Lakh-Rs. 10 Lakh	62774	4203	82317	5366.63	70519	4688.53
IV	Rs. 10 Lakh-Rs. 15 Lakh	55852	6125	50579	5365.27	43334	4818.64
V	Rs. 15 Lakh-Rs. 20 Lakh	39928	6098	45528	6813.17	26581	4258.38
VI	Rs. 20 Lakh-Rs. 25 Lakh	31094	6144	35412	5824.29	17282	3568.41
VII	Rs. 25 Lakh +	7708	7822	30756	11381.83	32722	13981.27
	Total	238176	31528	270706	35701.20	219532	32085.00

Source: NSB Annual Reports.

The trends in individual housing loans by slab from 2019-20 to 2023-24 show varying patterns for each fiscal year. For homeowners seeking loans of up to Rs 2 lakh, the number declined from 21,979 in 2019-20 to 2,231 in 2023-24, representing a 9.85-fold decrease. Additionally, the amount sanctioned for this loan range decreased by a factor of 7.58. In contrast, the number of individuals obtaining loans between Rs 2 lakh and Rs 5 lakh increased by 1.42 times during the same period. Four consecutive loan slabs—III, IV, V, and VI—experienced a significant rise in the number of borrowers and the amounts sanctioned in 2022-23 compared to 2019-20. However, both figures saw a substantial decline in 2023-24. The highest loan range, those above Rs 25 lakh, exhibited notable growth in the number of borrowers and the sanctioned amounts from 2019-20 to 2023-24, increasing by 4.25 times and 1.79 times, respectively. Overall, the trends indicate similar patterns for slabs III, IV, V, and VI regarding the number of borrowers and the amounts sanctioned over time. The findings suggest that the economic behavior of middle-class house loan borrowers has changed in response to the optional new tax structure, which is different from the old one. Although identifying income levels is mostly arbitrary (Jami, 2018), the Lower Middle Income Class has transitioned to the Middle and Upper Classes in the recent decade (SBI, 2023). The OECD (2019) report reveals that the middle class is being squeezed, with the share declining, especially among new generations, and the cost of a middle-class lifestyle increasing faster than their incomes. Given this, let us hypothesize that the middle income housing

loan borrowers do not show a shifting trend in the face of the new tax regime.

Table 5: ANOVA Analysis

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
Groups (between groups)	5	9624345397	1924869079	7.5745	0.00006034
Error (within groups)	36	9148528473	254125790.9		
Total	41	18772873870	457874972.5		

Source: Authors own calculation

H_0 is rejected due to a p-value of less than α (0.00006034 < 0.05). Thus, MIGs are demonstrating a shifting away from housing loans with progressive acceptance of the new tax system.

V. Discussion: Recently, RBI repo rate cut by 25 basis points to 6.25% on 7th February 2025 has significantly impacted home loan borrowers, as Union Bank and Central Bank of India revised their housing loan rates from 8.10-9% for 20-year tenure (MC, 2025). This has affected both current and prospective home loan seekers, particularly from MIGs. Most current home loan holders benefit from flexible lending rates, but external benchmarking from 1st October, 2019 will debar old beneficiaries from reducing their EMIs at current lending rates. New home loan seekers can plan their monthly expenditures based on individual factors like credit score, income, and loan agreement terms. Housing finance institutions like LIC HF and SBI HL may lose out to commercial banks due to the late incorporation of these changes.

The new fiscal policy in India restricts deductions on home loan interest paid under Section 24(b) for self-occupied properties, reducing the tax benefits associated with home ownership. Again, deductions on the principal amount repaid under Section 80C are not available for those choosing the new tax regime. The fiscal reform may make homeownership less appealing to persons in middle-to-higher tax brackets who choose the new tax regime, as they will lose considerable tax benefits from home loan interest. Because house loan tax benefits remain unaltered under the older

tax regime, borrowers need to estimate tax liabilities under both the old and new tax regimes to decide the most advantageous alternative for their situation. Additionally, Section 115 BAC states that current-year house property loss set-offs cannot be applied to other income heads under the new tax regime, and any remaining losses cannot be carried forward.

Banks and housing finance companies calculate loan eligibility using various formulae, including annual income, property cost percentage, EMI multiplied by repayment tenure, loan-to-value ratio, and CIBIL score. However, the most crucial factors are the property's value and the applicant's repaying capacity (EMI). Creditworthiness and age significantly influence the amount sanctioned to a borrower, affecting repayment capacity and the sanctioned amount. Age also plays a role in long-term loans, especially when the borrower's tenure is lengthy (Ghosh, 2014). Additionally, taking too many loans can limit creditworthiness, while maintaining a good credit score and steady repayments can prevent debt traps and enhance future creditworthiness. Home loan sanctioning takes 1 to 2 weeks, with salaried applicants receiving approval in as little as one week. Delays can occur due to missing information, longer income verification for self-employed individuals, property verification by financial institutions, additional scrutiny for larger loan types, and property title disputes or encumbrances (Dubey, 2024). However, Loan sanctioning can be influenced by invisible provisions and hidden costs, especially when the incumbent borrower has weak bargaining power.

VI. Conclusion:

This chapter examines the shifting trends in the housing finance landscape in light of the new optional tax regime, with a particular focus on middle-income groups. The old tax system is losing its effectiveness due to the introduction of the new tax regime, which reduces the total tax burden on taxpayers. Middle-income segments, representing a significant portion of India's 7% of taxpayers, often face the highest impact of accumulated direct taxes due to their financial stability. The study findings indicate a decrease in housing loans for MIGs and HIGs, while there is an increase for EWS and LIGs under the new conditions.

Furthermore, middle-income groups are moving away from housing loans in response to the acceptance of the new tax system. Field surveys of home loan borrowers, particularly from salaried groups, can make this paradox interesting.

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7

Economic Performance of Jute in Assam: Analyzing Area, Production and Productivity

Panchi Haloi*

Abstract

India is the largest producer of raw jute in the world with a 49.7 percent share in global production in 2021 closely followed by Bangladesh with 48.6 percent share. In 2024, Bangladesh overtook India as the largest producer of Jute in the world based on a report from the Food and Agriculture Organization of the United Nations (FAO). According to the Economics, Statistics & Evaluation Division, Ministry of Agriculture and Farmers Welfare Assam, West Bengal and Bihar together contribute 98.8 percent of total raw jute production during 2023. Assam is a home to more than 4 million small and marginal farmers who contributes 9percent of India's jute production share. Based on data compiled from Indiastat, Indiastat district, Directorate of Economics and Statistics, Government of Assam and various price policy jute report this study aims at examining the growth in area, production and productivity of jute in Assam. An overall and segregated detailed analysis is carried out for 3 sub-periods, i.e., period-I (1997-98 to 2004-05), period-II (2005-06 to 2013-14) and period-III (2014-15 to 2022-23). The overall compound annual growth rates of area under jute in Assam is negative whereas production and productivity under jute in Assam is positive and statistically significant. The periodic compound annual growth rates of area, production and productivity for

* Research Scholar, Department of Economics, Assam University, Silchar

period-1 is negative, and for period-II and III it encompasses both positive negative growth rates.

Keywords: *Jute, India, Assam, Compound Annual Growth Rate (CAGR).*

Introduction

The "golden fiber," jute (Corchorus spp.) is a dicotyledonous natural fiber crop. Two types of jute are farmed in India since prehistoric times: white jute (Corchorus capsularis), which is primarily self-pollinated, and tossa jute (Corchorus olitorius), which is slightly cross-pollinated. These plants are grown for their fiber. Nonetheless, jute needs to become a part of our economy and has the potential to produce foreign exchange for us. More over 4 million agricultural households are estimated to engage in jute cultivation, with the bulk of them falling into the small and marginal categories. Additionally, 0.5 million people work in related industries, including trading completed goods and raw jute. Among the different textile fiber production in the world, Jute stands second after cotton. Jute occupies nearly 0.4 per cent of the total area under agricultural land in the country (Baviskar et al., 2022; Price-Policy-Raw-Jute-2020-21, 2021). Raw jute production in India is expected to touch 0.2 million bales (1 bale = 180 kg) this year with 25-30percent increase in sowing area of fibre crops The Future of Food and Agriculture and Challenges (2017). About 5.0 million people in eastern and northeastern India depend on jute as their primary commercial crop for their livelihood Sinha et al. (2009). According to the office of Jute Commissioner, Ministry of Textiles the top 5 states of raw jute production in 2023-24 (kharif) in terms of yield (in kg/hectare) is Bihar, West Bengal, Andhra Pradesh, Nagaland, Meghalaya with 2636, 2448, 2151, 1150, 1050 respectively.

According to Price Policy for Jute 2024-25 season Paul Sharma et al. (2023) India is the largest producer of raw jute in the world with a 49.7 percent share in global production in 2021 closely followed by Bangladesh with 48.6 percent share. However, Bangladesh has the largest area under jute cultivation (50percent) in the world, followed by India (48.4percent). Jute is also cultivated in China,

Nepal, Uzbekistan, Thailand, Myanmar and Bhutan but their share is very meagre. India has higher yield (26.1 qtl/ha) than the global average (25.4 qtl/ha) and Bangladesh (24.7 qtl/ha) but is significantly lower than Uzbekistan (107.4 qtl/ha) and China (40.1 qtl/ha). Among the top five jute producers, Bangladesh has experienced the highest surge in production with a compound annual growth rate of 1.92 percent during 20112021, attributed to a substantial increase in yield (1.93percent).

Jute thrives in tropical climates with high rainfall, moderate temperatures, and fertile soil. It requires about 150–200 cm of annual rainfall, and the optimal temperature for its growth ranges from 25°C to 35°C (Ray, 2003). The plant grows best in regions with rich alluvial soils, typically in river deltas, which is why the Ganges Delta and surrounding areas are ideal for its cultivation. Jute is a Kharif (March to April) season crop. It is grown in a wide range of temperature. It can thrive well with a minimum temperature of 15 °C to maximum temperature of 38 °C and may increase up to 46 °C M. S. Islam & Alauddin (2012).

The jute industry plays a vital role in the economies of both India and Bangladesh, contributing to employment, rural development, and environmental sustainability. As one of the largest producers of jute globally, India has faced fluctuating growth due to various challenges, including land constraints, productivity issues, and the growing competition from synthetic fibers. According to Bag et al. (2016), India remains a major player in the global jute market but faces stiff competition from Bangladesh, which has become a dominant force in jute production and trade. While the sector continues to hold significant potential, its growth is often volatile, particularly in regions like Assam, an important jute-producing area in India Khatun & Deka (2013). These fluctuations are primarily driven by climatic and market conditions, which impact yields and the overall stability of the industry.

Furthermore, the dynamics of international jute trade are complex, with significant growth observed in India's exports, yet challenges remain in maintaining competitiveness on the global stage Kumari et al. (2020). Climate change is emerging as another critical factor that threatens the sustainability of jute farming. Studies by (M. M. Islam et al., 2009; M. S. Islam & Alauddin, 2012) reveal that jute crops are highly vulnerable to changing weather

patterns, such as rising temperatures and irregular rainfall, which can reduce yields. These climatic shifts are of growing concern for both India and Bangladesh, as they impact the long-term viability of jute production in South Asia. Assam is known for producing some of the finest quality raw jute in India, with the crop being cultivated in nearly all of the state's districts. This paper focuses on the current status of jute production in Assam, highlighting the compound annual growth rate.

Table-1: - District-wise Jute Area (in hectare), Production (in bales of 180 kg), Productivity (in bales/hectare) and share in total area and total production (in percent) in Assam during 2022-23.

Districts	Area	Share in total area	Production	Share in total production	Productivity
Baksa	416	0.74	4939	0.74	11.87
Barpeta	4761	8.42	62096	9.25	13.04
Bongaigaon	1685	2.98	17375	2.59	10.31
Cachar	33	0.06	392	0.06	11.88
Chirang	1455	2.57	14509	2.16	9.97
Darrang	3295	5.83	39503	5.88	11.99
Dhemaji	71	0.13	843	0.13	11.87
Dhubri	8997	15.91	109775	16.35	12.20
Dibrugarh	9	0.02	107	0.02	11.89
Dima Hasao	10	0.02	119	0.02	11.90
Goalpara	3144	5.56	30479	4.54	9.69
Golaghat	113	0.20	1342	0.20	11.88
Hailakandi	12	0.02	142	0.02	11.83
Jorhat	30	0.05	356	0.05	11.87
Kamrup	5317	9.40	51179	7.62	9.63
Kamrup Metropolitan	42	0.07	499	0.07	11.88
Karbi Anglong	1076	1.90	12774	1.90	11.87
Karimganj	48	0.08	570	0.08	11.88
Kokrajhar	1443	2.55	16833	2.51	11.67

Lakhimpur	73	0.13	866	0.13	11.86
Morigaon	5469	9.67	75499	11.25	13.80
Nagaon	10207	18.05	141060	21.01	13.82
Nalbari	3530	6.24	35712	5.32	10.12
Sivasagar	13	0.02	214	0.03	16.46
Sonitpur	3414	6.04	33047	4.92	9.68
Tinsukia	4	0.01	48	0.01	12.00
Udalguri	1890	3.34	21042	3.13	11.13
Assam	56557		671320		11.87

Source: Indiastat districts

Table-1 shows the area, production and productivity of jute among 27 districts of Assam. It can be seen that among the 27 districts of Assam, five districts—Nagaon, Dhubri, Morigaon, Kamrup, and Barpeta are performing at the top in terms of area, production and productivity during the year 2022-23.

Materials and Method

This study uses secondary data from 1997-98 to 2022-23 from sources like Indiastat, Ministry of Agriculture & Farmers Welfare, Government of India and various other secondary sources. Trend of growth in area, production and productivity of jute were analysed using time series data from 1997-98 to 2022-23 in Assam. The 27 districts of Assam are considered by merging the districts announced after 2015 with their original districts before they were separated. For better comparison of growth rate of area, production and productivity of jute in the study area over time, the overall time period (1997-98 to 2022-23) was divided into three sub-periods viz. Period-I (1997-98 to 2004-05), Period-II (2005-06 to 2013-14) and Period-III (2014-15 to 2022-23).

Growth in area, production & productivity was calculated using the following formula –

Y =abt ……. (1)

Where Y = Refers to area/ production/ productivity in 1st year a = Refers to intercept

t = Refers to year (time period) (say t = 1,2,3,…,n) b = 1 + r/100, where 'r' refers to the percentage rate of compound growth rate of area, production, productivity per annum.

By taking logarithms both side of the equation, it have been reduced to following linear form with log 'Y' as dependent variable and 't' as independent variable:

$\log Yt = \log a + t \log b$

For convenience, if we put 'log a' = A and 'log b' = B, then this can be written as –

$\log Yt = A + B\ t$…….(2)

Electronic copy available at: https://ssrn.com/abstract=3728002

This is semi log function with time 't' as independent variable. Then by using OLS technique, we have normal equations of the type.

$\sum \log Yt = nA + B \sum t$

$\sum \log Yt\ t = A \sum t + B \sum t2$.....(3)

Where 'n' is the number of observations (years)

By solving equation (3), the values of 'A' and 'B' have been computed. For deriving compound growth rate from the computed regression coefficients, the following procedure has been adopted.

When 'B' has positive value, anti-log of 'B' has been obtained and then one was subtracted from anti log value of 'B'. Thereafter the B-1 value has been multiplied by hundred. Thus, it gave the compound growth rate (CGR) of increasing type, when 'B' had negative value, the procedure of calculating CGR is the same, but the value of growth rate will be negative. This negative CGR indicates the decreasing growth rate over time. Percentage rate of compound growth per annum has been calculated as –

$r = (b-1) \times 100$

$r = (\text{Antilog 'B'} - 1) \times 100$

This represented a uniform rate of change from observation to observation Das & Mishra (2020).

Results

The compound annual growth rate (CAGR) of jute area, production and productivity for overall and three periods is shown below in Table-2.

Table 2: - CAGR of jute area, production and productivity.

Growth Rate	Period-I (1997-98 to 2004-05)	Period-II (2005-06 to 2013-14)	Period-III (2014-15 to 2022-23)	Overall (1997-98 to 2022-23)
Area	-2.38***	1.02***	-1.28***	-0.23*
Production	-2.78**	0.47	-0.81**	0.29*
Productivity	-0.47	-0.49	0.57*	0.52***

Source: Author's own compilation

*** Significant at 1percent level of probability

** Significant at 5percent level of probability

* Significant at 10percent level of probability

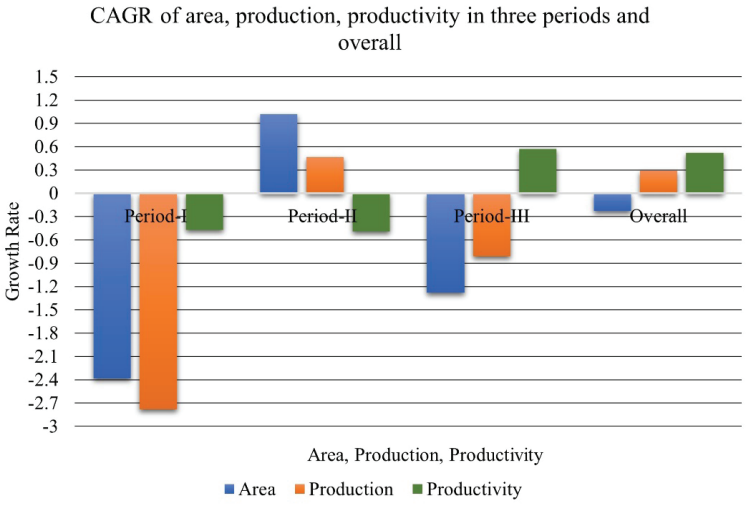
It is seen from table 2 that for Assam as a whole, the overall growth rate of area under jute cultivation was negative at 0.23 percent and is statistically significant at 10 percent level of significance. Period wise analysis indicated that growth rate of area during period-I and period-III is negative both being statistically significant at 1 percent level of significance. The reason for declining trend in area under cultivation might be due to shift of land for non-agricultural purposes such as construction of buildings, growing urbanisation etc. However, period-I shows the lowest level of growth this may be due to lesser cultivation across the districts of Assam. Period-II shows an increasing growth rate of 1.02 significant at 1 percent level of significance.

The state witnessed a positive growth rate of production at marginal rate of 0.29 statistically significant at 1 percent level of significance. The growth rate of production in period-I and period-III shows negative growth both significant at 5 percent level of significance. The negative growth in production may be due to labour issues, possibilities of natural disaster like flood or drought.

It is evident that the state's overall productivity has a positive growth rate of 0.52 statistically significant at 1 percent level of

significance. Period-III also shows positive growth in productivity at the rate of 0.57 being statistically significant at 10 percent level of significance which is higher than the state's overall productivity. This may be due to yield per unit of area is higher or efficiency in farming practices. However, period-I and period-II shows negative growth rate. The compound annual growth rate in the three periods and overall is shown in figure1.

Figure-1: - Graphical representation of CAGR of jute area, production and productivity.



In terms of jute area in Assam, a linear negative growth rate of -389.69 units can be seen during the period 1997-98 to 2022-23 with less variations. This negative growth can be due to urbanization, construction of buildings, shift from agriculture to non-agricultural aspects etc. The production of jute has increased by 4409.2 units over time, although there are noticeable variations over the year. The productivity of jute over the period 1997-98 to 2022-23 has increased by 0.124 units. In 2004-05, productivity and production of jute has fallen by almost 60percent compared to 2003-04, this can be due to occurrence of devastating flood throughout the State of Assam and catchments areas of Arunachal Pradesh, Meghalaya, Nagaland and Bhutan, the river Brahmaputra and its tributaries started swelling up which has caused widespread damage to human life and property, standing crops, flood control

embankments and other basic infrastructure. Similar is the case with 2012-13 production and productivity which has decreased during the 2012 flood due to heavy monsoon rains in Assam. The production and productivity increased during 2012-13 which can be due to an increase in the Minimum Support Price (MSP) to 2200 per quintal of jute set by the government for raw jute, encouraging farmers to cultivate more jute in the region of Assam. The graphical representation of jute area and production in Assam is shown in Figure-2 and jute productivity in Assam in figure-3 for the period 1997-98 to 2022-23.

Figure-2: - Graphical representation of Jute Area and Production in Assam, 1997-98 to 2022-23.

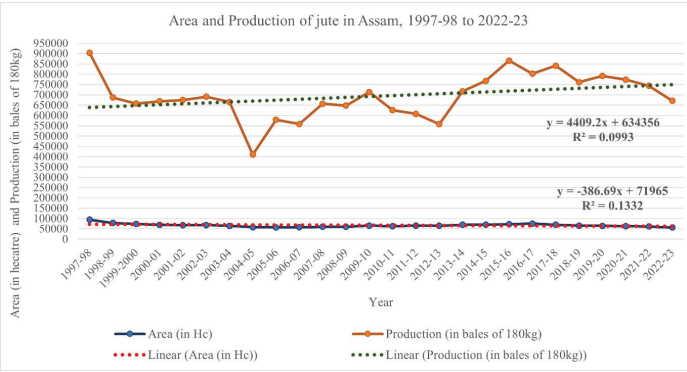
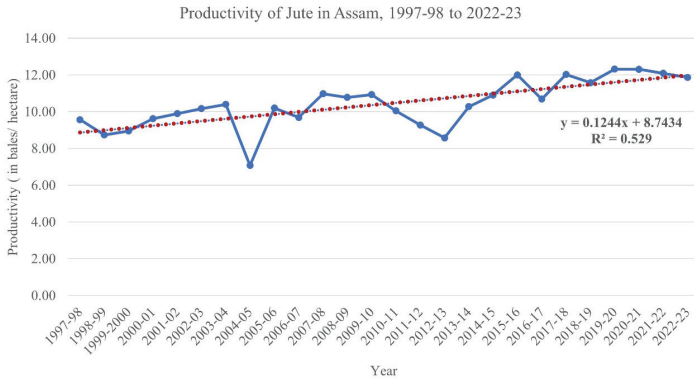


Figure-3: - Graphical representation of Jute Productivity in Assam, 1997-98 to 2022-23.



Discussion

Several factors, including environmental conditions, market dynamics, technological advancements, and policy-related aspects, influence jute production in India, especially in regions like Assam. Some of the key factors affecting jute production include:

1. **Climatic Conditions:** Jute is highly sensitive to weather conditions, and any adverse changes in temperature or rainfall patterns can significantly impact yields. According to M. M. Islam et al. (2009), climatic changes such as rising temperatures and irregular rainfall are major concerns for jute production, particularly in regions like Bangladesh and India, which rely heavily on stable climatic conditions for optimal crop growth.
2. **Soil and Land Availability:** The quality of soil and the availability of suitable agricultural land are crucial for jute production. Baviskar et al. (2022) highlight that jute requires fertile, well-drained soil for best results. However, with increasing urbanization and land-use changes, access to such land is becoming increasingly constrained, which may pose challenges for sustaining jute cultivation.
3. **Technological Advancements and Productivity:** Jute farming in India is still largely dependent on traditional practices, with limited technological advancements. Sinha et al. (2009) emphasize the potential of crop diversification and the adoption of new agricultural practices to improve productivity. Introducing modern techniques and high-quality seeds could help mitigate challenges such as low productivity and environmental stressors, enhancing the overall yield.
4. **Government Policies and Price Support:** Government policies are crucial in shaping the future of jute production. Price support mechanisms, subsidies, and crop insurance schemes can help stabilize the incomes of farmers. The Price Policy for Raw Jute (2020-21) by the government has been a step in this direction, aiming to protect farmers from price fluctuations. However, consistent policy support is needed to ensure long-term stability in the sector.

5. **Seed Availability:** Jute-producing states must focus on ensuring the timely availability of good-quality jute seeds. The production of high-quality seeds for mesta is particularly limited, necessitating organized seed production initiatives to meet demand.
6. **Variety and Technology Adoption:** While the popular jute variety JRO-524 has been in use for over 40 years, newer varieties like JRO-204 are gaining traction. The potential yield for jute varieties is 35-40 q/ha, but actual yields are only about 65percent of this potential. Similarly, mesta varieties show a potential yield of 25-30 q/ha, but actual yields remain lower due to factors like weather and poor technology adoption. Improved implements for sowing and weed control are still limited.
7. **Post-Harvest Operations:** Retting is essential for fiber quality but is hindered by inadequate facilities. While ribbon retting and microbial consortium technologies have been developed to improve quality and speed, they have not been widely adopted due to labor intensity and other limitations. More efficient retting methods need to be developed and popularized.
8. **Marketing:** Jute marketing is largely controlled by private traders, leaving farmers vulnerable to monopolistic pricing. With institutional marketing covering only a small portion of the total produce, developing better marketing infrastructure is crucial to protect farmers' interests and improve the efficiency of the jute sector.

Conclusion

In conclusion, a number of factors, including soil quality, climate, market dynamics, government regulations, and technological adoption, present both possibilities and problems for Assamese jute production. Along with varying production and productivity, the shrinking area used for jute farming emphasizes the necessity of focused actions to solve these problems. The effect of unfavourable weather conditions, including floods, on output highlights how susceptible the industry is to more erratic climate change. Simultaneously, improvements in seed availability,

technological acceptance, and jute variety developments may contribute to higher yields and increased productivity. The market is stabilized in large part by government assistance in the form of price controls and subsidies, but more investment in post-harvest operations, marketing systems, and infrastructure is necessary to protect farmers' interests. A complex strategy comprising enhanced technology, stronger legislative frameworks, and better resource management is required to guarantee the long-term viability and expansion of the Assamese jute sector.

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8

An Analysis of Skill Levels of Workers in India and their Impact on Earnings: Insights from the Periodic Labour Force Survey 2022-23

Sagarika Dey* & Ruma Choudhury**

Abstract

India is currently experiencing a favourable demographic situation, with half of its population under the age of thirty years. While this presents a unique opportunity for the country's growth, harnessing this demographic advantage depends heavily on the education and skill levels of its youth. The present study uses unit level data available from the Periodic Labour Force Survey (PLFS)-2022-23 to assesses the skill level of India's workforce by categorizing workers into four skill levels according to the National Classification of Occupations, 2015. The findings reveal a concerning scenario, with 90 percent of workers falling into the two lowest skill categories. While urban areas show slightly better results, there remains significant potential for skill development across all communities, age groups, and sectors. Natural Break maps created using GeoDa software highlight a notable variation in the distribution of skilled workers across Indian states with southern and some northern states having a distinct advantage in terms of skilled workforce. The study emphasizes the critical role of skill enhancement and vocational training, both for individual well-being and overall economic growth. Econometric analysis of the data

* Associate Professor, Department of Economics, Assam University, Silchar

** Post Graduate Student, Department of Economics, Assam University, Silchar

shows that workers with vocational training and higher skill levels earn more compared to their less-skilled counterparts. This underscores the importance of increasing investment in education and training to improve skill levels, thereby fostering inclusive and diffused growth while fully realizing India's demographic dividend.

Keywords: *Skills, Human Capital, Demographic Dividend, PLFS, NCO, Geoda, Natural Break Maps.*

1. Introduction

India is currently placed at a favourable demographic situation with half of its population being less than thirty years of age. While this makes India the youngest nation in the world, it has immense importance for India's growth process in a global setting where most countries are experiencing population ageing. However, India's ability to harness this demographic advantage and turn it into an economic dividend will depend critically on education and skill levels of its youth workers (Dey and Devi, 2019). This is because the productivity of workers is critically dependent on education, training and skills which form an inalienable part of human capital of a nation. The theoretical underpinning of the importance of education and skills in the growth process is provided by the endogenous growth theory which posits that economic growth arises from within a system and is driven by internal factors like human capital, innovation, and investment. Romer's 1986 model highlights the role of knowledge creation in long-term growth through investment in research technology. Lucas (1988) focuses on human capital, noting its spill over effects in boosting productivity. Romer's 1990 model stresses the importance of ideas in economic progress, while Pyatt & Becker's (1966) human capital theory underlines the role of education and training in increasing productivity and competitiveness. Additionally, in the human development approach, human capital is seen as being an end in itself rather than a means to an end (Streeten, 1994). Given the importance of education, skill formation and training for enhancing individual welfare and for achieving the overarching objective of transforming India into a developed nation by 2047, there has been much talk in both academic and policy circles on the need to upscale the skill level

of workers and bridge the skill gap. Against this backdrop the current research uses unit level data available from the Periodic Labour Force Survey (PLFS), 2022-23 to assess the skill levels of workers in India and to evaluate the relation between skills and earnings. The objectives of the article may be stated as follows: a. To assess the current skill levels of workers in India and examine the variations across states. b. To analyze how skill levels of workers vary by place of residence and across different social groups. c. To evaluate the impact of skills on workers' earnings.

2. Data Source and Methodology

The study is based on the secondary data**.** Unit level data available from PLFS, 2022-23 has been utilised in the study. The research focuses on the skill level of workers in the age group of 21-59 years. The number of workers in this age group in the data set was 1,48,599. Here, it may be noted that in PLFS of 2022-23, the skill level of workers were identified on the basis of the methodology adopted in the National Classification of Occupations (NCO) of 2015. The classification of skills in NCO (2015) is primarily based on the educational categories and levels, which appear in the International Standard Classification of Education (ISCED). Accordingly, four skill levels have been identified. Skill Level I comprises of workers who have up to ten years of formal education and/or informal skills. Skill Level II consists of workers with 11-13 years of formal education. Workers with 14-15 years of formal education are grouped under skill level III while those with more than 15 years of formal education are categorised under skill level IV. On the basis of the above classification, different occupations were categorised into nine divisions as shown in Table 1. Legislators, Senior Officials, and Managers belonging to Division 1 however were not allotted to any skill level. Hence, workers belonging to Division 1 were not included in the study. The pruned data set consisted of 1, 41, 945 workers from both rural and urban areas. Using the definitions outlined above, workers were grouped into the four skill levels on the basis of their occupational divisions given in the PLFS data

Table 1: Division of occupations by skill level of workers		
Divisions	**Occupations**	**Skill Level**
1	Legislators, Senior Officials, and Managers	Not Defined
2	Professionals	IV
3	Associate Professionals	III
4	Clerks	II
5	Service Workers and Shop & Market Sales Workers	II
6	Skilled Agricultural and Fishery Workers	II
7	Craft and Related Trades Workers	II
8	Plant and Machine Operators and Assemblers	II
9	Elementary Occupations	I

Source: NCO (2015)

Both descriptive as well as econometric techniques were used to analyse the data. Natural break maps were constructed using GeoDa software to assess the distribution of workers across Indian states according to the level of skills. Here, it may be mentioned that apart from classifying workers by NCO 2015 divisions, the PLFS also classified workers by type of employment . viz. own account workers, employers, unpaid family workers, salaried workers, workers engaged as casual daily wage workers in MNREGA and other casual daily wage workers. However, earnings were reported only for regular wage/salaried workers and those in self-employment. Hence, for evaluating the impact of skills on earnings, only these two groups of workers were considered for the regression analysis viz. regular wage/salaried workers and self-employed workers. In order to ascertain how skill levels of workers impact on earnings, a multiple linear regression model was fitted as follows:

$$Y_I = \alpha + \beta_i X_i + \mu_i$$

Where Y_i denotes the earnings received from regular wage/ salaried/self employment, Xi are the explanatory variables, is the

stochastic error term and α and β's are parameters to be estimated. The description of the explanatory variables used in the study is given in Table 2.

Table 2: Description of explanatory variables used in regression analysis

Variable	**Description**
AGE	Age of the worker (in completed years)
SEX	Sex of the worker (= 1 if male, 0 otherwise)
ST	Caste dummy (=1 if Scheduled Tribe, 0 otherwise)
SC	Caste dummy (=1 if Scheduled Caste=1, 0 otherwise)
OBC	Caste dummy (=1, if belonging to Other Backward Caste, 0 otherwise)
SECTOR	Sector dummy (1 =if rural, 0 otherwise)
TRAINING 1	Dummy for training (=1, if received training on the job, 0 otherwise)
TRAINING 2	Dummy for training (=1, if received part time training, 0 otherwise)
TRAINING 3	Dummy for training (=1, if received full time training, 0 otherwise)
SKILL LEVEL 2	Dummy for skill (=1, if worker with 11-13 years of formal education)
SKILL LEVEL 3	Dummy for skill (=1, if worker with 14-15 years of formal education)
SKILL LEVEL 4	Dummy for skill (=1, if worker with more 15 years of formal education)

Source: Authors

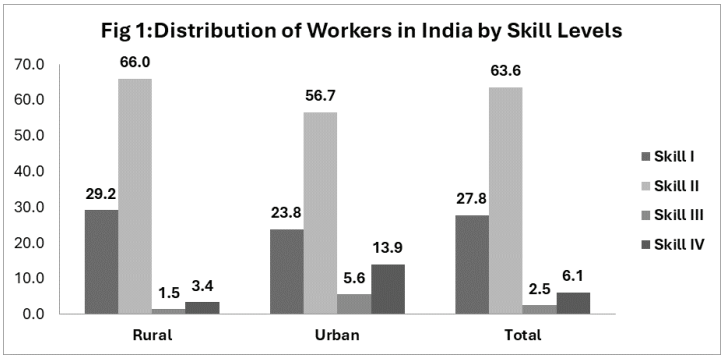
3. Analysis and findings:

The results of the data analysis have in organised in two sub-sections. The descriptive statistics are presented in Section 3.1 while the results of econometric analysis are reported in sub-section 3.2.

3.1 Findings from Descriptive analysis

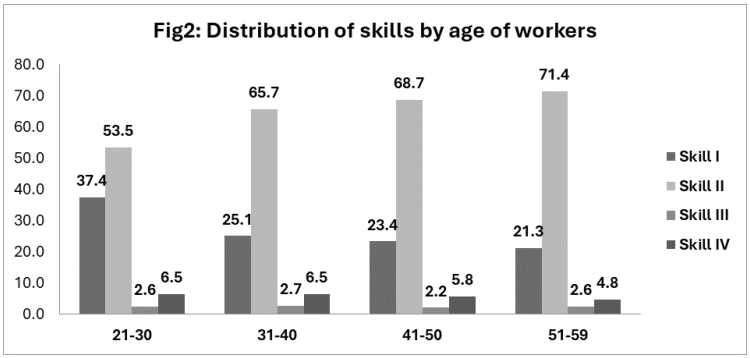
Fig 1 illustrates the distribution of workers in India across various skill categories, as outlined in Section 2. It can be seen

that approximately 28 percent of workers aged 21-59 fall into Skill Category I, which represents the lowest skill group. A significant portion, around 64 percent, belongs to Skill Group II. Together, these two groups account for a substantial 91 percent of the workforce in India. The proportion of workers in the higher skill categories is less than 10 percent. When categorized by place of residence, 95 percent of workers in rural areas belong to the two lowest skill groups, while in urban areas the figure is around 81 percent. Therefore, although workers in urban areas generally possess higher skill levels compared to those in rural areas, there remains considerable potential for skill development even within urban sectors. It may further be noted that when access to vocational training is considered, less than 5 percent of the workers in the study had access to any kind of vocational training.

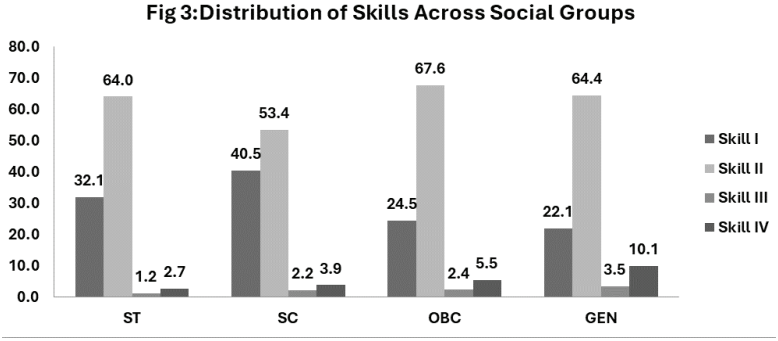


Source: Based on authors' calculation from PLFS (2022-23) data

Fig 2 depicts the skill levels of workers across different age groups. It is clear from the data that older age groups have a higher proportion of workers in Skill category II. However, it is concerning that the youngest group of workers shows the highest percentage in the lowest skill category i.e. Skill I. With 90 percent of young workers engaged in low-skilled jobs, realizing the demographic dividend appears to be a distant goal. While this presents a discouraging picture of the skill levels among young workers in India, it also highlights the significant economic potential that could be unlocked if this group were adequately trained and equipped with the necessary skills for the labour market.



Source: Based on authors' calculation from PLFS (2022-23) data



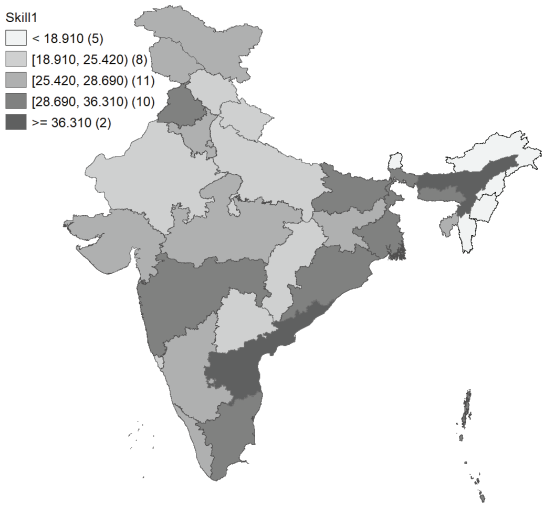
Source: Based on authors' calculation from PLFS (2022-23) data

Fig 3 illustrates the differences in skill levels across various social groups. A close examination of the data shows that SC, ST, and OBC workers are behind general category workers in skill formation. Specifically, when considering the first two skill levels (Skill I and Skill II) together, the percentage of ST, SC, and OBC workers in these lower skill categories is 96.1 percent, 93.9 percent, and 92.1 percent, respectively. In comparison, about 86.4 percent of workers from the forward castes fall into these categories. As a result, less than 10 percent of ST, SC, and OBC workers belong to the higher skill groups (Skill III and Skill IV), while 13.6 percent of general caste workers have higher skill levels. Although these figures indicate that ST, SC, and OBC groups are lagging behind forward castes in skill acquisition, the situation among the forward castes is only marginally better. This highlights the urgent need

to promote skill development not only among marginalized communities but also within forward groups.

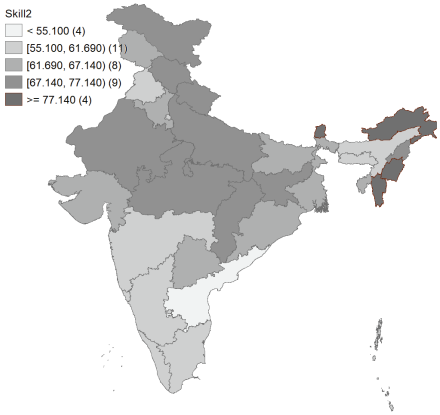
We now turn our attention to the inter-state variation in the distribution of skilled workers across the country. For this purpose workers residing in each state have been categorised into four categories according to their skill levels. The Natural Break maps that were constructed using GeoDa software grouped the states into five categories on the basis of the observed differences in the proportion of workers in each skill category. Accordingly, four Natural Break maps were created, one for each skill group. Taking Skill I which is the lowest skill category, it is found that Assam and Andhra Pradesh have the highest proportion of workers in this group (Fig 4). In both these states, the proportion of workers belonging to the lowest skill category is more than 36 percent. States with the second highest proportion of workers in skill category I are Meghalaya, West Bengal, Maharashtra, Tamil Nadu, Punjab, Bihar and Odisha. Surprisingly, the five North Eastern states of Sikkim, Arunachal Pradesh, Nagaland, Manipur and Mizoram have the lowest proportion of workers with low skill levels. In each of these states the proportion of low skill workers in the overall workforce is less than 20 percent.

Fig 4: Inter-state variation in proportion of workers belonging to Skill Category I



Source: Based on authors' calculation from PLFS (2022-23) data

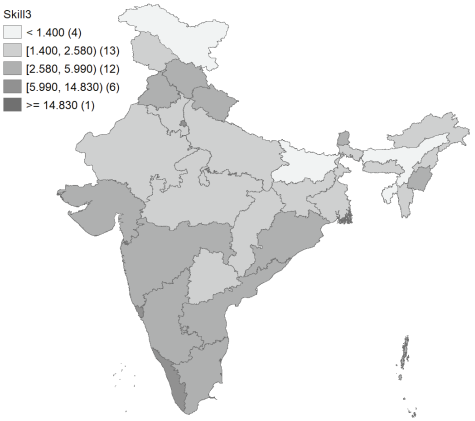
Fig5: Inter-state variation in proportion of workers belonging to Skill Category II



Source: Based on authors' calculation from PLFS (2022-23) data

Fig 5 represents percentage of workers in skill category II in different states and UTs. The North-Eastern states of Arunachal Pradesh, Manipur, Sikkim and Mizoram have the highest proportion of workers with Skill Level II. The states of Rajasthan, UP, Madhya Pradesh also have high concentration of workers in this skill category.

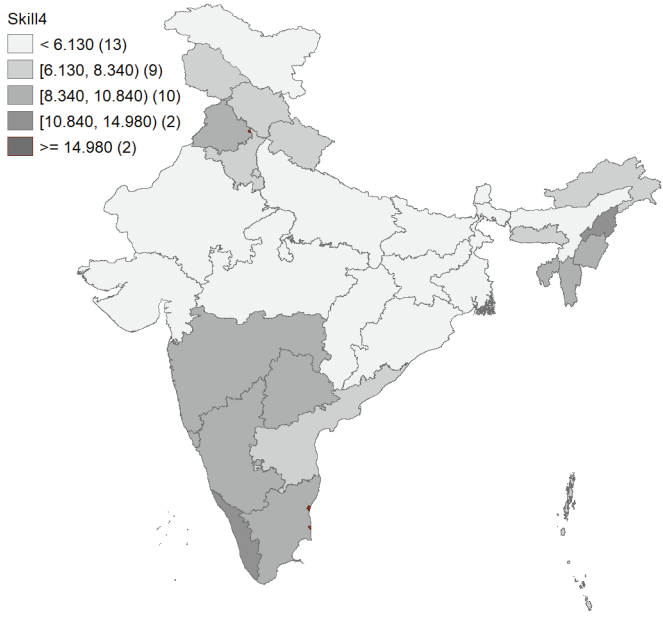
Fig 6: Inter-state variation in proportion of workers belonging to Skill Category III



Source: Based on authors' calculation from PLFS (2022-23) data

Fig 6 illustrates the percentage of workers in skill category III, with the Union Territory of Chandigarh having the highest proportion of workers in this category. It is evident that the Southern and Western states have a relatively higher percentage of workers in this skill group, while Assam, Tripura, Bihar, and Ladakh show a significantly lower concentration of workers with this skill level. The poor performance in Assam and Bihar may be partly due to the migration of better-skilled workers to other states in search of improved opportunities. However, the urgent need for skill enhancement among local workers in these states cannot be overlooked. Only through increased skill development can the per capita income gap between states be narrowed, thus achieving the goal of inclusive development.

Fig 7: Inter-state variation in proportion of workers belonging to Skill Category IV



Source: Based on authors' calculation from PLFS (2022-23) data

Figure 7 presents the state-wise distribution of workers in skill category IV. Notably, the Union Territories of Puducherry and Chandigarh form a distinct group, with more than 14 percent

of their workers in this category. Kerala and Nagaland follow closely, with over 10 percent of their workers belonging to the highest skill group. The southern states of Tamil Nadu, Karnataka, and Telangana, along with the North-Eastern states of Manipur, Mizoram, and Tripura, as well as Maharashtra and Punjab, occupy the third tier in the hierarchy shown by the natural break maps. It is concerning to observe that in central India, as well as in Gujarat, Ladakh, and Assam, the proportion of workers in skill category IV remains dismally low, below 6 percent.

3.2: Impact of skills on earnings: Findings from econometric analysis

Table 3 reports the results of the linear regression model that was fitted to analyse the factors which determine earnings from regular wage or salaried employment. A total of 40,351 individuals who were employed as salary earners or regular wage earners in the calendar month leading preceding the survey were considered for the purpose of estimation. Workers who received earnings by way of both salaried and self-employment were not considered. It is observed from the results presented in Table 3 that remuneration received by way of salaries or regular wages increases with increase in the age of the worker; this is expected as scope for career advancement and promotions are likely to increase with age. Again, male workers are likely to earn more than female workers. This could be because female workers may face entry barriers to better paying jobs on account of differences in educational opportunities. Caste also influences earnings from salaried employment. However, the impact is not uniform across all caste groups. Compared to workers belonging to the general caste, ST works tend to earn more by way of salaries. This could be due to higher levels of education prevalent among ST workers particularly in the North-Eastern states. In contrast, SC and OBC workers tend to earn significantly lower amounts compared to forward caste workers. Again, earnings from salaried employment tend to be lower in rural areas as compared to urban areas. Compared to workers with no vocational training, those with any kind of vocational training tend to earn better wages and salaries; such wages could be considered to be an economic rent for undergoing vocational training either on the job or outside it. Considering, Skill Level 1 as the base category, it follows from the

regression results that pecuniary returns from wage employment increase linearly with improvement in skill level of workers. Not only are the coefficients associated with different skill levels positive and significant, the size of co-efficient increases with improvement in skill base. Thus, on an average, a worker with skill level II earns INR 4415 more from wage employment every month compared to a wage earner with skill level I. Similarly, workers with skill level III and IV on an average earns INR 11, 541 and INR 20,643 more than the lowest skilled wage earner. The F statistic is highly significant indicating that the estimated regression equation provides a good fit to the observed data.

Table 3: Factors which impact on earnings from regular wage or salaried employment

Variables	Coefficient	t	P>|t|
AGE	430.86***	56.61	0
SEX	7634.97***	42.39	0
SC	-2985.21***	-13.04	0
ST	1387.49***	5.33	0
OBC	-2197.47***	-12.03	0
SECTOR	-4413.59***	-27.32	0
TRAINING1	8502.32***	18.43	0
TRAINING2	1884.11***	3.66	0
TRAINING3	3227.09***	10.49	0
SKILL LEVEL II	4415.00***	19.21	0
SKILL LEVEL III	11541.10***	34.71	0
SKILL LEVEL IV	20642.98***	77.78	0
CONSTANT	-6863.31***	-17.14	0
No. of observations	40351		
F(12, 40,338)	1357.05***		

*** denotes significant at 1 percent level of significance

Source: Based on authors' calculation from PLFS (2022-23) data

The determinants of earnings from self-employment are reported in Table 4. The analysis was carried out for 50,261 individuals who earned their livelihood solely by way of self-employment.

A scrutiny of the results reveals that barring the effect of ST, the impact of all other variables on the outcome is similar to the model presented in Table 3. It is found that workers belonging to all caste categories including ST tend to earn less from self employment compared to the forward caste workers. Again, male workers tend to earn more than female workers from self-employment which is again not a surprising find given that women generally lag behind in terms of access to credit or managerial skills. The sign of the remaining variables are along expected lines. Thus, with every increase in the age of the workers, earnings are predicted to be higher, holding all other variables constant. Self-employed workers in urban areas on an average are predicted to earn INR 4282 more on a monthly basis compared to their rural counterparts. Workers who received training on the job are expected to earn INR 3348 more from self employment activities compared to workers without any formal training (base category). Further, workers who received full vocational training are expected to earn INR. 1493 more compared to those in the base category. The coefficient for part time vocational education although positive is not statistically significant. For analysing the impact of skills on earnings from self employment, the lowest level of skill i.e., skill I has been treated as the base category. Thus, workers with skill level II on an average earn Rs. 3670 more compared to workers with the lowest skill level. Similarly, workers with skill level III and skill level IV respectively earn Rs. 11726 and Rs. 8924 more than workers belonging to the lowest skill category.

Table 6: Factors which impact on earnings from self-employment

Variables	**Coefficient**	**t**	**P>|t|**
AGE	51.39***	13.03	0
SEX	8151.29***	90.26	0
SC	-2468.97***	-19.82	0
ST	-1291.31***	-10.85	0
OBC	-1372.04***	-14.57	0
SECTOR	-4282.12***	-51.42	0
TRAINING1	3348.25***	4.45	0
TRAINING2	451.44	1.26	0.208
TRAINING3	1493.85***	5.89	0

SKILL LEVEL II	3689.69***	16.95	0
SKILL LEVEL III	11725.56***	32.03	0
SKILL LEVEL IV	8924.28***	29.37	0
CONSTANT	4793.16***	16.64	0
F(12, 50,248)	1260.27***		
*** denotes significant at 1 percent Source: Based on authors' calculation from PLFS (2022-23) data			

4. Summary and Conclusion

The study evaluates the current skill levels of Indian workers based on nationally representative data. Using the standard skill definitions outlined in NCO 2015, the findings show that the majority of Indian workers possess low skill levels, with over ninety percent falling into the two lowest skill categories. Also, less than 5 percent of the workers had access to any form of vocational training .While urban areas exhibit a greater proportion of workers with higher skill levels compared to rural regions, the statistics for urban sectors are still concerning. Despite the notion of a demographic dividend, the age-based segmentation of workers presents a troubling picture, as the youngest age group does not appear to have an advantage in skill acquisition over older groups. Similarly, while workers from forward castes tend to have better skill acquisition compared to marginalized groups, there is still significant potential for skill development within the forward caste population. The critical role of education and vocational training for realising the demographic divided cannot be overstated. Regression analysis of unit-level data highlights that both salaried and self-employed earnings are significantly and positively impacted by access to training and higher skill levels. Given the concerning state of vocational education coverage and the low skill levels among Indian workers, urgent policy actions are necessary to enhance skill development and increase access to vocational training. Attention must also be given to bridging the disparities in skill attainment across states. Addressing the skill gaps is crucial to fully leveraging India's demographic dividend before the opportunity window closes due to demographic shifts. The age structure of the Indian population will inevitably change, and it is essential to capitalize on the benefits of a young and

dynamic workforce before population aging begins to affect the economy.

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(Endnotes)

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9

Composition and Direction of India's Foreign Trade with China: An Analytical Study

Samar Das* & Ariful Hoque**

Abstract

The present study aims to comprehensively analyze the dynamics of India-China trade from 2006 (the emergence of BRICS) to 2023, focusing on a selected bundle of 10 SITC digit-1 level commodities. Utilizing secondary data, the research employs a few select trade indicators like Revealed comparative advantage (RCA) index, Revealed import dependency (RID) index, Net, Gross and Income terms of trade, Export intensity index (EII), Import intensity index and trade share analysis. The findings of the study reveal a volatile and imbalanced trade relationship between India and China over the study period. India's export share to China peaked at 4.67% in 2010 but dropped to 1.95% by 2022, while imports from China steadily rose, reaching 13.24% in 2015 with marginal decline thereafter. India's export intensity with China remained below one, indicating underperformance in exports, while the import intensity was generally above one, showing a stronger reliance on imports, particularly from 2013

* Research Scholar, Department of Economics, Tripura University (A Central University), Tripura West

** Assistant Professor & Head, Department of Economics, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya (A Govt. Model Degree College), Eraligool, Sribhumi, Assam

to 2019. India's Net Barter Terms of Trade (NBTT) were consistently favorable, with India gaining more from exports compared to imports, especially in 2016. However, China's Gross Barter Terms of Trade (GBTT) were more favorable, requiring India to export more for imports. China's higher Income Terms of Trade (ITT) demonstrated stronger purchasing power. India's comparative advantage in products like crude materials and animal fats, where China has high import reliance, suggests potential for increased exports to China. On the other hand, India could benefit from importing more machinery and chemicals from China, where China holds a comparative advantage.

Keywords: *Trade Share, RCA. RID, Intensity of Trade, Terms of Trade.*

Introduction

The present global trade scenario is witnessing dynamic changes. Recent developments around the world clearly show that no nation can completely isolate itself from the rest of the world and survive independently for a long time. Today's world is completely different from what it was on few decades ago. Globalization and economic cooperation have been strengthened in terms of opening up of economies, barrier-free trade in goods and services, and the free movement of factors of production (Agarwal, 2002). This phenomenal trend is evident in the establishment of BRICS group, comprising Brazil, Russia, India, China and South Africa. The rapid pace of change, driven by emerging economies on the global stage, has created a highly competitive environment for other nations. Among these economies, India and China are undoubtedly taking a leading role in both economic and political spheres. India and China's bilateral trade experienced fluctuations in recent years. In 2021, trade between the two nations was valued at approximately USD 125.62 billion, increasing by 8.47 percent to US$ 136.26 billion in 2022. China was India's third-largest trading partner as of 2022-23. In terms of economic indicators, China's gross domestic product (GDP) in 2023 was around US$ 17.79 trillion with a growth rate of 5.2 percent, contributing 17.86 percent to global GDP, while India's GDP stood at approximately US$ 3.57 trillion with a growth rate of 8.2 percent, accounting for 3.37 percent of the world GDP. Ranking 2nd and 5th globally in GDP, respectively, China and India together represent more

than one-third of the world's population, indicating a vast market potential (World Bank, 2025).

China and India represent unrivaled tales of economic growth from a domestic standpoint. Their rapid economic expansion has been closely tied to the surge in trade between the two nations. As two of the world's fastest-growing economies, both countries are expected to play an increasingly significant role in shaping the global economic landscape in the years to come (Sachs, 2003). Both economies are experiencing rapid growth and intimidation of the global community. The rise of these two Asian titans has sparked extensive economic literature examining its implications for the global economy. However, much remains to be explored regarding India-China relations, which this research aims to address across various dimensions. With the growing popularity of Jim O'Neill's BRIC name, Russia formalized the BRIC summit by inviting the foreign ministers of Brazil, India, and China, aiming to bolster their collective international influence. In light of this, the present study aims to analyze Indo-China trade, assess their past performance and explore future trade prospects.

The trade relations between China and India are of great importance since they are regarded as one of the most important bilateral relationships in the world economy. China has been India's main import supplier for the last fifteen years, and Chinese imports are essential to the country's industrial sector. India's trade deficit with China is substantial and still growing. By 2024, it may exceed $100 billion. China can manufacture items more cheaply than India thanks to its extensive industrial base. Through import substitution and free trade agreements (FTAs) with Asian nations, India has attempted to lessen its reliance on China. Yet, China's proportion of India's imports has grown over time. India shipped US$15.3 billion worth of goods to China in 2022, primarily consisting of iron ore, refined petroleum, and crustaceans. India needs to identify a clear path to reduce its trade deficit with China. This study will assist in finding that path by looking at the trends and patterns of India's trade with China. Additionally, the analysis of export and import intensity will help determine key sectors where India should focus to enhance its trade balance. The study will also assess India's gains from trade with China, which will demonstrate how much India is benefited

from trading with China. Furthermore, it will identify the commodities in which India holds a comparative advantage over China, providing valuable insights into India's trade potential and opportunities for export expansion in the Chinese market.

Objectives of the Study

The present study specifically seeks to address the following key objectives

- To examine the trends and patterns of India's trade with Chinese economy.
- To estimate the extent of trade intensity between India and China.
- To investigate India's gains from trade with China.
- To identify the potential commodities for future trade between India and China.

Literature Review

David Ricardo's theory of comparative advantage, developed in the early nineteenth century (Ricardo, 1817), along with the new trade theories that emerged in the late twentieth century (Helpman and Krugman, 1985; Krugman, 1979; Kunst and Marin, 1989), form the foundational roots of modern export theory. Classical economists, like Ricardo, emphasized that the primary driver of economic progress is not international trade itself but rather the specialization it enables, which generates greater economic efficiency and rewards. This principle remains central to understanding the benefits of trade and its role in fostering economic growth. Mahlawat (2018) studied the trade patterns between India and other BRICS nations using the Trade Intensity Index (TII) for the period 2006-2015. The study found that South Africa and Brazil had higher-than-expected trade volumes, while India's trade intensity with BRICS, particularly China and Russia, remained below expectations and showed a continuous decline. Sarin (2018) studied India-ASEAN trade relations and found that factors like GDP, population, common language, and trade openness positively influenced trade, while distance had a negative impact. Kiani et al. (2018) examined the factors affecting Pakistan's rice and cotton trade and found that

production, GDP, population, and common borders positively influenced trade, while distance had a negative effect. Uddin and Khanam (2017) examined Bangladesh's trade deficit, highlighting significant imports of goods such as rice, oil, and fertilizer. Their analysis revealed a positive relationship between government expenditure, exports, and GDP. However, the causality between imports and GDP was negative and insignificant, while inflation exhibited a positive but statistically insignificant relationship with GDP. Panda et al. (2016) observed that both India and China trade predominantly with neighboring countries. India's trade was impacted more by its partners' higher GDP and lower per capita income, while China's trade was affected by its partners' higher per capita income. Ghose et al. (2019) observed that while China's exports are almost entirely concentrated in manufacturing products, India's exports have shifted primarily to intermediate goods. Taneja et al. (2015) observed that India's trade deficit with China has substantially expanded with the increase in bilateral trade. Wani and Dhami (2016) pointed out that despite the remarkable bilateral trade expansion the widening gap in India's trade deficit with China remained a severe issue. Srivastava et al. (2021) analyzed India-China trade performance during the COVID-19 pandemic and found that the consistency of Chinese merchandise exports was greater than that of India during the pandemic. Singh (2016) analyzed recent trends in the volume and composition of BRICS countries' foreign trade, with a focus on both intra-BRICS and extra-BRICS trade. The findings highlighted China's significant dominance in intra-BRICS trade, holding a major share in both imports and exports. Renjini and Kar (2016) analyzed India-ASEAN agricultural trade during 1995-2014 and found India's strong competitiveness in agricultural exports and high trade intensity, particularly with Vietnam, Indonesia, and Thailand. Kocourek (2015) examined the comparative advantage of BRICS nations from 1995 to 2013, highlighting a shift toward more sophisticated merchandise. The study found that China dominated in sectors such as electronics and defense, raising concerns among its trading partners about market competitiveness and dependency. According to Khan and Ahmad (2017) India and China engage in more inter-than intra-industry trade and are more competitive than complementary trading partners. However, Li (2018) observed that their trade

structure is characterized by a fair degree of competitiveness and complementarity.

Although extensive research has been conducted on India's bilateral trade with various countries, including China, relatively few studies have specifically focused on the dynamics of India-China trade relations. Existing literature largely examines overall trade patterns but lacks a detailed assessment of trade intensity, India's comparative advantages, and sector-specific trade opportunities. Therefore, it is essential to analyze the impact of trade between the two nations and propose policy measures to address the growing trade imbalance.

Research Methodology

The present study is entirely based on secondary data and covers an 18-year period from 2006 (marking the emergence of BRICS) to 2023. The study aims to provide a comprehensive analysis of India-China trade dynamics. A set of 10 SITC digit-1 level commodity groups has been selected based on their significance in India-China trade. The trade composition is assessed using various indices, including the Revealed Comparative Advantage (RCA) index, the Revealed Import Dependency (RID) index, and India's gains from trade is measured through Net, Gross, and Income Terms of Trade. Moreover, the extent of trade is evaluated using the Export Intensity Index (EII), Import Intensity Index (III), and an analysis of trade share.

Bilateral Trade between India and China

India-China bilateral trade diplomacy is shaped by a complex interplay of geopolitical tensions and commercial interests. Despite a significant expansion in trade, China remains one of India's largest trading partners, while India continues to face a substantial trade deficit. India's top exports include pharmaceuticals and textiles, whereas its major imports comprise machinery and electronics. However, ongoing border disputes and political tensions have strained relations, prompting India to impose restrictions on Chinese goods and investments, citing national security concerns. Not with standing these obstacles, both nations continue to engage in dialogue aimed at addressing trade imbalances and strengthening cooperation, particularly

in sectors such as technology and renewable energy. The future of their trade relationship will largely depend on their ability to navigate political differences and identify mutually beneficial economic opportunities.

India's Export-Import Trade Share with China

Trade share refers to the percentage of a country's total trade with a specific partner. It is calculated by comparing the dollar value of trade between two countries to the total global trade of the country in question. A larger trade share denotes a better level of integration among the trading nations. Table 1 shows that India's export share with China is very volatile during the study period. It was maximum in 2010 with 4.67 percent and minimum in 2022 with only 1.95 percent. China's share in India's total import showed a consistent increasing trend from 2006 to 2015, except for a slight decline in 2009. After 2015, it showed a continuous declining trend. The highest import share was recorded in 2015 at 13.24 percent, while the lowest was in 2006 at 6.88 percent throughout the study years.

Table 1: India's Export-Import Trade Share with China (%)

Year	Export Share	Import Share
2006	3.96	6.88
2007	4.03	8.15
2008	3.65	9.58
2009	3.71	8.31
2010	4.67	9.19
2011	4.27	9.76
2012	3.32	9.17
2013	3.07	9.75
2014	2.83	11.01
2015	2.32	13.24
2016	2.04	12.61
2017	2.51	12.36
2018	3.04	11.52
2019	3.26	11.35

2020	3.79	11.50
2021	3.40	11.50
2022	1.95	11.40
2023	2.09	11.91

Source: Calculated based on data from World Development Indicators

Trade Intensity Index

Trade intensity index (TII) is an important method of measuring bilateral trade flows. It measures the intimacy of a country's trading relationship with other country. It was popularized by Kojima (1964). TII is divided into two types, viz., Export intensity index (EII), and Import intensity index (III). Following Kojima (1964), and Drysdale and Garnaut (1982), the EII and III are stated as follows,

$$EII_{ij} = (X_{ij} / X_{iw}) / (X_{wj} / X_{ww}) \quad .....(1)$$

$$III_{ij} = (M_{ij} / M_{iw}) / (M_{wj} / M_{ww}) .....(2)$$

Where, X_{ij} is country *i*'s export to country *j*, X_{iw} is the value of export by country i to world, X_{wj} and X_{ww} denote world's export to country j and the rest of the world, respectively. M_{ij} is country *i*'s import from country *j*, M_{iw} is the value of import by country i from the world, M_{wj} and M_{ww} denote world's import from country *j* and from the rest of the world, respectively..

Table 2 reveals that India's EII with China remained below one throughout the study period, indicating that expected export trade was less than the actual trade. This suggests that India's export relationship with China is not very intensive. The EII declined consistently from 0.65 in 2006 to 0.50 in 2009, saw a slight increase in the following year, and then declined again until 2016. Comparing India's recent export intensity with the emergence of BRICS, it is evident that India's exports to China have not grown significantly enough to reduce its trade deficit or move toward a trade surplus country. The III of India with China remained above one for most of the study years, indicating a strong and attractive import trade relationship. India's actual imports from China exceeded expected levels, peaking at 1.19 in 2015, compared to 0.84 in 2006, the year BRICS was established. From 2013 to 2019,

India's import trade with China was particularly intensive, as the III remained consistently above one. However, import intensity declined in 2020 and 2021 due to the COVID-19 pandemic, which significantly disrupted international trade. Following the reopening of economies, India's III rebounded to above one, signaling a recovery in trade relations.

Table 2: Trade Intensity Index of India against China

Year	Export Intensity Index	Import Intensity index
2006	0.65	0.84
2007	0.62	0.94
2008	0.56	1.10
2009	0.50	0.91
2010	0.57	0.93
2011	0.51	1.03
2012	0.39	0.94
2013	0.35	1.00
2014	0.32	1.09
2015	0.27	1.19
2016	0.24	1.14
2017	0.27	1.12
2018	0.32	1.06
2019	0.34	1.06
2020	0.37	0.98
2021	0.33	0.97
2022	0.21	1.00
2023	0.23	1.10

Source: Calculated based on data from Direction of Trade Statistics

India's Gains from Trade with China

Terms of trade (TOT) is used to measure India's gains from trade with China. The TOT is one of the most important tools to measure the gains from trade. Various concepts of TOT have been given by different economists depending on their different works. The present study considers the following three types of TOT.

Net Barter Terms of Trade (NBTT)

NBTT is defined as the ratio of export price index to import price index. It is calculated as

$$NBTT = \frac{Price\ Index\ of\ Export\ (P_x)}{Price\ Index\ of\ Export\ (P_m)} \times 100$$

Gross Barter Terms of Trade (GBTT)

GBTT is the ratio between import quantity index and export quantity index. A higher value of GBTT for any country indicates more favorable trade conditions for that country. Symbolically, it is expressed as

$$GBTT = \frac{Quantity\ Index\ of\ Import\ (Q_m)}{Quantity\ Index\ of\ Export\ (Q_x)} \times 100$$

Income Terms of Trade (ITT)

The ITT considers both price and quantity changes, providing a clear picture of whether trade is favorable or unfavorable for a country. It is expressed as

$$ITT = NBTT \times Quantity\ index\ of\ Export\ (Q_x)$$

A TOT value greater than 100 indicates that trade between two countries has been favorable, resulting in significant gains. Conversely, a value below 100 suggests unfavorable trade conditions, resulting in minimal gains or even losses in that specific year.

Table 3 shows India's gains from trade with China and that of China's with India over the period 2006-2023. From this calculation, it is evident that India's NBTT has been better than China's throughout the study period. China's NBTT remained below 100, while India exceeded this value in the years 2016, 2017 and 2020. In 2016, India benefited the most from trade with China, as its NBTT reached its highest value of 104.99, indicating that the price of overall exports was higher than the price of imports. Improvements in NBTT for commodities are generally seen as enhancing a nation's economic welfare, as they enable domestic goods to be sold at higher export prices while allowing foreign

goods to be imported at lower prices. This, in turn, provides consumers with access to a wide range of goods and improves their standard of living.

Table 3: India's Gains from Trade in Comparison to China

(Base: 2015 = 100)

Year	NBTT		GBTT		ITT	
	India	China	India	China	India	China
2006	83.87	94.87	81.88	104.90	41.94	48.55
2007	79.88	93.88	81.31	99.57	45.77	57.58
2008	79.89	88.82	87.71	95.23	53.56	59.12
2009	92.99	96.62	96.66	109.46	58.63	57.59
2010	91.49	86.99	94.34	104.22	72.50	66.42
2011	88.10	83.82	90.01	104.20	80.26	69.62
2012	88.14	86.17	96.94	103.48	78.85	75.57
2013	90.45	87.12	89.13	104.14	87.76	82.87
2014	91.82	89.59	87.79	101.50	93.58	90.10
2015	100.00	100.00	100.00	100.00	100.00	100.00
2016	104.99	99.78	97.89	102.24	106.76	101.20
2017	100.40	94.34	100.71	104.03	109.24	102.43
2018	95.62	91.40	100.49	106.32	107.82	103.33
2019	97.97	92.71	97.21	104.30	114.35	106.87
2020	103.17	98.46	93.07	106.36	106.65	116.72
2021	91.00	89.12	89.38	97.61	115.43	123.99
2022	81.33	89.45	96.78	102.97	105.46	121.06
2023	87.55	90.21	97.03	102.98	117.44	126.65

Source: Calculated based on data from World Development Indicators

China's GBTT is more favorable than India's, as China consistently has a GBTT value above 100 in most of the study years, except for 2007, 2008, and 2021. In contrast, India's GBTT is below 100 in almost all years, except for 2017 and 2018. This trade pattern suggests that, in order for India to import a certain amount of goods from China, it must export more to China, indicating unfavorable trade conditions for India. On the other hand, China enjoys a more advantageous position, as its GBTT value remains

above 100, reflecting a more favorable trade scenario for China. The ITT reflects the purchasing power or import capacity of a country, based on its exports to a trade partner. The ITT values of both India and China have been quite similar, with both exceeding 100 after 2015. However, China has had greater purchasing power in recent years, as its ITT value reached 126.65 in 2023, while India's ITT stood at 117.44, indicating that China has had a stronger ability to import goods compared to India.

Analysis of Trade Potential between India and China

Trade potentiality between two countries at commodity level can be assessed by the Revealed comparative advantage (RCA) index, and the Revealed Import Dependency (RID) Index. These indices can be expressed as follows

$$RCA_{ij} = \frac{(X_{ij} / X_{it})}{(X_{wj} / X_{wt})} \text{ .....(3)}$$

$$RID = \frac{(M_{ij} / M_{it})}{(M_{wj} / M_{wt})} \text{ .....(4)}$$

Where X_{ij} is the export of commodity j by country i, X_{it} is the total export of commodity j by country i, X_{wj} is the world's export of commodity j and X_{wt} is the world's total export of all commodities. M_{ij} is the import of commodity j by country i, M_{it} is the total import of commodity j by country i, M_{wj} is the world's import of commodity j and M_{wt} is the world's total import of all commodities.

The RCA and RID indices are calculated over an 18-year period, from 2006 to 2023. The average values are provided to offer a clear overview of the commodities having potential for future trade between India and China. By comparing the RCA and RID of different commodities, it becomes easier to identify commodities that are either complementary or competitive in nature between the two countries.

Table 4: Mean RCA and RID Values for India and China (2006-2023)

For India				***For China***			
SITC	**Products**	**RCA Value**	**RID Value**	**SITC**	**Products**	**RCA Value**	**RID Value**
1	Beverages and tobacco	0.093	0.631	1	Beverages and tobacco	1.176	0.034
2	Crude materials, inedible, except fuels	1.449	1.323	2	Crude materials, inedible, except fuels	1.413	1.538
3	Mineral fuels, lubricants, & related materials	0.333	0.746	3	Mineral fuels, lubricants, & related materials	0.8673	0.091
4	Animal & vegetable oils, fats, & waxes	3.088	0.360	4	Animal & vegetable oils, fats, & waxes	0.122	2.595
5	Chemicals & related products, n.e.s.	0.766	3.576	5	Chemicals & related products, n.e.s.	3.842	0.681
6	Manufactured goods	0.855	1.048	6	Manufactured goods	1.447	0.981
7	Machinery & transport equipment	0.312	1.769	7	Machinery & transport equipment	1.867	0.327
8	Miscellaneous manufactured articles	0.245	0.917	8	Miscellaneous manufactured articles	1.294	0.231
9	Commodities n. e. s.	0.329	1.238	9	Commodities n. e. s.	0.451	0.362

Source: Calculated based on data from WITS

Table 4 illustrates how India and China's competitive positions and import dependencies vary significantly across product categories, reflecting their distinct economic structures and trade

profiles. The table displays the RCA and RID values for India and China from 2006 to 2023 across nine product categories. RCA values indicate the relative competitiveness of a country in exporting a specific product, while RID values highlight the country's reliance on imports of that product. For India, Animal and vegetable oils, fats, and waxes stands out with the highest RCA value of **3.088**, suggesting a strong export advantage in this category, while **Beverages and tobacco** has the lowest RCA of **0.093**, indicating a comparative disadvantage. In terms of RID, India is most dependent on imports for **Chemicals and related products n.e.s** (RID value of **3.576**), whereas it has a moderate import dependency for Machinery and transport equipment (RID value of **1.769**).

For China, **Chemicals and related products n.e.s** shows the highest RCA value of **3.842**, indicating China's significant export advantage in this sector, while Animal and vegetable oils, fats, and waxes has a very low RCA of **0.122**, reflecting a comparative disadvantage. China's **RID values** reveal that it is highly dependent on imports for Crude materials, inedible, except fuels (**1.538**) and **Mineral fuel/lubricants** (**0.091**), but less dependent on **Beverages and tobacco** with a low RID of **0.034**.

Table 5: Commodities with Trade Potential between India and China (2006-2023)

RCA value > 1 for India and RID value > 1 for China				**RCA value > 1 for China and RID value > 1 for India**			
SITC Code	**Products**	**RCA of India**	**RID of China**	**SITC Code**	**Products**	**RCA of China**	**RID of India**
2	Crude materials, inedible, except fuels	1.449	1.538	2	Crude materials, inedible, except fuels	1.413	1.323
				5	Chemicals & related products, n.e.s.	3.842	3.576
4	Animal & vegetable oils, fats, & waxes	3.088	2.595	6	Manufactured goods	1.447	1.048
				7	Machinery & transport equipment	1.864	1.769

Source: Calculated based on data from WITS

Table 5 identifies the commodities with trade potential between India and China based on their RCA and RID values from 2006 to 2023. The first section highlights products where India has a comparative advantage (RCA > 1) and China has high import reliance (RID > 1). These commodities include Crude materials, inedible, except fuels and Animal and vegetable oils, fats, and waxes, where India is competitive in exports and China is heavily reliant on imports, suggesting a potential for increased trade from India to China in these sectors. The second section of the table identifies commodities where China has a comparative advantage (RCA > 1) and India has high import dependence (RID > 1). These products include **Crude** materials, inedible, except fuels, **Chemicals and related products n.e.s**, **manufactured goods**, and **Machinery and transport equipments**, where China is well-positioned as an exporter while India relies on imports, indicating that India could benefit from increased imports of these goods from China. Overall, the table shows the potential areas of trade where both countries could mutually benefit, with India exporting raw materials and agricultural products to China, while China could supply manufactured goods, chemicals, and machinery to India.

Conclusion

The trade relationship between India and China has shown notable volatility and imbalance throughout the study period. India's export share to China peaked at 4.67 percent in 2010 and declined to 1.95 percent by 2022. Similarly, while India's import share from China grew consistently from 2006 to 2015, reaching a high of 13.24 percent, it has seen only a slight decrease since then. India's export intensity index with China has remained below one, indicating that the actual exports are less than expected, suggesting a less intensive trade relationship. In contrast, the import intensity index has generally been above one, particularly from 2013 to 2019, showing a stronger import trade relationship, which weakened temporarily due to the COVID-19 pandemic but improved thereafter. Regarding terms of trade, India's Net Barter Terms of Trade consistently outperformed China, with India benefiting from more favorable prices on exports compared to imports. However, China's Gross Barter Terms of Trade were generally more favourable, indicating that India had to export

more to afford imports from China. The Income Terms of Trade revealed similar purchasing power for both countries, though China had a higher ITT value, indicating stronger purchasing power in recent years. India's comparative advantage (RCA > 1) in sectors like crude materials and animal fats, where China has high import reliance (RID > 1), suggests potential for increased exports from India to China. Conversely, in sectors where China has a comparative advantage, such as chemicals, machinery, and manufactured goods, India could benefit from increased imports from China.

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10

Assessing the drivers of Socially Responsible Investment Behavior among Retail Investors: Perspective from The Social Cognitive Theory

Debopriya Kar*, Binoti Patro & Rajorshi Bhattacharjee*****

Abstract

Conceptually grounded in the Social Cognitive Theory (SCT), the study uniquely investigates the interplay of personal and cognitive factors, environmental factors, and behavioral factors concerning socially responsible investment (SRI) decisions among retail investors. Using advanced statistical analysis, including partial least square structural equation modeling with Smart PLS-SEM v-4.0, the study was conducted on a diversified dataset of 487 Indian retail investors from various demographic backgrounds. The results demonstrate that the nexus of personal and cognitive factors, and environmental factor have a positive influence in driving responsible investment behavior among retail investors. These findings can be instrumental in promoting a more environmentally conscious society by emphasizing the importance of personal convictions in investment decisions, thereby strengthening collective efforts toward sustainable development.

* Research Scholar, Department of Management Studies, National Institute of Technology, Silchar

** Assistant Professor, Department of Management Studies, National Institute of Technology, Silchar

*** Research Scholar, Department of Management Studies, National Institute of Technology , Silchar

Stakeholders including policymakers, portfolio managers, and financial advisors may utilize the findings in structuring and refining realistic action plans for incorporating SRI in designing and effectively framing investment portfolio.

Keywords: *Social Cognitive Theory, Investment Behavior, Socially Responsible Investment (SRI), Mediation Model.*

1. Introduction

Socially responsible investment (SRI), has gained traction in the financial sector as a pathway toward a more equitable and environmentally aware future (Revelli, 2016; Matharu, 2019; Arefeen and Shimada, 2020). The increasing awareness among investors in recognizing the urgent global sustainability issues such as the climate crisis, social inequality, and intricate corporate governance issues has made SRI even more crucial to promote favorable social and environmental impacts. SRI aims to direct capital toward companies and projects that actively improve their operations' social and environmental aspects while simultaneously making a profit for investors (Cowton and Sandberg, 2012). The notion of 'socially responsible investment' has evolved as a potent and pertinent paradigm within investment strategies, potentially influencing how the financial markets develop. There exists a significant gap in our understanding of the intricate mechanisms influencing investors' decisions in this field. This study endeavors to close this gap by proposing a comprehensive model underscoring the nexus of financial literacy (FL), social norms (SN), and environmental beliefs (EN), in shaping socially responsible investment decisions (SRID). Understanding the implications of sustainable investing and making educated investment decisions depend on strong financial literacy. Insufficient financial understanding can lead to poor investment decisions that ignore environmental, social, and governance (ESG) aspects and their long-term impacts on earnings and society (D'Hondt et al., 2022; Filippini et al., 2024). Furthermore, understanding environmental behavior is required to evaluate investor preferences and motivations to make socially responsible investing decisions. According to

Vanwalleghem and Mirowska (2020), EN is a crucial factor in increasing the demand for sustainable investment solutions and reflecting investors' environmental sensitivity. Similarly, social norms (SN) are cultural conventions, expectations, and attitudes toward smart investing strategies. Social considerations, peer pressure, and cultural viewpoints on sustainable investing can all influence investor behavior. According to Mishra et al. (2023), SN influences investors' attitudes and behaviors toward socially responsible investing by providing the socio-cultural environment for investment decisions. The critical impact of SN has been explored and validated in diversified decision-making contexts (Chang & Sanfey, 2013; Melnyk, 2019, Müller-Engelmann, 2013). Therefore, the study aims to present a novel conceptual model and investigate the affects of FL, EN, and SN collectively on determining responsible investment behavior.

1.1 Theoretical Framework

To investigate the psychological elements that encourage retail investors to seek socially responsible investing (SRI), this study uniquely grounds the conceptual framework on the social cognitive theory (SCT). SCT has been widely used as a foundational framework in a variety of fields of study, including organizational management (Wood and Bandura, 1989; Chang and Edwards, 2014), health behavior (Anderson et al., 2007; Tsai, 2014), technology adoption (Boateng et al., 2016, Khoirunnida et al., 2017), purchase decision (Milakovic, 2021; Perera et al., 2019; Lim et al., 2019), and numerous other interdisciplinary domains.

1.2 Conceptual Model

The research model of our study has been conceptualized based on SCT, as the theory fundamentally states that individuals learn and make decisions through the interplay of cognitive abilities, personal beliefs and environmental beliefs. In the context of SRI decisions, this theory provides a comprehensive framework for understanding how the various factors play their roles in influencing investor behaviour toward making SRI decisions. The conceptual model as depicted in Figure 1 incorporates the three main components of SCT. The personal factors and cognitive abilities component include financial literacy (FL) and environmental belief (EN) as the determinants of SRI decisions. FL

equips investors with the knowledge to evaluate the SRI options efficiently and EN aids in shaping the investors' preferences for SRI. The environmental factor of the SCT is represented by social norms (SN) in our study and the behavioral factor is determined by the SRI decisions of the retail investors as the outcome of the interplay between these cognitive and environmental determinants.

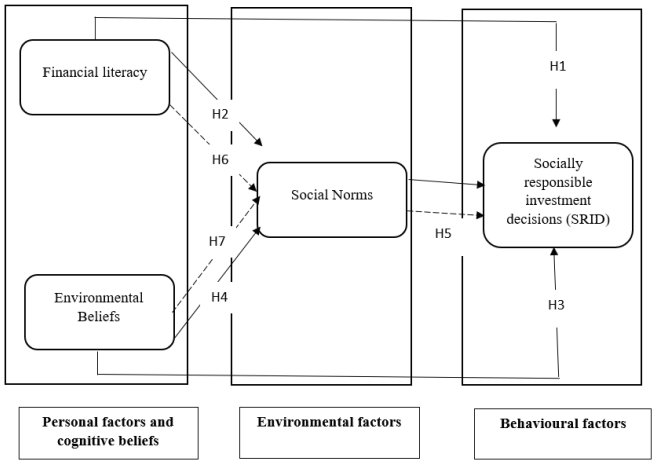

Figure 1. Conceptual Model

2. Review of literature and hypotheses formulation

2.1 The interplay between FL, SN, and SRID

Financial literacy is defined as having the awareness, understanding, and proficiency to manage personal finances, as well as the confidence to make sound financial decisions such as budgeting, saving, and investing (Redmund, 2010; OECD, 2017; Lusardi and Mitchell, 2014). Financially literate individuals have a better grasp on the concept of financial risks and their potential implications, according to several research, including those by Lusardi & Messy (2023), Molina-García et al. (2023), and Hermansson & Jönsson (2021).

While formerly FL focused solely on economic considerations, recently with the evolving definitions FL is acknowledged as critical in changing people's attitudes and behaviors regarding

environmental issues. Cucinelli and Soana (2023) demonstrated in their study that as retail investors learn more financial knowledge and improve their savings and financial control behaviors, they are more likely to choose socially responsible financial intermediaries. They are inclined to assess investment opportunities based on the variety of available options, associated expenses, and potential returns. This allows them to critically assess investment options and select those that support both their non-economic and economic objectives (Chrisman et al., 2012; Passi et al., 2024; Garg et al., 2022). According to Lusardi and Mitchell (2008), financial literacy extends beyond personal welfare to tackle societal concerns such as sustainability. OECD (2018) highlights the importance of sustainable financial literacy as a concept that integrates sustainability concepts into financial decision-making. Additionally, financial literacy was identified by Siddik et al. (2023) as a major predictor of company sustainability success. By reducing financial barriers and bolstering corporate governance, increased financial literacy may encourage business innovations. Thus, these factors support the development of sustainable companies and further efforts to mitigate the effects of climate change (Luo and Cheng, 2022). Furthermore, Kumari and Harikrishnan (2021) highlighted in their research the value of financial literacy as a tool for wise decision-making and guaranteeing the environment's sustainability in the future.

According to Gertler et al. (2012), and Lusardi and Mitchell (2014), financial literacy is critical in shaping how society as a whole views and manages financial matters, with implications ranging from individual savings to investment decisions. Financial decision-making based on social norms includes a variety of elements, including following cultural standards for investing, saving, and spending, as well as being influenced by peers' financial actions. This influence can be noticed through behaviors such as herd mentality and social proof, in which people base their financial decisions on what others are doing (Hidayanti et al., 2023; Rind et al., 2023; Banerjee & Das, 2023). Fernandes et al. (2014) proposed that financial knowledge could potentially reinforce social norms.

Drawing on the preceding arguments, we propose the following hypotheses:

H_1: FL significantly influences SRID.

H_2: FL significantly influences SN.

2.2 The interplay EN, SN, and SRID

Environmental beliefs are an individual's attitudes, values, and convictions regarding environmental issues and sustainability (Dietz et al., 2005). These attitudes are developed by personal experiences, sustainable financial literacy, societal influences, and environmental awareness. They have an important role in molding behaviors and affecting cultural norms on environmental conservation and sustainable activities (Stern, 2002). Gifford and Nilsson (2014) emphasized the role of environmental views in creating societal norms about sustainability. Furthermore, Leiserowitz (2006) emphasized the complex and multifaceted nature of public responses to climate change, demonstrating that these responses stem from a combination of values, beliefs, and personal experiences. Environmental values influence societal norms and can foster widespread adoption of sustainable practices (Dilla et al., 2019; Kollmuss and Agyeman, 2010). For example, investors who pay close attention to environmental issues are more likely to incorporate important information into their decision-making process (Barber and Odean 2008). Furthermore, Bolton and Kacperczyk (2017) found that environmentally conscientious investors evaluate carbon emissions and environmental risks while evaluating investment opportunities. Value-driven investors prioritize environmental values and social responsibility when making investment decisions (Schoenmaker & Schramade, 2023).

Thus, we propose the following hypotheses:

H_3: EN significantly influences SRID.

H_4: EN significantly influences SN.

2.3. The interplay between SN and SRID

Individuals' investing decisions are influenced by social norms, which dictate acceptable behavior within society. This can lead to herding behavior, in which investors follow the crowd based on social conventions rather than financial incentives (Cialdini and Goldstein, 2004). Over the last two decades, economists have expanded traditional rational choice theories to reflect collective behaviors by incorporating social and psychological factors. Bikhchandani et al. (2001) investigated the idea of herding in investing decisions and discovered that social norms

play an important role in persuading investors to follow the pack. Furthermore, Li et al. (2021) explored how cultural norms influence investing choices, implying that investors from various cultural backgrounds may exhibit varied investment behaviors shaped by the societal norms and values common in their respective cultures. Furthermore, Gutsche et al. (2019) noted how cultural standards that promote ethical and sustainable behaviors have aided the emergence of socially responsible investing.

Therefore, we propose the following hypotheses:

H_5: SN significantly influences SRID.

H_6: SN mediates the relationship between FL and SRID.

H_7: SN mediates EN and SRID.

3. Research Methodology

To create the questionnaire for this study, we employed a rigorous process that included an extensive examination of current literature, expert comments, and pilot testing (Carpenter, 2018). Using primary data, the study used an explanatory methodology to assess the links between FL, EN, SN, and SRI decisions. A well-structured questionnaire was created, incorporating measuring questions primarily derived from existing research and making required revisions to fit the study's setting. We customized the items for the 'financial literacy' construct to assess long-term financial literacy for our study (see Appendix 1).

The study used a survey instrument with four constructs and 17 statements: 4 items for Financial Literacy (FL), 4 for Environmental Beliefs (EN), 4 for Social Norms (SN), and 5 for Socially Responsible Investment Decisions (SRID). These constructs were measured using a "five-point" Likert scale, with '1' indicating "strongly disagree" and '5' indicating "strongly agree".

BSE India's publicly accessible database (bseindia.com) provided the first list of registered investors from every Indian state. The states of Assam, Delhi, and Karnataka were chosen at random using a simple random sampling technique. After that, questionnaires were given to individual investors in each state that was chosen based on the percentage of retail investors in that

state. The entire set of data was gathered between March 21, 2024, and June 30, 2024.

4. Results

In this study, for structural and measurement analysis, we used PLS-SEM with SmartPLS v4.0.8.7 software. PLS-SEM has the advantage of evaluating complex models, such as mediation and moderation effects, within a unified framework. We evaluated the measurement model first, then the structural model, in accordance with Hair et al.'s (2019) guidelines.

To reduce the possibility of Common Method Bias (CMB), which occurs when data is collected from the same group of participants using a single instrument that includes both the dependent and independent variables, we used two different strategies. First, we used procedural procedures by randomly arranging all research objects (Podsakoff et al., 2012). We then ran two statistical procedures to determine the presence of CMB. The first test entailed running the Harman one-factor test with SPSS 21.0 software. According to the findings, the highest explained variance came out at 42.578 percent, falling below the essential criterion of fifty percent. This result rules out any large CMB presence (Fuller et al., 2016; Podsakoff et al., 2012).

4.1 Measurement model assessment

The results demonstrated that all of the constructs' outer loadings were statistically significant and exceeded the “planned” 0.70 criteria. Cronbach's alpha and composite reliability (CR) were both more than 0.70, indicating adequate internal consistency (Hair et al., 2017). Furthermore, as shown in Table I, all components had average variance extracted (AVE) values much higher than the cutoff of 0.50, indicating strong convergent validity per the recommendations established by Fornell and Larcker (1981) and Hair et al. (2017).

To determine discriminant validity, the study employed the heterotrait-monotrait (HTMT) correlation ratio in addition to Fornell-Larcker's (1981) criterion, as indicated in Tables II and III. All HTMT values remained below the 0.85 limit, indicating discriminant validity. The measurement model is depicted in Figure 2.

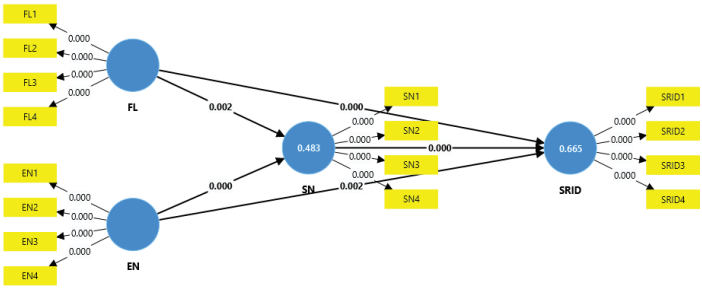

Figure 2. Construct measurement assessment model.

Table I: Convergent validity assessment.

Constructs	Cronbach's α	CR	AVE
EN	0.839	0.839	0.677
FL	0.753	0.756	0.574
SN	0.770	0.779	0.592
SRID	0.838	0.843	0.674

Table II: HTMT Ratio

Constructs	EB	FL	SN	SRID
EN				
FL	0.657			
SN	0.807	0.688		
SRID	0.782	0.827	0.830	

Table III: Forenell-Larcker values.

Constructs	EB	FL	SN	SRID
EN	0.784			
FL	0.560	0.750		
SN	0.654	0.543	0.783	
SRID	0.667	0.596	0.686	0.766

4.2 Structural model assessment

The appropriateness of the structural model was established through standardized root mean square residual (SRMR) value. An optimum match is suggested when the SRMR value is less than 0.10 (Henseler et al., 2016). While saturated SRMR represents perfect fit, which is impossible to achieve in real-world circumstances, estimated SRMR evaluates model fit while taking into account model complexity, assisting in determining the model's capacity to recreate observed correlations between variables. In our analysis, the model performed well, with an estimated SRMR value of 0.075. This shows that the relationships hypothesized in our model are statistically valid and that the model accurately represents the underlying data structure.

The following phase involved assessing the structural model's predictive relevance using R^2 and Q^2 metrics, as recommended by Yao et al. (2023). Chin (1998) provided three distinct ranges for R^2 values to classify the degree of fit: weak (0.02 to 0.13), moderate (0.14 to 0.26), and considerable (> 0.26). In our analysis, all endogenous variables had R^2 values ranging from 0.314 to 0.587, indicating a high degree of fit, as shown in Figure 3. This suggests that our model can explain a significant portion of the variance in the endogenous constructs, increasing confidence in its predictive capacity. Furthermore, all of the exogenous constructs had Q^2 values above zero, ranging from 0.278 to 0.344. These findings suggest that each exogenous construct made a significant contribution to predicting the expected correlations (Hair et al. 2016). Values greater than zero are important because they represent the degree of predictive accuracy in the PLS path model. The relevance of the model's accuracy is rated as small, medium, or big, with values greater than 0, 0.25, and 0.50, respectively. As a result, our model revealed significant explanatory competence and showed strong predictive power.

Furthermore, the study utilized the boot strapping technique using 5000 sub samples to rigorously evaluate the importance of path coefficients. Table IV has detailed data for the hypothesized connections, which are displayed in Figure 3. The use of bootstrapping strengthens our findings by guaranteeing that the computed path coefficients are accurate and statistically valid.

In the study, hypotheses 1 and 2 proposed that FL and SN each had a considerable impact on SRID. Financial literacy has a considerable impact on socially responsible investment behavior ($\beta = 0.526$, $p < 0.000$). This means that those who have more understanding of sustainable finance are more likely to participate in SRI. The study found a substantial influence of FL on SN ($\beta = 0.543$, $p < 0.000$), supporting the adoption of H1 and H2. In support of hypotheses 3 and 4, EN has a significant and favorable impact on both SRID ($\beta = 0.503$, $p \leq 0.000$) and SN ($\beta = 0.563$, $p \leq 0.000$). Furthermore, SN had a substantial influence on SRID ($\beta = 0.489$, $p < 0.000$). As a result, hypotheses 3, 4, and 5 were validated and accepted. The structural model is depicted in Figure 3.

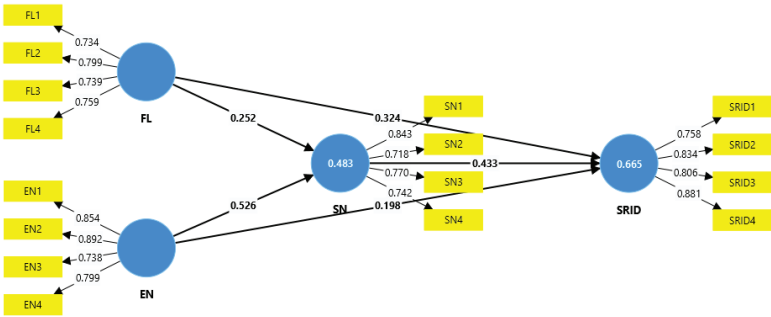

Figure 3. Structural model.

Table IV: Results of total effects

Hypotheses	Linkage	β	p-value	Remarks
H1	FL → SRID	0.526	0.000	Supported
H2	FL → SN	0.543	0.000	Supported
H3	EN → SRID	0.503	0.000	Supported
H4	EN → SN	0.563	0.000	Supported
H5	SN → SRID	0.489	0.000	Supported

4.3 Mediation assessment

To investigate the mediation effects, we used Preacher and Hayes' (2008) bootstrapping resampling approach. In addition, we examined the importance of interaction terms to assess their effect on the dependent variable. Table V shows that SN significantly affects the link between FL and SRID ($\beta = 0.386$, $p \leq 0.000$) and EN and SRID ($\beta = 0.267$, $p \leq 0.000$), supporting H6 and H7. These findings indicate that social norms play an important role in changing people's attitudes and behaviors toward sustainable investing.

Table V: Mediation results.

Hypotheses	Linkage	β	p-value	Remarks
H6	FL → SN → SRID	0.386	0.000	Supported
H7	EN → SN→ SRID	0.267	0.000	Supported

5. Discussion and implications

The study provides empirical evidence demonstrating the efficacy of Social Cognitive Theory (SCT) in decision-making within the context of SRI. From a theoretical approach, the current work empirically evaluates the interrelationships between FL, EN, SN, and SRID, adding to our theoretical understanding of these interactions. The data indicate a significant association between FL and SRID, EN and SRID, and SN and SRID, which is similar with previous study by Jain et al. (2022), Kumari and Harikrishnan (2021), Raut (2020), and Cucinelli and Soana (2023). This tendency represents a global change in which investors prioritize environmental and social concerns over financial profits (Tripathi and Kaur, 2020; Ahmad et al., 2023; Liu et al., 2023; Dmuchowski et al., 2023). Interestingly, our data show that social norms play an important role in determining SRI-related decisions. This is consistent with previous studies indicating a favorable relationship between normative influence and socially responsible investment decisions (Cialdini and Goldstein, 2004; Gutsche et al., 2019; Hong and Kacperczyk, 2009). This observation serves as a reminder that human conduct is intricately linked to societal processes. Social norms, which often operate in the

background, have a substantial impact on investor decisions and help to promote responsible investing as a desired and widely accepted practice. In conclusion, our research offers light on the complex factors that underpin SRI choices and gives a path for multiple stakeholders to guide the economy toward greater environmental consciousness and sustainability.

The study's findings have several important theoretical implications that contribute to our knowledge of social cognitive theory (SCT), sustainable development, and behavioural finance. To begin, by applying SCT to the realm of sustainable finance and emphasizing the importance of FL, EN, and SN as critical components in individual investment decisions, this work contributes to SCT. The study extends the application of SCT beyond traditional domains such as health behavior and education by investigating the interaction of FL, EN, and SN in deciding responsible investing choices. This update expands SCT's utility as a theoretical framework for understanding various pro-environmental behaviors and financial decisions. Additionally, the study merges concepts from the domains of behavioral finance and sustainable investing. Behavioral finance focuses on how psychological biases influence financial decisions, whereas sustainable investing seeks to match investments with ethical, social, and environmental goals. This study combines ideas from both disciplines to provide a comprehensive understanding of investor behavior in the context of sustainable finance by highlighting the importance of FL, EN, and SN as drivers of SRI decisions.

Furthermore, the study offers important practical consequences for many stakeholders, including financial institutions, educators, politicians, and individual investors. It provides actionable insights for furthering sustainability goals and boosting SRI. The report suggests that educators and policymakers prioritize developing targeted financial education projects centered on sustainable finance for people of all ages. Moreover, policymakers could also explore incorporating social responsibility incentives and standards into financial rules. This might include urging financial firms to offer SRI options and regularly report ESG data. They could also encourage sustainable investments through tax breaks, subsidies, and research projects aimed at sustainable

technology and businesses. To attract a broader range of investors and help clients achieve both financial returns and positive societal impact, the study emphasizes the role of EN as a driver of sustainable investment decisions, encouraging financial advisors and portfolio managers to incorporate ESG factors into their investment strategies by providing investment options that align with multiple ESG themes and risk profiles. Additionally, based on the study's results about the significant impact of social norms on investment decisions, policymakers, and organizations might create campaigns promoting sustainable investing as a socially responsible activity. These programs can use the influence of peers, public personalities, and social networks to create positive feedback loops that encourage more people to adopt responsible investment habits. Recognizing the potential for sustainable investments to have positive results over time might encourage a move away from short-term profit-seeking behaviours and toward sustainable investment methods that are aligned with the larger goal of sustainable development.

6. Limitations and Future Research scope

Despite the study's contribution, there are certain limitations that need to be addressed and explored for future research potential. Since the study is based on data captured within a single time frame and specific geographical context, it is suggested to assess the model in a different setting of emerging economies with extended time period to generalize the findings of the study. Additionally, future research may consider extending the model by incorporating factors such as ethical values, self-efficacy, environmental concern and status-quo bias to contribute to the existing research of SRI behavior.

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11

Arsenic Contamination in Groundwater and its Impact on Human Health in North-Eastern India: A Review

Swarup Bharali* & Ritwik Mazumder**

Abstract

Arsenic is a metalloid with compounds that exist in crystalline, powder, or vitreous form. It is a natural component found in the earth's crust, but industrial waste is a major source of harmful Arsenic compounds. Arsenic contamination in groundwater in North-East India has already been proven to be dangerous regarding its influence on human health. Long-term consumption of arsenic-contaminated water produces arsenicosis, a chronic health disorder caused by prolonged exposure to arsenic above tolerance thresholds. This study aims to outline the actual status of arsenic concentration level of North-Eastern states of India based on a review of literature. Existing studies also reported the presence of arsenic-contaminated groundwater in Assam, Manipur, Meghalaya, Mizoram, Arunachal Pradesh, Nagaland, and Tripura, and Sikkim. Most of the areas of the North-East Indian states are identified having arsenic concentration level ranges from 50 μg/L to 986 μg/L. The level is distressingly significant when compared to the permissible limits quoted by WHO (World Health Organization) and BIS (Burau of Indian Standard) (10 μg/L and 50 μg/L).

* Research Scholar, Department of Economics, Assam University, Silchar

** Professor, Department of Economics, Assam University, Silchar

Prolonged exposure to arsenic in drinking water can lead to skin lesions, cardiovascular diseases and various cancers including those of the skin. Arsenic-affected people are suffering from income loss, lower productivity, and diminishing ability to work, resulting in strained family relationships.

Keywords: *Arsenic, Groundwater, North-Eastern States, Health Hazard, Status.*

1. Introduction

Access to safe drinking water, sanitation, and hygiene is a fundamental human necessity for health and well-being, as per the United Nations 6th Sustainable Development Goal. In India, right to water is recognized as a fundamental right by the higher judiciary. It is an essential resource for human survival, and hence ensuring the supply of pure and safe drinking water-free from any harmful contaminants is a critical concern for public health. Various studies and reports have highlighted the presence of arsenic in water, rendering it unsafe for consumption (WHO 2019, Mahanta et al., 2016, and Roy 2007). Arsenic contamination in groundwater is a global concern, as it has led to numerous health related issues in various regions across the globe, including Argentina, Pakistan, Mexico, Thailand, Chile, Nepal, Vietnam, and Myanmar (Dhar et al., 1997; Chakraborti et al., 2002; Mandal and Suzuki, 2002; Smedley and Kinniburgh, 2002; Pfeifer et al., 2004; Hossain, 2006; Mondal et al., 2006). The extent and the nature of groundwater arsenic contamination in drinking water is continuously increasing, with the new areas being identified through the ongoing surveys. Over the past few decades, several new cases of arsenic contamination have emerged, particularly in Asian countries. Before 2000, three major incidents of groundwater Arsenic contamination were recognized in Asia, specifically in Bangladesh, West Bengal (India), and in certain locations in China and Taiwan.

In Eastern Africa, arsenic has been detected in surface water systems in Ethiopia, Kenya, and Tanzania. The concentrations levels range from a minimum of 0.21 µg/L (Dsikowitzky et al., 2013, Rango et al., 2013) to a maximum of 566 µg/L within regions of the East African Rift Valley (EARV). The presence of arsenic

in groundwater systems has been documented in Ethiopia and Tanzania. In Ethiopia, arsenic concentrations in groundwater range from a minimum of 0.6 μg/L to a maximum of 566 μg/L, as reported by Rango et al. (2013) in the Kenyan section of the EARV. In Ghana, arsenic concentrations in surface water, primarily from the Ankobra River, ranged from <0.003 to 28,950 μg/L (Rossiter et al., 2010; Akabzaa et al., 2009). Similarly, arsenic levels between 0.62 and 119 μg/L were reported in the surface water systems of Cape Town and Koekemoe Spruit (Akinsoji et al., 2013; Dzoma et al., 2010).

In Asian scenario, Arsenic contamination has been reported in various countries, including Afghanistan, Armenia, Azerbaijan, Bangladesh, Cambodia, China, Georgia, India, Indonesia, Iran, Iraq, Japan, Jordan, Kazakhstan, Kyrgyzstan, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, the Philippines, Russia, Saudi Arabia, Sri Lanka, Thailand, Turkey, Turkmenistan, Uzbekistan, Vietnam, Tajikistan, and Korea. Among these, China, Bangladesh, India, and Pakistan are the most severely affected (Shaji et al., 2021).

High concentrations of arsenic (>10 ppb) have been detected in shallow aquifers across 10 states in India. The first reported case of arsenic contamination in groundwater was from the Chandigarh region in northern India (Datta and Kaul, 1976), followed by a second case in the lower Gangetic Plain of West Bengal (Garat et al., 1984).

Arsenic contamination in groundwater was first reported in Assam in 2004. Higher concentrations of arsenic and other elements have been observed at shallow depths, similar to findings in other regions of the Brahmaputra floodplain. Additionally, the Jorhat district of Assam has been identified as having high levels of arsenic in its groundwater (Shaji et al., 2021, Singh, 2004, Mahanta et al., 2016a).

Consumption of arsenic contaminated water exceeding 50 μg/L (According to BIS) is linked to various health related issues, including skin disorders (pigmentation, dermal hyperkeratosis, and skin cancer), as well as cardiovascular, neurological, haematological, renal, and respiratory diseases. According to WHO guidelines (WHO, 1993), the maximum permissible limit

of arsenic in drinking water is 10 μg/L, which is also adopted by the Bureau of Indian Standards (BIS, 2003). Additionally, it has been associated with lung cancer, bladder, liver, kidney, and prostate (Smith et al., 1998). Over the past four decades, millions of tubewells have been installed in the Ganges Brahmaputra Meghna (GBM) delta complex and other regions worldwide (Ravenscroft et al., 2009). The occurrence, source, and movement of arsenic in sedimentary aquifers are influenced by several factors such as local geology, geomorphology, hydrogeology, and sediment geochemistry (Nickson et al., 1998; Acharyya et al., 2000; Smedley and Kinniburgh, 2002; McArthur et al., 2004; Acharyya and Shah, 2007, 2010).

Long run exposure to arsenic-contaminated drinking water has a significant negative impact on human health, socioeconomic conditions, productivity, and agriculture. Many people who are primarily living in rural areas are unaware of the arsenic-related issues they are facing. Infect, in Majuli district, Assam, around 99 per cent of the affected population is unaware of the harmful health impacts of arsenic contamination, with only 15per cent having any understanding of the associated health risks (Goswami et al. 2020). Overall, 84per cent of households have heard about arsenic, with the wealthiest group being far more informed (97per cent) compared to the poorest (69 per cent) (Ahmed et al. 2011). Sultana et al. (2013) found that most respondents do not have the basic knowledge about arsenic poisoning. Beyond its health consequences, arsenic contamination in water causes severe social and psychological distress. Many past research, particularly in Bangladesh, highlighted the socio-economic, cultural, and mental health effects of arsenicosis (Curry et al. 2000; Barkat 2004; Hadi & Parveen 2004; Hanchett 2004; Hassan et al. 2005; Ahmad et al. 2007; Nahar, Hossain & Hossain 2008; Brinkel et al. 2009; Sarker 2010; Mahmood & Halder 2011; Sultana et al. 2012; Syed et al. 2012).

The present study aims to provide an overview of the Nort Eastern situation concerning arsenic contamination in water, as well as human exposure to contaminated water, which continues to pose a health risk. It is important to note that the data presented are based on major published case studies and do not necessarily represent the complete scenario in each state.

2. Sources of Arsenic contamination

Groundwater can be contaminated by both natural and human-made sources. Common causes of pollution include leaks from septic tanks and landfills, industrial and municipal waste disposal, dumping of toxic chemicals, radioactive waste disposal, mining activities and mine drainage, as well as the use of fertilizers and pesticides in agricultural production. Additionally, natural contaminants such as arsenic, lead, and fluoride can also pollute groundwater. Arsenic contamination, in particular, originates from both natural and anthropogenic sources.

Natural Sources: Arsenic is naturally present in soil and rock and can dissolve into groundwater, eventually entering drinking water wells. One of the most common mineral sources of arsenic is arsenopyrite, which is found in abundance. It typically occurs under anaerobic conditions, along with other minerals like phosphates and silicates, which tend to form rocky structures (Smedley and Kinniburgh, 2002).

Anthropogenic Sources: Arsenic can enter groundwater due to human activities such as mining, coal and petroleum extraction, excessive pesticide use, and industrial effluent discharge.

3. Methodology

The information and data have been gathered from secondary sources, including various government reports, journals, articles, the Public Health Engineering Department (PHED) website, the State Water Investigation Directorate (SWID) website, and Planning Commission reports.

3.1 Health problems due to prolonged use of arsenic contaminated water

Long-term use of Arsenic-contaminated water causes several diseases. According to the BIS standard, 50 μg/L is the maximum level that is safe to drink, Arsenic-contaminated water. The World Health Organization set the level of Arsenic-contaminated water to 10 μg/L. But if an area where the Arsenic contamination water level is above its maximum level (BIS), then long-term exposure to Arsenic in drinking water has been linked to an increased risk of various cancers, skin lesions, neurological

effects (cognitive deficits, developmental issues in children, etc), cardiovascular effect (hypertension, atherosclerosis), reproductive and developmental issues (infertility, increases risk during pregnancy), gastrointestinal issues (abdominal pain, diarrhea), immune system suppressors (Infections, Illness) etc.

Figure 1: Pictures of health issues due to arsenicosis

Source: *(Chakraborti et al., 2017)*

Drinking tube-well water that has Arsenic contamination above 50 µg/L increases the risk of fatal loss and infant death (Chakraborti et al., 2016). The long-term exposure to high levels of inorganic Arsenic contaminated water above BIS level, the first changes usually seen in the skin: are pigmentation changes and then skin lesions and hard patches on the palms of the hands and soles of the feet, which may be the precursor to skin cancer (WHO, 2019). Consumption of arsenic contaminated water led to multiple health disorders, including cancer, melanosis, keratosis, and Arsenicosis (Jha & Tripathi, 2021). Arsenic-affected people are not only suffering health-related problems but also a burden on their families as well as society, and also for the country as well (Ahmed et al., 2011).

4. Present scenario of arsenic contamination in groundwater in North Eastern India

The first monitoring of groundwater arsenic contamination in the North-Eastern (NE) region was conducted in 2003 by Singh (2004). His survey covered all eight NE states- Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and

Tripura. The study identified elevated arsenic levels (>50 μg/L) in the groundwater of most NE states, except Meghalaya and Sikkim. Later, Kumar et al. (2013) also confirmed Mizoram as a non-arsenic-contaminated state. However, further monitoring of groundwater in other NE states remains crucial, given the WHO permissible limit of 10 μg/L.

In Assam, groundwater arsenic concentrations have been found to exceed 50 μg/L in most of the districts, and almost 23 out of 27 districts affected from arsenic contamination (Singh, 2004; Hazarika and Bhuyan, 2013; Kumar et al., 2013; Goswami et al., 2014; Puzari et al., 2015). The Arsenic levels across different districts range from 50 to 657 μg/L. The most severely affected districts are Jorhat, Lakhimpur, Nalbari, and Nagaon. In Jorhat, arsenic contamination is highest, ranging from 194 to 657 μg/L, while in Lakhimpur, the levels of arsenic contamination varied between 50 and 550 μg/L. In Nalbari, 19per cent of the samples (72 samples) contained arsenic concentrations between 100 and 422 μg/L (Singh, 2004). According to recent data from 2023, cancer cases in Assam have surged due to arsenic contamination in drinking water. Prolonged consumption of arsenic-contaminated drinking water has been linked to various health issues, primarily skin pigmentation, thickening of the skin, and the development of hard patches on palms and soles (hyperkeratosis).The Public Health Engineering Department of Assam in 2023 reported that 6,881 habitations across 20 districts in the state are affected by arsenic contamination. Baksa district in Lower Assam recorded the highest number of affected habitations at 1,506, followed by 1,454 in Jorhat district of Upper Assam and 1,342 in Nalbari district.

In the floodplain areas of Assam, including Barpeta, Dhemaji, Dhubri, Darrang, and Golaghat districts, the level of arsenic contamination in water ranged from 100 to 200 μg/L and in the remaining 14 districts, arsenic concentrations in water varied between 50 and 100 μg/L. Three districts of Assam, viz, Karbi Anglong, NC Hills, and Morigaon, were found to be free from arsenic contamination. In Golaghat, which borders West Bengal and Bangladesh, arsenic levels reached up to 128 μg/L (Chetia et al., 2011). Majuli Island, a subdivision of Jorhat and the world's largest inhabited riverine island, is also affected by arsenic

contamination. Groundwater arsenic levels in Majuli ranged from <3 to 468 µg/L (n=380), with 37.6per cent of samples exceeding 10 µg/L and 16per cent surpassing 50 µg/L (Goswami et al., 2014).

Table 1: Number of districts affected and groundwater (GW) arsenic (As) contamination range in various states of Northeast India.

Sl.No	State	No. of affected districts	Range of GW As µg/L (microgram per liter)	References
1	Arunachal Pradesh	6	58-618	Singh, 2004
2	Assam	23	3-657	Singh, 2004; Hazarika and Bhuyan, 2013; Kumar *et al.*, 2013; Goswami *et al.*, 2014; Puzari*et al.*, 2015
3	Nagaland	3	50-278	Singh, 2004; Puzari*et al.*, 2015
4	Manipur	4	3-986	Singh, 2004; Chakraborti *et al.*, 2008
5	Meghalaya	0	No arsenic state	Singh, 2004
6	Mizoram	1	<10	Singh, 2004; Kumar *et al.*, 2013
7	Sikkim	0	No arsenic state	Singh, 2004
8	Tripura	4	65-444	Singh, 2004; Banerjee *et al.*, 2011

In Arunachal Pradesh, arsenic contamination was reported in six out of 13 districts surveyed in 2004- Papum Pare, West Kameng, East Kameng, Lower Subansiri, Dibang Valley, and Tirap (Singh, 2004). All these districts are located near the Assam border. Arsenic concentrations ranged from 58 to 618 µg/L, with the highest levels recorded in the Midland block of Dibang Valley district. Similarly,

the border areas of Nagaland, particularly those adjacent to Assam's Jorhat district, are affected by arsenic contamination. In Nagaland, two out of eight districts- Mokokchung (50–278 μg/L) and Mon (67–159 μg/L)- had elevated arsenic levels. Additionally, traces of arsenic (<10 μg/L) were detected in Wokha and Zunheboto districts (Singh, 2004). Tripura is also significantly affected by arsenic contamination. Groundwater arsenic levels ranged from 65 to 444 μg/L in West Tripura (Jirania block), Dhalai (Salema block), and North Tripura (Dharmanagar block). Among these, Dhalai district exhibited arsenic contamination levels nearly twice as high as those in West and North Tripura (Singh, 2004).

The presence of arsenic contamination in groundwater is also been reported in Manipur. Out of the state's nine districts, four located in the Manipur Valley- home to 59 per cent of the state's population- were monitored for arsenic contamination (Chakraborti et al., 2008). In their study, Chakraborti et al. (2008) analysed 628 of the estimated 2,014 hand tube wells in the valley and found that 63.3 per cent had arsenic levels of ≥10 μg/L, 23.2 per cent had concentrations between 11 and 50 μg/L, and 40 per cent exceeded 50 μg/L. Thoubal was identified as the most severely affected district, with 77.6 per cent of tube wells containing arsenic levels above 10 μg/L and 44.4 per cent exceeding 50 μg/L. The highest recorded arsenic concentration (798–986 μg/L) was found in the Kakching block of Thoubal district. An earlier study by Singh (2004) also reported that 50 per cent of samples from Thoubal had arsenic levels exceeding 50 μg/L. Bishnupur was the least affected district, with 21.4 per cent of wells showing arsenic levels above 10 μg/L and 7.1 per cent above 50 μg/L (Chakraborti et al., 2008). The percentage of contaminated wells in Manipur is higher than in other Arsenic-affected states. Notably, there is no correlation between arsenic concentration and the depth of tube wells in Manipur.

Mizoram has been reported as a non-arsenic-contaminated state. Studies, including those by Singh (2004) and Kumar et al. (2013), have not found significant levels of arsenic in Mizoram's groundwater. These studies have not reported significant arsenic contamination in the groundwater of Sikkim state of the Northeast. Research, including findings by Singh (2004) and Kumar et al. (2013), has indicated that Sikkim is not affected by

arsenic contamination, unlike several other states in Northeast India. However, continued monitoring is essential to confirm the absence of contamination.

Table 2: Distribution of groundwater arsenic in north-eastern states of India

Sl. No	State	No. of affected districts	Arsenic Affected districts >50 μg/L
1	Arunachal Pradesh	6	Papum Pare, West Kameng, East Kameng, Lower Subansiri, Dibang Valley, Tirap
2	Assam	23	Nagaon, Jorhat, Lakhimpur, Nalbari, Golghat, Dhubri, Darrang, Barpeta, Dhemaji, Baksa, Bongaigaon, Cachar, Chirang, Dibrugarh, Goalpara, Hailakandi, Karimganj, Kokrajhar, Sivasagar, Sonitpur, Tinsukia, Kamrup Metropolitan, KamrupUdalguri
3	Nagaland	3	Mokok Chong, Mon, Dimapur
4	Manipur	4	Imphal East, Imphal West, Thoubal, Bishnupur
5	Meghalaya	0	Arsenic free state
6	Mizoram	1	Aizawl
7	Sikkim	0	Arsenic free state
8	Tripura	4	West Tripura, Dhalai, North Tripura, South Tripura

Source: Mishra et al., 2016.

An alarmingly high number of places in 20 out of 23 Assam's old districts have groundwater contaminated with massive amounts of arsenic, causing the water completely unsafe for human consumption, according to the results of a survey carried out by a team of scientists from the North Eastern Regional Institute of Water and Land Management (NERIWALM). NERIWALM researchers noticed during their survey that the highest level of arsenic, 657 micrograms per liter, is found in the groundwater Titabor block in the Jorhat district of Assam. According to the BIS report 2008,

Arsenic contamination pockets are increasing continuously. Arsenic covering pockets of seven states (West Bengal, Jharkhand, Bihar, Assam, Uttar Pradesh, Manipur, Chhattisgarh) in 2017 has risen to 10 states (Including Punjab, Haryana, Karnataka) (Kumar Bhattacharya, 2016). Jorhat and Nalbari have more Arsenic-affected populations and the annual household health cost of a 1μm/L increase in Arsenic concentration per litre is about INR4. Furthermore, if the level of Arsenic concentration is reduced to the safe limit of 50 μg/L, the annual welfare gain for a household is estimated to be INR 862. than other districts of Assam (Mahanta et al., 2016).

5. Conclusion

Water is a fundamental need for humans. There is no human existence without water. Arsenic, a metalloid element, can exist in crystalline, powdered, or vitreous forms. It occurs naturally in the Earth's crust. Water contaminated with 50 micrograms of Arsenic per liter is considered acceptable to drink by the Bureau of Indian Standards (BIS). Severe illnesses such as skin cancer, bladder issues, pregnancy problems, diabetic problems, and other bodily disorders can result from drinking water contaminated with Arsenic above the BIS threshold. Along with decreased working hours, and unaware of the arsenic in the water, is also the problem of people's psychological well-being. Prolonged exposure to Arsenic shortens life expectancy and impairs physical capacity, which affects the economy as well.

The review highlights that in recent years, arsenic contamination has been detected in several states that were previously unaffected. With each new survey, additional arsenic-affected areas have been identified, particularly in Uttar Pradesh, Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu (South India). In Northeast India, groundwater arsenic contamination has been identified in six states, while Mizoram and Meghalaya have been recognized as arsenic-free. According to the review, Manipur has the highest arsenic concentration in its groundwater, whereas Assam has the largest number of arsenic-affected districts among all northeastern states.

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12

Terror Attack and Indian Stock Market: An event Analysis

Mahesh Dahal*& Joy Das**

Abstract

The study examined the influence of terror attack on the Indian stock market by considering firms constituted under BSE 100 Index. Using event study methodology on daily price data collected from BSE India, the study observed overreaction of the market during the post event days. On event day although the market was on positive side, but a significant negative reaction is observed on immediate next days. The return kept changing showcasing the confused mindset of investors leading to overreaction of the market to the events as a whole.

Introduction

Terrorism is the unlawful use of force or violence against persons or property to intimidate a government or its citizen to further certain political or social objectives. The 8th report on terrorism in India published in 2008 defined terrorism as the peacetime

* Assistant Professor Department of Commerce, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Tulungia

** Professor, Department of Commerce, Nagaland University, Kohima Campus Meriema, Nagaland

equivalent of war crime. An act of terror in India includes any intentional act of violence that causes death, injury or property damage, induces fear, and is targeted against any group of people identified by their political, philosophical, ideological, racial, ethnic, religious or any other nature (Government of India, 2008).

India's tryst with terrorism and violent extremism can be traced back partly to the religion-based partition in 1947, which ripped the sub-continent into two nations. The sub-continent remained witness to the most horrifying ethnic riots in modern history, which were marked by extreme violence and acts of terrorism.

India, being a developing country, is facing different types of challenges in comparison to many of the other developed countries (Kumar, 2021). Among others, the threat that is the most menacing of all is that of terrorism. There was a time when terrorism was a distant concept wrapped with political motives and cross-border motivations, and to some extent was confined to the state of Jammu and Kashmir. Then it started spreading. Alarmingly, due to externally-sponsored Jihadi terrorism from Pakistan, India bled when the 2008 Mumbai attacks took place. Terrorist attacks result in many economic and social consequences. It damages to the infrastructure, biological loss, environmental damages, loss of confidence in the market and government, social disruption, failure of banking, trade and supply system.

Overview of the Terrorist Attacks happened in India during the last 5 years

Government of India, under the leadership of prime Minister of India in the last eight years, has achieved a huge success in finding a permanent solution the problems of terrorism in Kashmir and Armed Groups in the North East which had been a threat to internal security for many years (Institute for Conflict Management, 22-April-2022).

However, still the cases of terror attack can be witnessed within the Territory of India. Among other the terror attack on Amarnath Pilgrims is onee of the worst attack which killed several pilgrims (Business standard, 2017). Another attack on CRPF in Chhattisgarh's Sukma district (Deccan Chronical, 2018) shocked the nation. The Pulwama attack of J&K where around

44 CRPF personnel were killed and several injured was one of the deadliest terror attacks (Karnad, Chellaney, Saran et al., 2019). The encounter in Chhattisgarh between police officials and maoist is also one of the deadliest attack on Indian forces, which took around 22 life police personal (The Indian Express, 2021).

Considering the India's position as one of the fastest growing nation and emerging hub for investment hotspot, it becomes important to examine the reaction of investors towards such incident. The result of the study showcases the confident of investors toward Indian market and economy despite such infamous incidents.

Literature Review

A few studies are found to be discussing the overall consequences of terrorism on world economies. However, there is not much evidence about the quantifications of the impact of terrorist activities on financial markets and with special reference to India. Thus, the researcher looks into the existing literature to form a better understanding of the destruction effects of terrorist attacks on the stock market and the findings are presented below.

Karolyi & Martell (2005) observe the effect of terror attack using event study methodology and found significant negative effect on stock market in US Stock Exchange Market. Christofis et al, (2013) examined the effect of the three Major Incidents on Istanbul Stock Exchange and reported only short-lived effects since the market rebound was fairly quick however, the tourist industry was found to be more adversely affected by these events. Liargovas & Repousis (2010) investigates the reaction of Greek banks to three major international terrorist events. And found that out of three major terrorist attacks only one resulted in significant abnormal return in Greek bank stocks. The study also indicated the overreaction of exchange to the terrorist attacks. Papakyriakou et al,. (2019) on examining the reflect of terrorism acts on stock exchanges of G7 countries, resulted that there is significantly decline in stock market on the event day as well as on the next trading day. The investor's sentiment affects according to the country level news stories and social media sources. It is also found that there is sharp decline in indices after the event in the countries that leads to economic losses. Aksok (2014) found no statistically significant abnormal returns for the event day, the

market further declined in the post-event days and the analysis shows that Turkish stock market is sensitive to terrorism. Nguyen et al,(2021) studies the effect of terrorism on corporate investment in Indonesia and found negative reaction of corporate investment in the combined group. Kumar & Liu,(2013) investigates the effect of terrorist attacks on International Stock Markets and found negative impact of the event. Chaudhry et al,(2018) examines the effect of terrorism on stock markets in SAARC region and found that terrorism negatively affects the stock market returns of both highly affected and less affected countries Kousar et al,(2019) inspected the impact of terrorism on Stock Markets of South Asian countries and found negative effect on stock market return on Pakistan, India, and Bangladesh but insignificant impact in Sri Lankan stock market. Shoham et al, (2011) analyzed the effect of the attacks on abnormal returns on the Israel Stock Market and observed terrorist attack in the center of Israel has a negative effect for several days and when the attack takes place in the periphery, it has a less significant effect & no lasting impact after the first day. Aslam et al, (2020) examined the impact of terrorist incident and revealed that attacks targeted the security forces and commercial business places which have a significant unfavourable impact on the stock returns. Maitah et al (2017) analyzed the impact of terrorist attacks on exchange rate in Turkey and reveals that a negative impact on the exchange rate in both short run and long run. Markoulis & Neofytou (2019) examined the effect of major attacks in the US and Europe on industry- specific indices and the result shows the significant negative abnormal return on the day of attack. Gul et al (2010) assessed the impact of terrorist activities on the financial markets in Pakistan and found the terrorist activities negatively influence the financial market but the significant differ depending the market.

The existing literature consist of several studies on the impact of terror attack in different parts of the world which reveal that the occurrence of the event had both negative and positive impact on the stock markets. Also, it is found that emerging / developing nations are highly exposed to terrorism as compared to developed nations. However, the literature also showed some exceptions also. Further, it is found that the majority of the studies have been conducted in developed nations and only a few studies have

focused on emerging countries like India. Owing to lack of studies and inconclusive evidence the present study has been initiated to examine impact of terrorist attack on the Indian stock market. The study will provide valuable insights for policymakers, investors, and market participants, helping them to form informed decisions in uncertain and volatile times.

Research Methodology

Objective of the study

This study is undertaken to examine the impact of terror attack (terrorism) on the Indian stock market.

Data

In the present study, firms constituting BSE 100 index is taken into consideration for examining the impact of the terror attack on the Indian stock market.

Data source

The present study is based on secondary source of data. The stock prices of the respective firms are collected from the official website of BSE India. And the information and dates relating to the different terror attack has been collected from various news articles such as *The Times of India, The Hindu, Hindustan Times, The Economic Times, Money control news* for cross verification and authenticity and accuracy of the dates so collected.

Tools and Techniques:

Event Study Methodology:

The present study is an empirical work which relies on event study methodology to analyze the impact of terrorist attack on the Indian stock market. The event study methodology developed by (Fama et al, 1969) is considered as one of the most popular and suitable method to study the impact of an event on security returns for a particular period.

Calculation of return: To calculate the daily returns, a log return is used so as to minimize the skewness and to maintain the normality of the data.

Calculation of Expected Return: Using the Ordinary Least Square (OLS) market model developed by Sharpe (1963), the expected returns are calculated.

$$E(R_{j,t}) = \alpha_j + \beta_j * R_{m,t}$$

Calculation of abnormal returns: Now the abnormal returns are calculated using the following formula-

$$AR_{j,t} = R_{j,t} - E(R_{j,t})$$

Calculation of average abnormal return: The Average Abnormal Return (AAR) are calculated by cross-sectional aggregation of the abnormal returns to understand the impact of the event on endorsed firms and it's competing firms

Calculation of cumulative average abnormal returns

In order to observe the impact of the event over multiple days, the cumulative average abnormal returns are calculated.

And finally, T-test is utilised to check if the statistical significance of the return so calculated.

Results and Findings

The figure 1 displays the behavior of AAR of BSE 100 companies during the announcement of terror attack. It is seen from the figure that the announcement has conveyed certain information into the market causing movement in the return series. The AAR prior to announcement day has shown a little volatility as the AAR on the day (-10) to (-5) shows positive return, on day (-4) it shows negative decline and again on day (-3) (-2) it shows sharp positive upraise and on day (-1) it has seen negative return. On event day (0) average return has shown positive upward shift. During the post- announcement period a certain decline in the return series on day (1) is witnessed. However, an upward shift in the market is observed on day (2) and again it started to decline slightly on day (3) but on day (4) an upward shift in the market is observed. While from day (5) to day (6) market witnessed upward shifts. Again, a significant decline on day (7) which remained extremely negative is seen. While a downward shift in the market has seen from day (8) to day (9) and upraise on day (10). Such fluctuation can be attributed to the investor's, non-acceptance, unwillingness

and confused mindset in processing the information released through the announcement of the events.

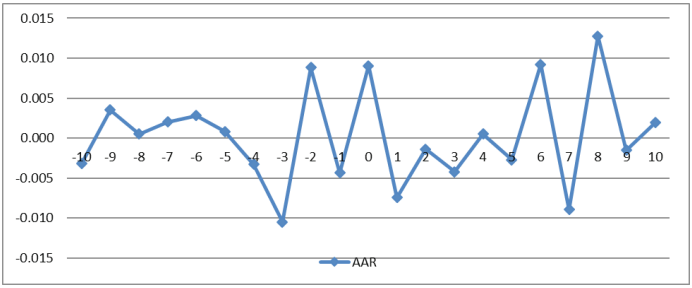

Figure 1: Average Abnormal returns of Firms around the Terror Attacks

Source: Author's calculation

The Average Abnormal Returns shows the impact of the event under BSE100 Companies around the Terror Attack for the event window. In the table 1, the average abnormal return that which is statistically tested by employing T-statistic along with their proportional P-values for the event window are summarized.

Table 1 Average Abnormal returns of Firms around the Terror Attacks

Days	AAR	p-value
-10	-0.003	0.51
-9	0.004	0.46
-8	0.001	0.91
-7	0.002	0.67
-6	0.003	0.56
-5	0.001	0.87
-4	-0.003	0.49
-3	-0.010	0.03**
-2	0.009	0.06*
-1	-0.004	0.37
0	0.009	0.06*
1	-0.007	0.12

2	-0.001	0.77
3	-0.004	0.38
4	0.001	0.91
5	-0.003	0.57
6	0.009	0.05*
7	-0.009	0.06*
8	0.013	0.01**
9	-0.002	0.75
10	0.002	0.69

Source: Author's calculation

Significant at: ***p-value<0.01, **p-value < 0.05, *p-value < 0.1

From Table 1, it is observed during the pre-announcement period there is negative return on day (-10) and it is seen a continuous positive for next five days from (-9) to (-5) and again negative for two days, on day (-3) average abnormal return has seen negative and significant and on day (-2) it is seen positive and significant at 10% level.

However, it is observed that the Average Abnormal Return on the day of the event is positively significant. Followed by insignificant negative abnormal return on day (+1), (+2) and (+3). On the day (+6) the market shows positively significant at 5% level and on day (+7) it shows negatively significant at 10% level, again on day (+8) the market has shown positive significant during the post-announcement period. From the behaviour of the average abnormal return in the post announcement period it can be inferred that the investors are confused regarding the information released and the market continue to fluctuate causing significantly volatility average abnormal return series.

Table 2: Cumulative Average Abnormal returns of Firms around the Terror Attacks

CAARs Windows	CAARs	P-values
(-2,2)	0.005	0.66
(-2,0)	0.014	0.10*

(0,2)	0.000	0.98
(-10,10)	0.005	0.85
(-1,0)	0.005	0.49
(0,1)	0.002	0.81
(-1,1)	-0.003	0.74

Source: Author's calculation

Significant at: ***p-value<0.01, **p-value < 0.05, *p-value < 0.1

Further the CAAR is present in table 2 shows positive and significant return for window (-2, 0) implying a positive market sentiment prior to the events. However in post event window the market seems to be insignificant indicating no significant impact of the event on stock returns.

Conclusion

The present study is an attempt to examine the impact of the terror attack on the Indian Stock market represented by the firms constituting BSE 100 index. The study has been carried by employing Event study Methodology on daily stock prices collected from the official website of BSE India.

The study has found that the impact in the stock market on the occurrences of the terror attacks for the last five years, are both negative and positive in the stock market. It has seen from the overall AAR of firms around the terror attack that the stock prices are negatively significant prior to the event. However, on the event day the market has responded positively with significant return. Such positive reaction of the market can also be seen during the Kargil conflict of 1999, the Sensex and Nifty gained 33 percent each. During the 3 months conflicts, Sensex collected 1,115 points and Nifty rushed 319 points and similarly, during the attacks in Mumbai in 2008, the Sensex surged 400 points in two-day trading. The Nifty rallied100 points even when Mumbai was burning (Money Control, 2019). Such positive reaction of the market indicates the positive sentiment and confidence of the investors in the Indian Stock Market.

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13

Terracotta Industry in Asharikandi: A source of Sustainable Rural Livelihood

Hemoprova Bhakat* & Mahuya Deb**

Abstract

Terracotta is a culture that emphasizes the unification of natural elements with human life. Terracotta pottery is an age-old traditional art of making pottery in India, giving away sustainable entrepreneurship to thousands of people. The presence of craft clusters in rural India is a source of local resource use and non-farm income generation. However, with the growing commercialization and availability of cheap alternative products globally, Terracotta pottery is facing fierce competition. This is aggravated by the restrictions being imposed. Moreover, restrictions have been imposed on the use of traditional kilns as a measure to stop pollution. The ever-growing demand for plastic goods, coupled with nearly two years of pandemic-induced lockdown, has pushed Assam's terracotta industry to the brink of extinction. Drawing upon primary survey-based findings in a terracotta cluster in rural Assam, this paper delves into the socio-economic dynamics of the community within the terracotta and pottery industry in Asharikandi highlighting both the challenges faced by the artisans and the opportunities within this domain that provides for economic growth and social empowerment in rural Assam.

Keywords: *Terracotta, Competition, Socio Economic Dynamics, Challenges.*

* Student, M.Com 4th Semester, Department of Commerce, Gauhati University

** Assistant Professor, Department of Commerce, Gauhati University

Introduction

The term 'Terracotta' has been derived from the words 'TERA' and 'COTTA'. Terra means 'Earth' and Cotta means 'Baked'. Literary the people who made earthen product are known as "Potters" and the profession is called as "Pottery" (**Haloi, 2017**). An object of art made of a composition of clay and sand and baked with earthen colour, a brownish red is terracotta. In India, one of the single largest cluster where both Terracotta and Pottery crafts are found and practiced in a traditional way is Asharikandi (Madaikhali) craft village. The village Asharikandi is better known as "Terracotta craft village". The terracotta industry in Asharikandi , a village in the Dhubri district of Assam, is a unique and significant cultural asset, representing centuries of traditional craftsmanship. In recent years, the industry has witnessed a shift, as local artisans increasingly engage in entrepreneurial activities to meet market demand, enhance their income, and improve the socio-economic conditions of their community (**Hoque 2017).** This transformation from a purely traditional craft to an entrepreneurial venture offers a rich area for exploration in terms of its socio-economic impact, challenges, and opportunities. The name Asharikandi is derived from the combination of two words, ASHAR and KANDI. ASHAR means the third month of Assamese calendar and KANDI means shedding tears. The villages's low-lying area is flooded during the rainy month if Ashar (around Mid-June to Mid-July). Asharikandi is known for its distinctive terracotta products, which include clay pottery, figurines, religious idols, and decorative items. The craft, passed down through generations, is an integral part of the local culture and heritage. However, with the advent of modern markets and the changing dynamics of rural economies, many artisans in Asharikandi have begun to see their traditional craft not just as a livelihood but as a business opportunity. This shift towards entrepreneurship is influenced by various factors, including the need for economic diversification, access to new markets, and the increasing recognition of the craft's cultural and artistic value both locally and globally.

Review of literature

A thorough review of both national and international journals revealed a few important details related to the terracotta,

handicraft and folk art which find a mention below: **Satpathi (2011**), in his research focused on the major crisis of Terracotta craft and suggested further recommendations to sustain its potentiality in India. The tiresome technique of terracotta craft making, the impact of financial organizations and technical assistance are also analyzed in this article in a scientific way. **Khalid (2012)** in his study analyzed the holistic role of handicraft sector for constructing countries share of employment opportunity, rise in regional development rate and prosperity creation. **Towseef Mohi Ud Din(2014)** in his scholarly publication focused on the role of Indian traditional handicraft sector in employment generation , skill enhancement and regional development. He also defined the simplistic procedure of production of various handicrafts by using clay, tree bark, stone and bamboo metals in a sustainable and eco-friendly manner. **Ghosh (2014**) in his research article focused on the impact of intermediary person and analyzed how they would manipulate the price of this terracotta craft article. He showed in his research paper how the rural artisans were deprived as their commodity would be sold at a low price where it is sold in the market at a high price so a high margin of profit. It is the gain by this middleman due to the unawareness of the original artisans who could not get the expected profit after a hard struggle of craft making. So the socio economic situations of these craftsmen remained in a zone of shadow and deprivation. **Dutta(2014)** in his research article on the ground level problems of affecting the marketing mix of terracotta products suggested that Govt. authorities, NGOs and the artisans should take corrective measures for proper utilization of available resources through modern techniques and marketing strategies to develop Asharikandi as a world class production hub for terracotta products. **Sahoo (2016)** in his research paper described the magnificent role of terracotta cottage industry for accelerating the regional development in these rural craft hubs in a very sustainable manner. He also identified the role of women engagement and women participation in these pottery craft. **Gangopadhay and Sen (2019)** in their study on socio economic study on terracotta workers in Panchmura described about the recent rise of demand of terracotta crafts and suggested to merge the terracotta sector with organized sector for its further growth and acceleration of employment and earning opportunity. They

also suggested for proper information, technology up-gradation, skill enhancement programme and proper marketing technique for the convenient development of this sector. **Das et. al (2023)** in their paper aimed to regain the past glory of Terracotta Industry through an interactive service design platform. Based on the inputs with the artisans of Assam, India, the current state of the market and capital was tallied through a questionnaire-based survey. **Sachdev, S et al. (2024)** focused on one arena of livelihood management to promote sustainable rural development, i.e., the Panchmura, Bankura district terracotta industry, which is part of folk culture and heritage.

Research Gap

Majority of the studies related to terracotta industry has dwelt on the problems encountered by the artisans. Very few studies have considered this art as a form of rural sustainable livelihood which could uplift the socio economic condition of the youth living in this region. Also from the perspective of preserving and promoting this unique cultural heritage it seeks to understand how local artisans are navigating the challenges of transforming their traditional craft into viable entrepreneurial ventures. Keeping this in view the following objectives are formulated.

Objectives of the study

1. To study about the socio economic characteristics of the artisans in Asharikandi;
2. To explore how the sector contributes to sustainable livelihood;
3. To identify the constraints suffered by the artisans of the study area.

The broader objective of this research is to shed light on the potential of traditional industries such as terracotta craftsmanship that contribute to rural economic development, poverty alleviation, and cultural preservation. By focusing on entrepreneurship in Asharikandi, this research will contribute valuable insights into the role of cultural industries in promoting sustainable rural development and the potential for rural artisans. Terracotta craftsmanship can be considered a **rural livelihood**

because it provides income and sustenance to artisans in villages, especially in regions where clay is abundant. This study aims to offer a comprehensive understanding of the socio-economic implications of craftsmanship in the terracotta industry of Asharikandi , Dhubri , highlighting both the challenges faced by artisans and the opportunities that entrepreneurship provides for economic growth and social empowerment in rural India.

Research Methodology

An exploratory and descriptive research design is adopted in this research study. To serve the purpose of the study, a structured questionnaire and schedule is designed for the respondents. Also personal interviews were taken. The secondary data has been collected from various published and unpublished articles, Govt. Websites, published books, journals, statistical data and census data. The study involves a sample size of 50 respondents irrespective of their background , educational qualifications and age groups. The sample has been collected using convenience sampling techniques. The collected data have been properly classified, tabulated and presented through various table and diagram such as pie charts, bar diagrams, graphs etc. MS-Excel has been used for analyzing the data in this research study.

Data Analysis and Interpretation

Table1: Demographic profile of the artisans

Age	**No. of Respondents**	**Percentage**
Under 25	3	6%
25-35	5	10%
35-45	10	20%
45-55	17	34%
55 and above	15	30%
Educational Qualification	**No. of Respondents**	
No formal education	14	28%
Primary level	20	40%
Secondary level	6	12%

Higher Secondary level	8	16%
Graduate	2	4%
Others	0	0
Marital Status	**No. of Respondents**	
Married	42	84%
Unmarried	4	8%
Widowed	3	6%
Divorced	1	2%
Monthly income(in rupees)	**No. of Respondents**	
< 10000	26	52%
10000 - 30000	18	36%
30000- 50000	6	12%
> 50000	0	0%
Total	50	100%

Source: Field Study

From the demographic profile it is evident that 34% of the respondents are in the age group 45-55 followed by 30% who are above 55. Respondents who are in the employable age constitute 36%. With respect to the educational level, 20 % of the respondents (highest amongst the lot) and only 2% were graduate. 84% of the respondents were married and 52% were earning below 10,000 rupees per month. A very deplorable state of affairs as seen from their socio economic status.

Table 2: Years of involvement in Terracotta Craftsmanship

Years	No. of Respondents	Percentage
Less than a year	5	10%
1 – 5	8	16%
5 - 10	18	36%
10 years and more	19	38%
Total	50	100%

Source: *Field Study*

From the table it is seen that 38% of respondents were in the terracotta craftsmanship for 10 years and more, this includes artisans with high experience and their deep knowledge can drive product innovation and sustainable practices. Also 36% of them were in the business for 5 to 10 years, which represents more expertise artisans entrepreneurs having knowledge of the market and demand shifts.16% of the artisans were involved in this terracotta craftsmanship for 1 to 5 years, this represents those artisans developing their skills and establishing themselves for the different market challenges. Remaining 10% of the artisans were in this sector for less than a year, which indicates newcomers exploring this sector or a lack of other job opportunity.

Table 3: Learning Platform of Terracotta Craftsmanship

Platform	No. of Respondents	Percentage
Family	34	68%
Self Taught	12	24%
Training	4	8%
Total	50	100%

Source: Field Study

From the table it is seen that 68% of the respondents have learnt the skill from their family ie the skill has been passed on through generations. It aligns with the sustainable development framework which is people centered approach to development. Learning a skill and passing onto the next generation not only keeps the art alive but it also contributes to sustainability. 24% of the respondents learnt terracotta craftsmanship by themselves which shows their effort and creativity but without guidance it may result in potential risk of quality product and limited growth. A very low percentage i.e. 8% of the artisans learnt through professional training. Expanding training programs could improve the quality, innovation and market reach while strengthening both sustainability and entrepreneurial success.

Table 4: Primary source of income of the artisans

Terracotta	No. of Respondents	Percentage
Yes	34	68%
No	16	32%
Maybe	0	0
Total	50	100%

Source: Field Study

The above table points to the fact that 68% of the artisans rely solely on terracotta as their only source of income. While 32% of the artisans have diversified income sources and does not depend primarily on terracotta. This suggests that terracotta plays a crucial role in their livelihood and economic stability. However it is highly vulnerable to changing market demands and consumer preferences. A drop in demand of the terracotta products could directly impact their income and well-being.

Table 5: Type of products produced by the artisans

Type	No. of Respondents	Percentage
Utility items	18	36%
Sculptures	14	28%
Decorative items	12	24%
Others	6	12%
Total	50	100%

Source: Field Study

This table categorizes the different types of terracotta products made by artisans. Utility items (36%) are the most commonly produced, indicating that artisans focus on practical products such as pots, plates, and storage containers. This implies that artisans should target more the household and eco-friendly products. Sculptures (28%) hold a significant share, showing demand for artistic and traditional clay figurines. Such items should find place in exhibitions, online platforms and tourism markets. Decorative items (24%) include home decor pieces like wall hangings, showpieces, and vases, highlighting their importance in interior

design. Other items (12%) may include jewelry, religious idols, or customized handmade products.

Table 6: Initial investment of the artisans on Terracotta business

Investment (in Rupees)	No. of respondents	Percentage
Less than 5000	16	32%
5000 - 10000	20	40%
10000 - 20000	9	18%
More than 20000	5	10%
Total	50	100%

Source: Field study

This table presents data on the **amount of investment** made by terracotta artisans in their business categorized into different investment ranges. 40% of respondents invest between ₹5,000 - ₹10,000 making it the most common investment range, suggesting that most artisans operate on a small scale. So if proper skill training is provided the artisans can maximize their profits even with low investments. 32% invest less than ₹5,000 showing a significant portion of entrepreneurs with very low capital. Government should introduce subsidies and grants to help the small artisans scale up their business. 18% invest ₹10,000 - ₹20,000, which may indicate more established artisans with slightly larger operations. Through bulk purchasing it can help reduce costs and improve production efficiency. Only 10% invest more than ₹20,000, implying that few artisans are scaling up to higher production levels.

Table 7: Primary source of funding terracotta artisans

Source	No. of respondent	Percentage
Personal Savings	17	34%
Family & friends	18	36%
Bank loans	7	14%
Others	8	16%
Total	50	100%

Source: Field Study

From the above table, it can be seen that majority of the artisans i.e. 36% of the respondents were dependent on family and friends for financing their terracotta business, which limits their ability to scale and long term sustainability but also shows trust and close-knit social networks. 34% of the artisans use personal savings for financing their craft business, this shows self reliance and careful or sustainable financial planning but also it shows their financial insecurities that affects long-term sustainability. Together, these two sources account for 70% of the total artisans, showing that informal sources of funding (self and close networks) are the primary choices for most individuals. Also 14% of the artisan depends on bank loan for financing their business which indicates the limited access to formal sources suggesting lack of financial literacy. 16% of the respondents resort to other sources such as micro finance institutions and so on. The last option indicates diverse funding options beyond traditional methods. It could reflect a growing interest in alternative financing like microfinance, government grants, or angel investors. As policy implications for financial institutions there is a gap in accessibility or awareness, which banks could address by offering more flexible loan products for small businesses. Encouraging alternative funding options (e.g., grants, microfinance) could help diversify financing sources and support economic growth.

Table 8: Capacity of producing products

No of units produced /month	No. of Respondents	Percentage
Less than 100	16	32%
100 - 300	24	48%
300 - 500	10	20%
More than 500	0	0%
Total	50	100%

Source : Field Study

Since 80% of respondents produce **300 units or less**, this suggests that many businesses or individuals operate on a small to medium scale rather than mass production. Some businesses (20%) have reached 300-500 units per month indicating that there

is potential for expansion if barriers like funding, market demand, or resources are addressed. Businesses operating in the lower production ranges may need strategies to scale up, such as better funding access, improved marketing, or investment in production efficiency. **For policymakers & financial Institutions:** support for small-scale producers (through grants, better loan accessibility, or infrastructure support) could help increase production. **For investors or suppliers** there may be opportunities to invest in expanding production capacity or supplying better materials/ equipment to increase output.

Table 9: Type of raw materials used by the artisans

Materials	No of Respondent	Percentage
Clay	36	72%
Natural pigments	8	16%
Glazes	3	6%
Others	3	6%
Total	50	100%

Source : Field Study

The above table shows that 72% of the artisans use clay that indicates the artisan's strong dependency on natural resources. Clay is often readily available and cost-effective compared to processed materials. High demand for clay suggests a strong market for quality clay sources, while low use of glazes might indicate an untapped market for those materials. Many artisans may rely on clay due to traditional methods or local industry norms. This suggests that the majority of respondents are involved in ceramics, pottery, or clay-based crafts. 16% of the artisans uses natural pigments as raw materials which appeals to consumers seeking organic traditional products and promote sustainability. **Natural pigments (8 respondents, 16%)** are the second most common material, likely used for decoration or coloring of finished products. A small percentage i.e. 6% of the artisans uses glazes as their primary raw materials which improves product's durability and results in increase of market competitiveness. The remaining 6% of the artisans uses other raw materials that indicates innovation and adaptability which is vital for sustainable

entrepreneurship. The low percentage of glaze users may indicate constraints such as cost, lack of access, or preference for natural finishes. **Rest of the materials** could include alternative materials like wood, metal, or recycled materials, though they are not as widely used.

Table 10: Main expenditure of the artisans

Expenses	No. of respondents	Percentage
Raw material	10	20%
Labour cost	24	48%
Marketing	9	18%
Overhead cost	7	14%
Total	50	100%

Source: Field study

The table shows the expenditure breakdown of the terracotta artisans. It can be seen that 48% of the artisans have highest expenditure in labor cost, which reflects the labor intensive nature of the work. 20% of the artisans have main expenditure on acquiring raw materials in terracotta product making; this highlights reliance on natural resources. The other 18% artisans have marketing cost as their main expenditure which shows that the entrepreneurs are investing in reaching buyers and it is a positive indicator for business growth and sustainability. 14% of the artisans found overhead cost as their main expenditure, which includes all the indirect expenses. A rise in these expenses may result in a cut into the income of the artisans thereby making their livelihoods less stable, so keeping these costs manageable is essential for sustainable profitability.

Table 11: Main customers of the artisans

Customers	No of respondents	Percentage
Local customers	18	36%
Retailers	12	24%

Tourists	8	4%
Online customers	12	24%
Total	50	100%

Source: Field Study

This provides insights into different types of customers purchasing terracotta products along with their distribution percentage. 36% of the artisans sell their products to the local customers, which indicate strong local demand and reliance on local buyers that could limit growth and sustainability. 24% of the respondents sell their products to the retailers who provide wider market reach and bulk orders with a stable sale. Another 24% of the artisans sell their products on various online platforms which reflect modern adaptability and access to growth potential while enhancing sustainability. Remaining 4% of the artisans sell their products to tourists who reflect the lack of tourism attraction and seasonal tourism shifts. Diversifying the customer base may result in long term sustainability of the terracotta entrepreneurship. Strengthening local sales and offering customized products could be a long term solution. Also **retail partnerships** with more craft stores, boutiques, gift shops and **online presence** by leveraging e-commerce platforms like Etsy, Amazon Handmade, and social media marketing **could boost sales. Tourists could also be attracted** by collaborating with tourism boards, selling in souvenir shops, and offering special packaging.

Table 12: Type of promotion used by the artisans

Promotion	**No of respondents**	**Percentage**
Social media	8	16%
Word of mouth	20	40%
Exhibition & fairs	16	32%
Others	6	12%
Total	50	100%

Source*: Field Study*

This table presents data on how terracotta artisans promote their products. It highlights different promotional strategies and their

effectiveness based on the number of respondents. 40% of the artisans use word of mouth as their promotional strategy for promoting their products which reflects the trust of the customer in personal experience and authenticity. 32% of the respondent artisans use exhibition and fairs for promotion of their products. This confirms that physical event works well for promoting terracotta products. 16% of the artisans use social media platform to promote their products which shows the growing demand for organic and handmade products online. 12% of the artisans uses other promotional methods such as local advertisement, small events, partnerships and so on which is less impactful to the more personal and experience driven methods.

Table 13: Training received by the respondent

Training	No of respondents	Percentage
Yes from Govt. Organization	12	24%
Yes from NGO	14	28%
Yes from both Govt. & NGO	8	16%
No	16	32%
Total	50	100%

Source : *Field Study*

From the above table it can be seen that majority of the artisans i.e. 32% of the artisans have not received any training program neither by Govt. organization nor by NGOs, which suggests a need of more accessible skill development. 28% of the artisans received training from NGOs which is a slightly more than the Govt. training programs received by 24% of the artisans. While 16% if the artisans received training from both the Govt. organizations and NGOs. This highlights the importance of expanding and improving training program to support growth and sustainable entrepreneurship.

Table 14: Foresights on terracotta business of the respondents

Future plan	No of respondents	Percentage
Expand product range	14	28%

Increase market reach	18	36%
Improved production range	10	20%
Others	8	16%
Total	50	100%

Source: *Field Study*

This table provides insights into the **future plans** of terracotta artisans based on their priorities. 36% of the artisans have a future plan on increasing their market reach indicating a desire to reach into a wider consumer base and boost sales. 28% of the respondent artisans want to expand their product range reflecting a interest in offering more variety to attract different consumers. This could include new designs, styles, or categories, indicating a need for creativity and innovation. Expanding the product range (28%) indicates that entrepreneurs recognize the importance of innovation to stay competitive. Whereas 20% of the artisans want to improve their production range in the future suggesting enhancement in quality and efficiency of the production by upgrading techniques, using better materials, or increasing efficiency.

Table 15: Type of challenges faced by the artisans

Challenges due to weather condition	**No. of respondents**	**Percentage**
Quality of raw materials	8	16%
Lack of skilled Labour	22	44%
Financial constrains	11	22%
Poor quality tool & equipment	9	18%
Challenges faced in accessing market		
Lack of market information	19	38%
High competition	15	30%
Transport issues	9	18%
Others	7	14%
Financial Challenges faced by the respondents		

Access to loan & credits	18	36%
High cost of raw materials	14	28%
Fluctuating market price	12	24%
Others	8	16%
Social Challenges faced by the craftsmen		
Lack of community support	28	56%
Cultural barriers	12	24%
Gender discrimination	4	8%
Others	6	12%
Total	**50**	**100%**

Source: Field Study

This table presents the various challenges faced by terracotta craftsmen, categorized into four main areas: **weather-related issues, market accessibility, financial difficulties, and social challenges Lack of skilled labor (44%)** is the biggest weather-related challenge, possibly due to seasonal labor migration or unsuitable working conditions. **Financial constraints (22%)** and **poor tools & equipment (18%)** hinder production efficiency. **Raw material quality (16%)** is affected by weather conditions like excessive moisture or extreme dryness. The various challenges faced by the terracotta artisans in their business, highlighting obstacles across environmental, financial, markets and social dimensions. A significant range of artisans i.e. 84% of the respondents faces severe disruption due to the weather conditions as it the process which involves drying and firing of clay so the weather plays a crucial role. A smaller portion i.e.125 of the artisans faces occasional disruptions and 4% of the respondent artisans have minimized weather related risk through improved production techniques. Weather affects everyone to some extent.

Table 16: Support needed by the artisans

Support	No of respondents	Percentage
Better access to raw materials	6	12%
More training programs	9	18%
Improved market support	11	22%
Financial assistance	18	36%
Others	6	12%
Total	50	100%

Source: *Field Study*

The above table shows that majority of the artisans need financial assistance as support, highlighting the artisans' need for funding to sustain and grow their business. 18 respondents consider funding the biggest hurdle, indicating a need for grants, loans, or subsidies. is the most needed support, indicating that artisans struggle with funding for materials, production, or business expansion. Also 22% of the artisans need assistance in improving market support which reflects a demand for better sales opportunities and visibility. 18% of the artisans need more training program which shows the need for skill development and innovation in areas like design, production, or business management. 12% of the artisans need support in better access to raw materials while remaining 12% of the artisans need other support which includes logistical and specific challenges. Overall financial backing and market access are the top priorities for the artisans in Asharikandi.

Findings

From this research study, it can be said that the economic and socio cultural status of the artisans in Asharikandi remained stagnant and in some cases it deteriorated due to interplay of some negative forces. The terracotta crafts of Asharikandi encompass a range of daily utility items, sacred idols, and decorative objects. It is a home-based cottage industry that requires minimal talent, advanced technology, and capital investment for its formation. The natural raw materials can be readily accessed at a moderate cost

in the riverine region. The terracotta skill serves as the sole source of income for the majority of artisans in the region. Despite the Government's provision of various support to the terracotta craft, artisans encounter numerous challenges, including insufficient financial assistance, inadequate technological innovation, a deficiency in skill development programs, an unstructured production system, and a lack of coordination among artisans, all of which require immediate resolution.

Conclusion

The terracotta crafts possess their own symbolism and undoubtedly represent a source of pride for the craft industries of Assam. It possesses distinct cultural, spiritual, aesthetic, historical, and heritage values that must be preserved and sustained through effective management. It elucidates the intricate connection between traditional craftsmanship and the possibilities for sustainable development. The Asharikandi terracotta hub ought to venture into innovative avenues in marketing and commerce. It necessitates the continuous involvement of the young local artisans in this craft throughout the year to ensure their employment and income prospects. The terracotta craft should be integrated into the organized sector to enhance its development and success. A comprehensive provision of information, financial support, advancements in technology, skill enhancement initiatives, and effective marketing strategies are essential for its efficient and sustainable growth. Interventions among governmental organizations, non-governmental organizations, private enterprises, and the local community are essential to ensure the sustainability of artisans and to preserve Asharikandi's cultural legacy for future generations. This research establishes a basis for subsequent investigations and practical insights aimed at transforming Asharikandi into a sustainable source of rural livelihood, thereby enhancing regional development and safeguarding cultural heritage.

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14

Education and Inequality: Understanding Variations and Regional Dropout Trends in India's Secondary Schools

Jayashree Das*, Shanku Paul & Alok Sen*****

Abstract

The study investigates the regional variations in secondary school dropout rates across India, examining temporal trends and their implications for educational policy. Secondary education, pivotal for intellectual and vocational growth, is hindered by significant dropout rates influenced by socio-economic, cultural, and infrastructural factors. Using Unified District Information System for Education (UDISE) data from 2012–2020 and statistical tools like ANOVA, the study analyzes variations of dropout rates in six regions of india. Results highlight distinct and significant regional trends and variations. Northern and Northeastern regions show fluctuating trends, while Central and East regions reveal significant increases before tapering. The findings underscore the necessity for region-specific interventions and policy measures addressing local challenges. By identifying trends and variations, this study offers insights for targeted solutions to promote inclusive and equitable access to education, ultimately fostering social stability and sustainable economic growth.

Keywords: *Dropout Rate, Regional Variation, UDISE, India*

* PhD Research Scholar, Department of Economics, Assam University, Silchar, Assam

** PhD Research Scholar, Department of Economics, Assam University, Silchar, Assam

*** Dean, Mahatma Gandhi School of Economics and Commerce, Assam University, Silchar, Assam

Introduction

High dropout rates at the secondary education level in India remain a significant obstacle to achieving universal education (Garg et al., 2024). Secondary education is a pivotal stage in shaping students' intellectual development, vocational skills, and social integration, equipping them for higher education and improving their employability (Kayyali, 2024). However, a substantial number of students abandon their education at this critical stage, leading to profound consequences for individuals and society. The causes of school dropouts are multifaceted and vary across regions, influenced by socio-economic, cultural, and infrastructural factors (Venkatesan et al., 2024). Dropping out often results in reduced economic opportunities, social exclusion, and an increased likelihood of engaging in detrimental behaviours such as substance abuse or criminal activities (Saladino et al., 2021). These individuals also face lower earning potential and higher unemployment rates, perpetuating cycles of poverty and inequality.

High dropout rates also burden public resources, as dropouts are more likely to rely on government welfare programs, healthcare services, and social safety nets (Sharma et al., 2021) which started in 2016, aims to achieve universal health coverage (UHC. This perpetuates economic disparities and hampers national development by limiting the country’s ability to fully utilize its human capital (Aijaz et al., 2024)specifically how it affects employability, skills, and economic growth, may enhance the development of human capital within the framework of Pakistan's educational system. This research critically examines the economics of education in Pakistan by addressing significant research issues. It examines the financial barriers to education, focusing on issues including financial inequality and procedural hurdles. The research examines how initiatives for curriculum reform and teacher training help educational institutions support human capital development. It also examines the effects of online education, demonstrating its ability to close knowledge gaps and improve digital literacy. Despite obstacles like the digital divide, this research emphasizes the significance of strategic measures to guarantee equal access to high-quality education and build a trained, flexible workforce essential for Pakistan's socio-economic

success. However, implement evidence-based policies to enhance the management of education. Research in the future should concentrate on inventive financing approaches and reliable data. Education is a key driver of social mobility, and high dropout rates undermine this mechanism, adversely affecting productivity and global competitiveness (Valencia Quecano et al., 2024).

The background of this issue highlights India's vast geographical and cultural diversity, which presents unique challenges in addressing dropout rates. The country comprises 28 states and 8 union territories, each with distinct socio-economic profiles, demographic characteristics, and educational infrastructures. While affluent states in the South exhibit relatively lower dropout rates, economically disadvantaged regions, such as the North-East, face persistent challenges due to poor infrastructure, socio-cultural barriers, and limited parental education. These disparities emphasize the need for a region-specific approach to effectively address dropout rates.

Despite extensive research on school dropouts in India, significant gaps remain. Existing studies predominantly rely on cross-sectional data, which provide snapshots of dropout rates but fail to capture their dynamic and evolving nature. Furthermore, while much is known about general causes—such as poverty, inadequate infrastructure, and socio-cultural factors—the regional variations and long-term trends in dropout rates are underexplored. This gap in the literature necessitates a comprehensive analysis that considers both temporal and spatial dimensions to uncover region-specific determinants and patterns.

This study aims to address these gaps by leveraging time-series data from the Unified District Information System for Education (UDISE), which offers longitudinal insights into school enrollment and dropout trends across India.

Understanding regional disparities is crucial for designing effective and equitable educational policies. By uncovering the root causes of dropout rates in different regions, this study informs resource allocation strategies and supports the development of tailored interventions. For instance, improving school infrastructure in remote areas, addressing socio-cultural barriers, and enhancing parental awareness could significantly reduce dropout rates.

Moreover, addressing this issue has broader societal implications, as reducing dropout rates fosters social stability, enhances economic growth, and alleviates public healthcare burdens. Education is strongly linked to better health outcomes and increased civic engagement, making it a cornerstone for national progress.

Reducing school dropout rates is not merely about improving educational outcomes; it is about building a more inclusive and equitable society. By bridging regional disparities and fostering educational equity, this study contributes to India's broader goals of social cohesion, economic development, and global competitiveness. Through this research, India can take meaningful strides toward achieving universal secondary education and ensuring a brighter future for all its citizens.

Literature Review

The issue of school dropouts in India and other developing nations has been the subject of extensive research, uncovering a wide array of factors contributing to the phenomenon. Garg et al. (2024) utilized a Cox proportional hazard model to analyse data from the 75th NSSO round, finding that 74% of individuals aged 18 and above dropped out before completing 12th grade. Key contributors included geographic, economic, and institutional disparities, with lack of interest, financial constraints, and distance to school being critical factors. Similarly, Goel and Husain (2018) focused on gender-specific enrollment and dropout rates, emphasizing the challenges faced by girl students. Sajjad et al. (2022)we present important insights and references for educational interventions/investments to be tailored to local necessities in Pakistan. Several spatial statistical models such as the Global Moran's I-based spatial autocorrelation, multivariate clustering, and the Cluster and Outlier model are used to explore geographic heterogeneities and patterns. Additionally, significant determinants among several socio-economic, spatio-environmental, and infrastructural variables are identified for education status (EdS highlighted the role of socioeconomic variables, noting that parental education and wealth significantly impact dropout rates, with girls being disproportionately affected. Tiwari (2021) examined marginalized youth in Delhi's slums,

identifying poverty, inadequate educational support, and family-related issues as primary reasons for dropouts. Sridevi and Nagpal (2020) extended this by highlighting systemic factors such as child marriage, safety concerns, and inadequate school facilities, offering policy recommendations to improve school culture and provide basic amenities. Rasmy et al. (2017)social and school on student dropout but these factors were examined in a separate fashion and primarily focussed in rural villages. This study aims to develop a comprehensive framework of social environmental determinants of student dropout in secondary school in the the plantation settlement which is understudied. These determinants play a critical role in identifying the measures or interventions that will enhance a child's education. The role of these institutions in the social environment and its influence on student dropout is examined in general and amongst the secondary school students in the plantation settlement in particular. The findings reveal that although family factors contribute predominantly to student dropout as shown in conventional literature, school and social variables appear to be equally important and emerging determinants as well. Mahalanabis and Acharya (2010) connected dropout causes to broader developmental goals, emphasizing the role of community-wide efforts in tackling educational disparities. Regional studies further underline the complexity of the issue. Mishra and Chatterjee (2017) introduced the Index of Susceptibility of School Drop Out (ISDO) to assess risk variations, while Kamal and Illiyan (2023) revealed narrowing rural-urban gaps in dropout rates between 2007-08 and 2017-18. Gender dynamics also remain central, as Maina et al. (2020) reported financial constraints, peer pressure, and early pregnancy as significant factors influencing female dropouts. Comparative studies, such as those by Huisman and Smits (2015), showed that school infrastructure and teacher availability influence dropout rates across 30 developing nations. Hoque et al. (2022) underscored the critical role of teacher interventions in reducing dropouts in underprivileged contexts. Taken together, these studies provide a comprehensive understanding of the multifaceted issue of school dropouts, emphasizing the need for targeted interventions that address systemic, social, and individual factors to achieve sustainable educational outcomes.

Methodology

Data source

The study is based on the data sourced from the Unified District Information System for Education (UDISE). UDISE is a comprehensive data collection system that plays a critical role in managing and analysing educational statistics in India. Launched by the Ministry of Education, UDISE is designed to provide accurate, reliable, and up-to-date data that covers various aspects of the education system. The system collects extensive information from schools across the country, including key indicators such as student enrolment figures, teacher qualifications, infrastructure availability, and available resources. These data points are crucial for understanding the status of education in both urban and rural areas. UDISE is updated annually, ensuring that policymakers, researchers, and education planners have access to the most recent data to guide their decision-making processes. The dataset includes a wide range of variables such as the number of students enrolled at different education levels, dropout rates, teacher-student ratios, availability of school facilities (e.g., classrooms, toilets, libraries), and teacher training programs. By compiling this information at the district, state, and national levels, UDISE enables a comprehensive assessment of the country's educational landscape. This data collection system is essential for formulating evidence-based educational policies and strategies. It helps identify areas of concern, such as regions with low enrolment or inadequate infrastructure, and facilitates targeted interventions to address these challenges. Additionally, UDISE plays a significant role in monitoring the implementation of government programs and schemes aimed at improving the quality of education. The insights generated from UDISE data support long-term educational planning and the equitable distribution of resources across different states and districts. Through its regular updates, UDISE ensures that the education sector in India is consistently monitored and improved, contributing to better educational outcomes for students nationwide.

Methods

The data were analysed using graphical and statistical tools such as bar diagrams, descriptive statistics, and the analysis of variance (ANOVA) test.

A bar diagram, also referred to as a bar chart, is an effective visualization tool for displaying data by using bars to represent various categories or groups. The length or height of each bar corresponds to the value or quantity of the category it represents. Typically, the categories are shown on the x-axis, while the y-axis represents the values or frequencies for each category. This straightforward layout makes bar diagrams a useful method for comparing different quantities across various categories, providing a clear and intuitive way to visualize trends and relationships in the data.

Additionally, the analysis of variance (ANOVA) was employed to determine whether there were significant differences between the means of three or more groups. ANOVA tests the null hypothesis that all group means are equal, against the alternative hypothesis that at least one mean is different. By comparing the variance within each group to the variance between groups, ANOVA helps assess whether the observed differences in group means are due to random variation or represent a true effect. This technique is widely used in experiments and observational studies to evaluate the impact of different factors, providing essential insights for drawing meaningful conclusions from the data (Liu & Wang, 2021).

Mathematically, it can be expressed as

$$F = \frac{MS_B}{MS_w} \qquad (1)$$

Where:

- $MS_B = \frac{SS_B}{df_B}$ which indicates Mean Square Between
- $MSw = \frac{SS_w}{df_w}$ which indicates Mean Square Within

- SS_B and SS_W are the sum of squares between and within groups.
- df_B and df_w are the degrees of freedom for between and within groups.

If the F-ratio is significantly high, we reject the null hypothesis, indicating at least one group mean is different.

Result and Discussion

Regional Variation in School Dropout Level

Table 1 provides a detailed overview of regional variations in school dropout rates from 2012 to 2020. Our study analyzed data across six distinct regions: North (Region 1), Central (Region 2), East (Region 3), Northeast (Region 4), West (Region 5), and South (Region 6). The table delineates the regions and their associated states or territories for analysis. The North Region encompasses Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Ladakh, Punjab, Rajasthan, and Uttarakhand. The Central Region includes Chhattisgarh, Madhya Pradesh, and Uttar Pradesh. The East Region covers Bihar, Jharkhand, Odisha, and West Bengal. The North East Region comprises Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Arunachal Pradesh. The West Region includes Goa, Gujarat, and Maharashtra. Lastly, the South Region consists of Andaman & Nicobar, Andhra Pradesh, Karnataka, Kerala, Lakshadweep, Puducherry, Tamil Nadu, and Telangana.

Table 1: Variation in School Dropout across Regions

Year	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	SD	Variance	F statistic
2012	18.24	8.86	11.83	17.52	25.37	14.21	5.77	33.34	1.08***
2013	18.96	20.09	11.60	18.07	29.48	18.07	5.77	33.32	1.50***
2014	18.69	20.08	20.08	16.88	20.90	14.98	2.27	5.145	1.51***
2015	17.57	20.08	22.11	17.29	17.57	17.82	1.94	3.77	1.49***
2016	9.89	23.25	16.54	17.19	23.41	19.97	5.09	25.69	1.54***
2017	19.04	31.21	23.33	13.3	13.21	18.43	6.79	46.17	1.08***
2018	19.07	29.98	20.18	15.01	14.64	17.63	5.62	31.56	1.45***
2019	19.10	28.76	17.02	16.72	16.08	16.82	4.85	23.52	4.34***
2020	16.67	11.47	15.97	15.2	13.66	17.54	2.21	4.89	3.08***

*Note: Here *** denotes statistically significant at 1% level.*

Source: Estimated by Authors based on UDISE data

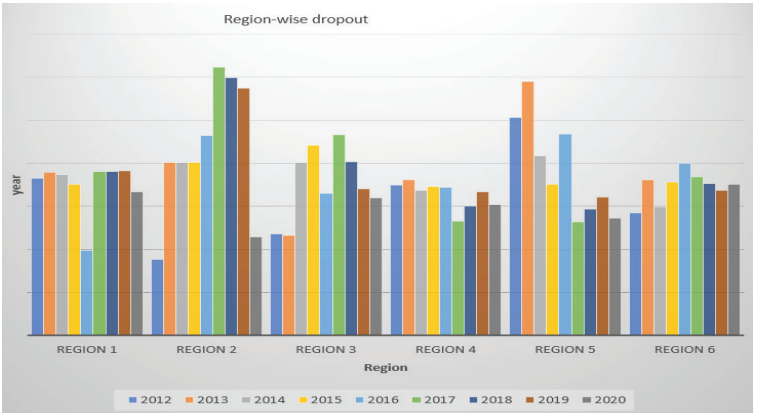
In order to analyse the variation in school dropouts in India, data has been tested using the technique of ANOVA to find regional variation. In the study, we evaluated regional variations using standard deviation as a measure. In 2012, we found that the deviation from the mean was 5.77. To determine if the variations among regions were statistically significant, we applied an ANOVA test. The F-statistic value for 2012 was 1.08, with a p-value of 0.001, indicating significant variation among the regions. In 2013, the deviation from the mean remained 5.77. The analysis for this year showed an F-statistic of 1.50 and a p-value of 0.000, again indicating significant regional variation. For the years 2014, 2015, and 2016, the regional variations were 5.14, 3.77, and 25.69 respectively. The corresponding F-statistics for these years were 1.51, 1.49, and 1.54, each with a p-value of 0.00, demonstrating that the variations were statistically significant. In 2017, the deviation from the mean increased to 46.16. The F-statistic for this year was 1.08, with a significant p-value of 0.001. For the years 2018, 2019, and 2020, the deviations from the mean were 31.55, 23.52, and 4.89, respectively. The corresponding F-statistics were 1.45, 4.34, and 3.08, with p-values of 0.00, 0.001, and 0.00, respectively. These results indicate that the variations for each of these years were statistically significant. Overall, our study highlights consistent and significant regional variations over the years analysed. The use of standard deviation provided a clear measure of these variations, and the application of the ANOVA test confirmed their statistical significance. This approach allowed us to robustly assess and verify the extent of regional differences year by year.

Trends of School Dropout in India

The trends of dropout rates for six different regions in India from 2012 to 2020 is represented in figure 1. Here, it can been be found that Region 1 (North) exhibited a mixed trend over the years. From 2012 to 2013, the dropout rate increased by 0.72 percentage points, followed by a decrease of 0.29 percentage points in 2014. The rate then continued to decline, with a significant drop of 6.98 percentage points between 2015 and 2016. However, this downward trend was interrupted by an increase of 9.15 percentage points in 2017, and the rate remained relatively stable in the following years, with minor fluctuations. By 2020, the dropout rate in region 1 had decreased to 16.67%, a 1.57 percentage point

reduction from 2019. In contrast, Region 2 (Central) experienced a consistent increase in dropout rates from 2012 to 2017, with the rate rising from 8.86% to 31.21%. This represents a significant jump of 22.34 percentage points over the five-year period. However, the trend then reversed, and the dropout rate began to decline, falling by 7.52 percentage points between 2019 and 2020, reaching 11.47%. Region 3 (East) also exhibited an overall increasing trend, though with some fluctuations. The dropout rate decreased slightly from 2012 to 2013 and 2013 to 2014, but then increased by 1.51 percentage points in 2015 and continued to rise, reaching a peak of 23.34% in 2017. Thereafter, the rate began to decline, falling by 2.15 percentage points in 2019 and a further 1.21 percentage points in 2020, ending up at 15.97%. In Region 4 (North-East), the dropout rate showed a generally decreasing trend, with some minor increases. From 2012 to 2013, the rate increased by 0.56 percentage points, but then began a steady decline, falling by a total of 2.31 percentage points from 2013 to 2016. The rate fluctuated slightly in the following years, but by 2020, it had reached 15.2%, a 1.52 percentage point reduction from 2019. Region 5 (West) experienced a more consistent downward trend in dropout rates. After an initial increase of 3.24 percentage points from 2012 to 2013, the rate began to decline, with the most significant drop of 9.16 percentage points occurring between 2016 and 2017. The decreasing trend continued in the subsequent years, and by 2020, the dropout rate had reached 13.66%, a 2.42 percentage point reduction from 2019. Finally, Region 6 (South) exhibited a mixed trend, with both increases and decreases in dropout rates. The rate increased by 3.91 percentage points from 2012 to 2013, followed by a decrease of 0.79 percentage points in 2014. The rate then fluctuated, with some increases and decreases, before reaching 17.54% in 2020, a 0.72 percentage point reduction from 2019. Overall, the data reveals a diverse set of trends across the six regions. While some regions, such as the North-East and West, experienced consistent decreases in dropout rates, others, like the Central and East regions, saw significant increases before eventually reversing course. The varying trends highlight the need for targeted interventions and region-specific strategies to address the unique challenges faced by each area and ensure equitable access to quality education.

Fig 1: Trends of dropout rates of Indian regions



Source: Prepared by author as per UDISE data

Conclusion and Policy Suggestions

The findings of this study highlight the ongoing challenge of high secondary school dropout rates in India, which vary significantly across regions due to socio-economic, infrastructural, and cultural factors. Analysing UDISE data from 2012 to 2020 reveals that economically disadvantaged areas, particularly in the North-East and Central regions, experience higher dropout rates compared to more developed Southern states. These disparities emphasize the need for targeted interventions to bridge the educational gap and ensure equitable access to secondary education. The study further confirms that dropout rates have long-term consequences for both individuals and society, limiting employment opportunities, reducing earning potential, and increasing the risk of social marginalization. At a national level, high dropout rates hinder economic growth, increase dependence on welfare programs, and restrict India's human capital development. Given the regional variations in dropout trends, a uniform policy approach is inadequate, and solutions must be tailored to address the unique challenges of different regions. Addressing the root causes of dropouts will not only improve India's global competitiveness but also enhance social cohesion and contribute to the goal of universal secondary education. The study underscores that reducing dropout rates is not merely an academic policy issue

but a critical step toward achieving sustainable socio-economic development.

To effectively reduce dropout rates and improve secondary education retention, several policy measures must be implemented. Region-specific interventions should address the unique challenges of each area, prioritizing financial incentives and infrastructure improvements in economically weaker states. Strengthening financial support mechanisms, such as expanding scholarships and direct cash transfers linked to school attendance, can help alleviate the economic burden on families. Improving school infrastructure, including classrooms, libraries, sanitation, and transportation, is crucial for enhancing educational access. Additionally, increasing the recruitment and training of qualified teachers, particularly in rural and underdeveloped regions, can improve student engagement and learning outcomes. Socio-cultural barriers must also be addressed through community engagement programs that emphasize the importance of education, particularly for female students, by providing safe transportation and flexible school schedules. Leveraging technology, such as digital learning platforms and mobile-based education programs, can bridge the accessibility gap in remote areas. Schools should implement early intervention strategies using real-time data to identify at-risk students and provide counselling, mentorship, and remedial education support. Integrating vocational training with secondary education can also make schooling more relevant to students' future employment prospects, increasing retention rates. Strengthening collaboration between the government, NGOs, and private sector stakeholders can enhance resource mobilization and policy implementation. Lastly, continuous evaluation of policy effectiveness through data-driven decision-making will ensure that interventions remain relevant and impactful. By adopting these targeted strategies, India can significantly improve secondary education retention, fostering an inclusive and skilled workforce essential for national progress and sustainable development.

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15

Entrepreneurial Ecosystems and Tax Structures in India: Lessons From Selected OECD Countries

Rahul Kumar*, Somak Biswas & Surendra Prashad Kushwaha*****

Abstract

This study examines the impact of taxation policies on entrepreneurship and entrepreneurial activities in India by comparative study with selected OECD countries using secondary data from the Global Entrepreneurship Monitor (GEM), OECD's reports, and various ministries of the Government of India. The study uses multiple regression models to study the impact of corporate tax, tax bureaucracy, and venture capital investment on new business registration. The results indicate that India's complex taxation policy and high compliance costs negatively impact entrepreneurship, although entrepreneurship in India depends on various other factors such as ease of doing business, a favourable political and bureaucratic atmosphere, and advanced infrastructure. This study also revealed that simple, predictable, and favourable taxation policy, low compliance burden, advanced and developed infrastructure, and political stability create a favourable atmosphere for entrepreneurial activities in OECD countries, which promotes entrepreneurial activities.

* Research Intern, Sociological Research Unit Indian Statistical Institute, Giridih

** Assistant Professor, Dept. of Economics, St. Columba's College, Hazaribag

** Assistant Professor, University Dept. of Economics &Finance Officer Vinoba Bhave University, Hazaribag

The findings of the study also suggested that India should adopt best practices and policies from OECD countries to create a favourable atmosphere for entrepreneurship and entrepreneurial activities.

Keywords: *Entrepreneurship, India, OECD, GEM, TEA*

Introduction

The roots of entrepreneurship trace back to the economic theory of mercantilism[1]. Mercantilist economic doctrine believed that capital accumulation can be increased only through export; they encourage individuals and domestic producers to participate in production, innovation, and foreign trade (Heilbroner, 1980). The Industrial Revolution (1760-1840) is considered an important turning point in the development of entrepreneurship, as it gave rise to capitalism, which started investing in the economy with the aim of earning more profits, which led to innovation, technical advancement, and a significant reduction in the cost of production, which gave a new impetus to economic growth (Schumpeter, 1934). In the globalised world, entrepreneurship is one of the basic requirements of economic growth, as entrepreneurs bring with not only investment but also skilled labour, advanced production techniques, and innovation. According to the concept of "creative destruction", entrepreneurship disrupts industries for innovation and develops new and advanced techniques of production, making it the driving force of economic growth (Schumpeter, 1942). It promotes innovation and new techniques of production, which adversely affects traditional industries, production techniques, and employment opportunities; hence it is also called a double-edged sword that destroys traditional systems and creates a new economic landscape (Aghion & Howitt, 1992).

In the modern era, entrepreneurship often acts as a catalyst for economic growth, innovation, technical advancement, employment generation, and inclusive growth, but the activities of entrepreneurs depend on numerous factors such as expected profits, ease of doing business, the economic status of a country,

1 *Mercantilism was an economic ideology that prevailed from 16th – 18th century in Europe, that sought to make country strong through export (restrictive trade policy).*

and taxation policies. Taxation is a vital and important tool of fiscal policy, which is not used only for revenue generation but also for maintaining various macroeconomic variables, including overall economic stability. Taxation policies of countries significantly affect the entrepreneur's decisions regarding business establishment and expansion and other business activities (Djankov et al. 2010). Unforeseeable taxation policies create instability in the economy, which negatively impacts long-term investment, innovation, and economic growth. Hence, the government must adopt an effective taxation mechanism that strikes a balance between revenue generation and entrepreneurship, fostering investment, innovations, and economic growth (OECD, 2021).

The OECD[2] plays a key role in shaping global economic policies. OECD is known for its diverse macroeconomic policies and group of developed countries and hence provides a compelling context for a comparative study of the impact of taxation on entrepreneurship. Taxation policies directly affect entrepreneurship, including establishment of businesses, investment, innovation, etc. OECD countries have diverse tax regimes; some countries adopt favourable tax regimes such as low corporate taxes and easy taxation systems to promote entrepreneurship, innovation research and development (R&D), and economic growth (Djankov et al., 2010). While some do the opposite by imposing a higher tax burden on entrepreneurs, which adversely affects entrepreneurship, R&D, innovation, and economic growth (OECD, 2021).

Taxation policies play an important role in creating a conducive environment for entrepreneurs, as they directly affect the decision to set up an industry, investment, cost of production, profit, innovation, R&D, and other macroeconomic variables. As of July 2024, India's corporate tax stands at 25.17 percent, which is higher than the OECD average of 21.1 percent (OECD & OGD, 2024). India's complex, unpredictable, high tax rates and narrow tax base negatively impact the MPI[3], which slows down the pace of startups. Although the Indian government has launched

2 *The Organisation for Economic Co-operation and Development (1961) is a group of 38 developed and advanced economies known for stable macroeconomic policy and better business environment.*

3 *Marginal Propensity to Invest (Keynes, 1936) defined as change in investment due to change in Income ().*

various schemes and policies, like the Make in India mission, Startup India mission, PLI[4] schemes, etc., to increase the pace of entrepreneurship in India in the last few years, it could not succeed due to complex processes, weak will, and red tapism. In contrast, OECD countries have streamlined their taxation policy over the past few decades, which encourages investment, startups, innovations, R&D, and overall economic growth. OECD countries that have adopted simpler tax systems and economic policies that encourage investment, startups, and innovation have seen significant growth in entrepreneurial activity (OECD, 2024). The Indian government has taken significant steps towards tax reforms in the last few years, including reducing corporate tax from 30% to 25.17%, abolishing the equalisation levy, etc. Administrative and predictability challenges are the biggest problems of India's tax system. Simple tax compliance and transparent policies can further enhance the favourable scenario for entrepreneurship in India.

Significance of the Study

This paper attempts to understand the impact of taxation on entrepreneurship. Taxation policy directly affects success and failure of businesses; it has a direct impact on MPI, startup establishment, expected profit, innovation, and R&D. OECD countries are known for their stable economic policies and group of developed countries; hence, comparative study with OECD countries helps to understand how stable taxation policy encourages startups, investment, innovation, and R&D. This study also attempts to understand how revenue generation can be balanced with entrepreneurship development so that a better ecosystem can be developed for entrepreneurship and economic growth.

Literature Review

Entrepreneurship is recognised as a driver of economic growth in both developed and developing economies because it innovates new commodities, techniques, and factors of production; generates employment; and it also increases competition among

4 *Production Link Incentives (2021) is performance based financial scheme that motivate and encourage entrepreneurs to production of endogenous, cost effective and import substitution goods and services.*

commodities as well as among countries and firms Schumpeter (1942).

Djankov et al. (2010) studied the impact of corporate tax on entrepreneurship and found an inverse relationship between tax rate and the establishment of new firms, expansion of existing firms, startups, innovation, and R&D. Progressive taxation policy reduces the willingness to invest because it reduces the expected profit, which negatively impacts entrepreneurship, while simplified, transparent, and stable taxation policies encourage long-term investment and economic growth Gullen & Gordon (2007).

Tax rebate fostering the investments, startups and, R&D. Tax rebate and R&D enhance the techniques of production and boost the innovation as well as the output in the OECD countries Bloom et al. (2019). The government of India also starts various initiatives for entrepreneurs such as income tax exemptions, production link Incentive under certain conditions.

Unpredictable tax policy, high tax rates, a narrow tax base, and an unstable tax system are the biggest challenges facing emerging economies like India, which directly or indirectly affect all macroeconomic variables. Agarwal & Sengupta (2021). A comparative study of OECD economies makes it clear that if taxation policies are kept simple and easy, stable, and favourable to entrepreneurs, then entrepreneurship and the rate of economic growth can be increased.

Previous theoretical and empirical studies revealed a direct relationship between economic growth and entrepreneurial activities. A stable and streamlined tax system and a predictable and low tax rate encourage entrepreneurial activities such as investment, innovation, and R&D, which foster long-term economic growth. Schumpeter's Creative Destruction Theory (1942).

The study suggests that economies should learn from OECD countries and simplify and stabilise their tax systems in line with global standards to ensure innovation, investment, and policy stability. India has made significant reforms in its tax policy in the last few years, and reducing corporate tax from 30% to 25% is an important step in this direction. However, structural reforms are

required to align the Indian tax system with global standards and create an ecosystem conducive to entrepreneurial activities.

Objective of the Study

This study has following objectives

i. To study the impact of taxation policies on entrepreneurial activities.

ii. To compare the taxation policies of India and OECD to analyse the best practices and gaps.

Data Source and Research Methodology

This study used quantitative research techniques to analyse the impact of taxation policies on entrepreneurship. The study is based on secondary data gathered from global entrepreneur mentor (GEM), OECD's reports, central statistics organisation, world bank report, economic surveys and officials reports of Government of India. To analysis the impact of taxation policies and investment policies multiple regression model has been used. The data has been analysed by using MS Excel and E-Views 12 student version software.

Model of the Study

$$Y=\beta_0 + \beta_1 X_{1_} + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

Y: New Business Registration (Per 10000 Population)

X_1: Effective Average Corporate Tax

$X_{2:}$ Taxes and bureaucracy

$X_{3:}$ Investment in Billion (USD) Investment in Billion USD [Venture Capital]

β_1, β_2, β_3: Regression Coefficient

Ɛ: Error Term

Result and Analysis

Taxation Policies and Entrepreneurial Activities

Taxation policy is one of the important variables of entrepreneurial activities; it significantly affects propensity to investment, administrative and compliance costs and burdens, research and development, and innovation. India's complex taxation policies, high tax rates, and compliance costs, combined with limited benefits for new businesses and an increased administrative burden, pose significant challenges for entrepreneurs and discourage entrepreneurial activities in the country. On the contrary, OECD countries have made their tax systems very easy, simple, and predictable, which has reduced the tax compliance cost significantly. At the same time, OECD countries have launched many initiatives to promote R&D and innovation, which has given a new impetus to the growth rate of entrepreneurship. Comparatively high tax rates, a narrow tax base, high compliance costs, complex bureaucracy, limited tax benefits and economic support for startups and R&D, and uncertain and unpredicted macroeconomic policies are hindering the growth of entrepreneurial activities in India. If India improves its taxation policies by adopting the best policies of OECD countries, it could enhance the favourable ecosystem for entrepreneurial activities in India.

Table 1: Impact of Taxation Policies on Entrepreneurial Activities

Parameters	**India as of (Sep. 2024)**	**Average of OECD Countries (As of Sep. 2024)**	**Impact on Entrepreneurial Activities**
Rate of Corporate Tax	25.17 % (22 % +3.17 % Surcharge)	21 %	High Corporate tax reduce the marginal propensity to invest (MPI) which discourage the entrepreneurial activities

R& D Tax Credit	0	10-15%	Investment in R&D can reduce the cost of production and upgrade the techniques of production which encourage investment in startups and new businesses. Lack of incentives and benefits to R&D limits the innovations and reduce the investment.
Time Taken in Tax Compliance	254 Hours	159 Hours	Complex taxation policies increase the administrative cost and burden which deters the entrepreneurial activities.
Frequency of Tax Filling	GST (Monthly) IT (Yearly)	Quarterly and annually	Frequents tax filings system increase the administrative burden.
Tax Exemptions for Startup	3- Years	5-10 Years	Small and limited tax benefits to startups reduce the MPI and restrict the long-term investment as well as growth.
Cost of Tax Compliance	1.7 %	0.8%	High tax compliance cost reduces the profits of entrepreneurs which discourage the investment.

Rank in World Bank's Ease of Doing Business Index (till 2020)*	63	25 (Average of OECD Countries)	The Ease of doing business index shows that complex, unpredictable, and high tax rate creates barriers to starting and running new business

Source: Author's Estimation Based on data of OECD, World Bank and, Ministry of Finance Government of India.

Entrepreneurial Activities in India and OECD Countries

Table 1 shows that entrepreneurial activities in India and OECD countries are significantly different due to different macroeconomic policies, different consumer bases, and their demand. In India, entrepreneurship is driven by necessity due to lack of innovation, income, awareness, and competition among industries. In past few years, the Indian government has started various schemes, and initiatives such as Startups India, Production Link Incentives and the make in India Schemes for small and medium businesses to encourage entrepreneurial activities, but unfavourable business environments, limited access to formal banking systems, lack of skilled labour, administrative and bureaucratic hurdles, and inadequate infrastructure are the major obstacles to the growth of entrepreneurship. In the contrary, OECD is a group of 38 highly developed economies. Entrepreneurship in most of the OECD countries is driven by opportunity due to stable and predictable macroeconomic policies, skilled labour, organised banking system, highly developed infrastructure, and well-defined intellectual property laws that foster a business-friendly ecosystem.

Table 2: Indicators of Entrepreneurial Activities of India and Average of OECD Countries

Year	Average of OECD Countries				India			
	TEA1	Governmental support and policies	Taxes and bureaucracy	Governmental programs	(TEA) of India	Governmental support and policies	Taxes and bureaucracy	Governmental programs
2013	9.477	4.486	4.153	4.731	9.88	6.63	6.22	6.70
2014	9.550	4.434	4.206	4.741	6.60	6.62	6.21	6.30
2015	10.452	4.413	4.048	4.611	10.83	5.31	4.69	4.83
2016	10.662	4.303	4.084	4.674	10.59	5.70	545	5.62
2017	10.932	4.466	4.046	4.748	9.28	5.77	5.08	5.42
2018	10.695	4.530	4.062	4.871	11.42	6.32	4.73	5.73
2019	12.149	4.708	4.386	4.964	14.97	5.37	3.53	4.68
2020	11.005	4.651	4.243	4.983	5.30	5.57	4.35	4.70
2021	10.476	4.639	5.012	5.140	14.37	5.52	4.03	4.53
2022	11.281	4.562	4.854	5.230	11.52	5.00	4.05	4.90
2023	11.837	4.074	4.672	4.856	12.00	3.15	3.07	3.42

Source: Author's Estimation and Global Entrepreneurship Monitor.

Table 2 shows that TEA of India is comparatively higher than the average of OECD countries due to rapid economic growth, emerging and huge market, larger consumer base, urbanization, and high MPC[5], whereas it experiences decline in government support and policies and governmental program from 6.22 -3.15 and 6.70 - 3.42 respectively from 2013-2023, due to complex taxation policies, high compliance costs, policy inconsistency, and lack of accountability. Tax bureaucracy of India decreased from 6.22 to 3.07 during the same period. Almost all entrepreneurial activities indicators of OECD countries are stable due to stable economic policies, easy and predictable taxation policies, and consistency in policy implementation and accountability of government as well as entrepreneurs.

5 *Marginal Propensity to consume (Keynes,1937) is define as the change in consumption due to change in income (). Direct relationship exists between value of MPC and demand. The value of MPC lies between 0 to 1.*

Table: 3 Status of new Business Registration, Fear of Failure, Effective Corporate tax, and Venture capital Investment

Year	India					OECD Countries				
	New Business Registration (Per 10000 Population)	Fear of Failure Rate	Effective Average Corporate Tax	Venture Capital		New Business Registration (Per 10000 Population)	Fear of Failure Rate	Effective Average Corporate Tax	Venture Capital	
				No of Deals	Investment in Billion (USD)				No of Deals	Investment in Billion (USD)
2013	0.1	38.91	34.0	450	6.0	2.9	39.54	23.5	41	700
2014	0.1	37.67	34.0	500	6.5	3.2	40.15	23.2	50	780
2015	0.1	44.01	34.0	600	8.0	3.3	39.37	23.0	65	920
2016	0.1	37.53	34.0	650	9.0	3.6	39.29	22.8	60	880
2017	0.1	39.56	34.0	700	10.0	3.6	39.01	22.5	70	950
2018	0.1	50.06	34.0	800	12.0	4	39.56	22.3	90	1020
2019	0.1	62.37	25.2	900	14.0	4	39.65	22.1	100	1080
2020	0.2	56.80	25.2	750	10.0	4.2	39.38	21.9	85	9500
2021	0.2	54.14	25.2	1200	25.7	4.7	71.98	21.7	150	1100
2022	0.2	53.97	25.2	1300	25.7	4.5	41.94	21.5	120	1000
2023	0.3	62.82	25.2	1000	9.6	4.5	42.73	21.3	NA	NA

Source: OECD Library, Statista Indian and OECD VC Deal Data Database, IVCA, Global Entrepreneurship Monitor and Economic Survey of India.

Note: Fear of failure rate include percentage of 18-64 years population who see good opportunities in businesses but do not start business due to fear of failure.

Table 3 shows the comparative analysis of new business registration, fear of failure rate, effective average corporate tax, and venture capital between India and selected OECD countries. The above table revealed that new business registration in India was just 0.1 percent until 2019; after 2019, India experienced a slight rise from 0.1 percent to 0.3 percent due to policy reforms and a significant reduction in corporate income tax. In the last 10 years, the fear of failure rate of startups rose to 68.82 percent from 38.91 percent due to economic uncertainties, unpredictable taxation policies, and rising competition from foreign enterprises. In the last few years, the Indian stock market has registered tremendous growth, and investors have made substantial profits, which attracted the attention of foreign investors. From 2013 to 2022, India registered a 166.6 percent growth rate in venture capital investment.

Table 4: Result of Regression Analysis

Result of Regression Analysis of India				
Dependent Variable: New Business Registration (Per 10000 Population) Method: Least Squares Sample (adjusted): 1 11 Included Observation: 11 after Adjustment				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.549221	0.170592	3.219496	0.0147
Effective Average Corporate Tax	-0.012832	0.004819	-2.662875	0.0323
Taxes and Bureaucracy	1.22E-06	0.000107	0.011458	0.9912
Investment in Billion USD [Venture Capital]	-0.001522	0.003090	-0.492361	0.6375
Model Summary				

R-squared	0.591085	Mean dependent var	0.145455
Adjusted R-squared	0.415835	S.D. dependent var	0.068755
S.E. of regression	0.052550	Akaike info criterion	-2.778814
Sum squared resid	0.019331	Schwarz criterion	-2.634125
Log likelihood	19.28348	Hannan-Quinn criter.	-2.870020
F-statistic	3.372818	Durbin-Watson stat	1.406267
Prob(F-statistic)	0.083951		

Result of Regression Analysis of Average of Selected OECD Countries

Dependent Variable: New Business Registration (Per 10000 Population)
Method: Least Squares
Sample (adjusted): 1 11
Included Observation: 11 after Adjustment

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
c	19.97180	3.173720	6.292867	0.0008
Effective Average Corporate Tax	-0.765403	0.109289	-7.003463	0.0004
Taxes and Bureaucracy	0.234870	0.198453	1.183504	0.2814
Investment in Billion USD [Venture Capital]	-3.55E-07	-1.90E-05	-0.018650	0.9857

Model Summary

R-squared	0.965031	Mean dependent var	3.800000
Adjusted R-squared	0.947547	S.D. dependent var	0.581187

S.E. of regression	0.133107	Akaike info criterion	-0.906156	
Sum squared resid	0.106305	Schwarz criterion	-0.906156	
Log likelihood	8.530778	Hannan-Quinn criter.	-1.038930	
F-statistic	55.19418	Durbin-Watson stat	2.978571	
Prob(F-statistic)	0.000092			

Source: Author's Estimation

Table 4 shows the result of multiple regression analysis, to understand the impact of effective corporate tax, tax bureaucracy, and venture on new business registration (per 10,000 population), multiple regression analysis has been used. The overall regression model of the study is statistically significant at the 10 percent level of significance. The regression analysis shows that in India, a high effective average corporate tax negatively associated with new business registration means that if the rate of effective corporate tax increased, the new business registration decreased. On the other hand, venture capital and tax bureaucracy do not significantly affect the new business registration in India. In India, new business registration depends on other factors such as political and administrative atmosphere, ease of doing business, market competition, and infrastructure because only 59.1 percent of the variation in new business registration is explained by the dependent variable.

While the regression model of selected OECD countries signifies high explanatory power. The result revealed that effective tax rates and venture capital significantly affect new business registration in selected OECD countries. The values of adjusted R^2(0.947547), F- Statistic (55.19478) P-value (0.00092) and the D-W statistic (2.97857) validate the robustness of the model.

Tax Composition of India and OECD

India's tax composition is significantly different from OECD countries due to different economic structures and priorities.

India's approx. 45 percent of total government revenue came from indirect tax. On the contrary, the tax system of OECD countries is more balanced and stable compared to India. In India, 35 percent of total government revenue came from the Goods and Services Tax and corporation tax, which indicates the high tax rate and narrow tax base. While in OECD countries, 50 percent of its revenue came from direct taxes and contributions to social securities, 25 percent from value-added tax, and only 10 percent from corporation tax. The diversified source of revenue helps to maintain stable tax policies that promote inclusive growth.

Table 5: Tax Composition of India and OECD

Parameters	**India**	**OECD (Average of Countries)**
Tax-GDP Ratio	11.7% (2024)	34.1% (OECD average)
Share of Direct Taxes in Total Tax Revenue	37%	67%
Share of Indirect Taxes in Total Tax Revenue	63%	33%
Corporation tax Rate	25%	21% (OECD average)
Personal Income Tax Rate	30% for income above ₹10 lakh	Rates vary, often exceed 40%
Indirect Tax (GST/VAT).	GST at 5%, 12%, 18%, 28% slabs	VAT between 10%–25%

Source: OECD tax Data Base and Ministry of Finance, Govt of India

Table 5 shows the different taxation policies of India and OECD countries are impacting their macroeconomic policies. India's tax–GDP ratio is significantly low compared to 34.1 percent of OECD countries, showing a narrower tax base and a low propensity to spend. 67 percent of India's total tax revenue came from indirect taxes, whereas OECD countries rely more on direct taxes; 63 percent of total tax revenue in OECD countries came from direct taxes. The structural difference shown in Table 4 highlights the reform area of India's taxation system. A more stable, balanced, and predictable tax structure with an expanded

tax base could enhance the mobilisation of domestic as well as foreign investment and create a more favourable landscape for entrepreneurial activities.

Conclusion

The comparative study of India and selected OECD countries highlights taxation policies as a catalyst for entrepreneurial activities. The study revealed that the high rate of corporate, complex, and unpredictive tax structures and high tax compliance costs negatively hinder the entrepreneurial activities. Regression analysis shows that entrepreneurship in India also depends on other factors like political and administrative atmosphere, advanced and developed infrastructure, and ease of doing business environment. In contrast, selected OECD countries with simplified, predictable, stable, and favourable taxation policies experience higher entrepreneurial activities and innovation. To foster a favourable entrepreneurial ecosystem, India should adopt best practices from OECD countries, including simplified, predictable, stable, and streamlined taxation policies, eliminating red tape and bureaucratic hurdles, and increasing expenditure on research and development activities. These policy reforms can create a more conducive atmosphere for entrepreneurial activities and foster long-term economic growth with sustainability.

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16

A Conceptual Investigation on Emergence of Industry 4.0

Pankaj Kumar Tripathi*, Trilochan Sharma & Abhishek Pandey*****

Abstract

In the age of technological disruptions, it is important for everyone to understand the history of industrial sector development across the world. Metaverse like buzz word are shaping the features of new age technological innovations. In this connection, present exploratory work is based on highlighting the set of dimensions shaping evolving industries and its interlinkages with Industry 4.0. The industrial sector has gone through different revolutions, as this paper has attempted to highlight them. Each industrial revolution has changed the world, from coal and steam power to chemicals, electricity, and steel. Since the Third Industrial Revolution introduced collaboration and decentralisation, firms have changed and emphasised reciprocal partnerships. It expanded financial systems and technologies, helping globalise and introduce modern tools to numerous businesses. Advanced technologies like AI, IoT, and blockchain drove Industry 4.0, the Fourth Industrial Revolution.

* Assistant Professor, Faculty of Commerce, Accounting and Financial Management Department

** School of Management Studies, Mahatma Jyotiba Phule Rohilkhand University, Bareilly, U.P.

*** Department of Management, School of Management Sciences, Lucknow, U.P.

It revolutionised production and business patterns with automation, smart manufacturing, and interconnection. It generated ethical and societal concerns regarding privacy, data security, and the labour market. Moreover, this study outlined Industry 4.0's six design principles: decentralisation, virtualization, interoperability, modularity, real-time functionality, and service-centricity. These fundamentals underpin the transition from traditional industry to Industry 4.0. After navigating Industry 4.0's challenges and opportunities, it becomes clear that this revolution is a fundamental transformation that affects every area of our lives. Informed decision-making and responsible stewardship of these innovative innovations are crucial to the future of industry, economy, and society.

Keywords: *Industrial Revolution, Industry 4.0, IoT, AI, Emergence of Industry, Metaverse*

1. Introduction

Now a days, as the part of Industry 4.0, different applications are undergoing transformations as a result of the introduction of digital twins, metaverses, and virtualization. (Yao & Liu ,2025). Since its inception, the industry's history has been evaluated by the accumulation of profound know-how, significant outcomes, and groundbreaking inventions that have fundamentally transformed urban structures, demographics, product offerings, production processes, and labour dynamics, among various other factors (Gabriela Pereira Carvalho & Walmir Cazarini, 2020). The emergence of this industry can be attributed to the convergence of three pivotal factors: skill, investigation, and commercial innovation. These elements played crucial role in creating employment opportunities and fostering the development of novel products that cater to people's evolving needs. Consequently, the industry's evolution unfolds through distinct and equally momentous phases, characterised by the "First, Second, Third, and the imminent Fourth Industrial Revolution". It is worth mentioning that Industry 4.0 does not exist in isolation from its predecessors; rather, it builds upon the foundational pillars of earlier industrial revolutions, but with a heightened emphasis on combination, digitization, virtualization, advanced skills, and rapid responsiveness to stimuli (Roblek et al., 2016). Much like the industry itself, products, distribution methods, consumer demands, labour practices, and internal and external influences

have undergone significant transformations at each stage of its development. To harness the full potential of Industry 4.0 and explore new collaborative opportunities within this emerging landscape, a comprehensive understanding of its capabilities across various domains is essential.

In this context, this paper aims to introduce Industry 4.0 and its defining characteristics. To achieve this, the chapter is organized into three sections: the first addressing the historic progression of industry, the subsequent delving into origins and key concepts of Industry 4.0, and the third elucidating the design principles underpinning this innovative industrial paradigm (Kagermann, 2015). Even, Sankaran et al. (2025) explores that Smart Society 5.0 is possible with interventions like Artificial intelligence and Virtualisation.

2. History of Industrial Revolution

The historical record of the industrial revolutions goes beyond a mere list of innovations, discoveries in energy sources, new machinery, materials, or methodologies. However, it is vital to recognize that these elements have played a pivotal role in driving economic progress over the past two hundred and fifty years. standardization was also a prominent reason for industrial revolution and further technological advancements (Zhang et al., 2025).

While some technologies, such as hydrodynamic mills were for several decades, it is the widespread adoption and proliferation of these devices, often referred to as machinery, that define and distinguish this era from the earlier epochs (Hamilton Ortiz et al., 2020). Figure below shows the stages of industrial revolution.

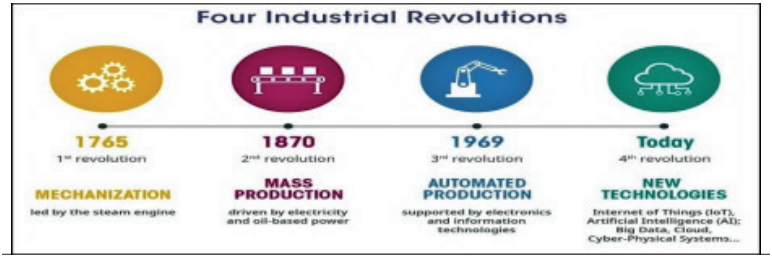

Figure 1. Industrial Revolutions at a Glance

Source: Authors.

Water, animal labour, and wood were the principal sources of energy prior to the beginning of the First Industrial Revolution in the middle of the 18th century. During this time period, the First Industrial Revolution took place. Wood, in addition to being the primary material for construction and fuel, played a crucial role in powering various activities. Iron quickly emerged as a central material in the construction industry, while coal gained prominence as the initial fuel source, and steam power emerged as a dominant engine technology. These three components synergized to establish a new technological paradigm during that era (Morales Velazquez et al., 2017). The rise of industrial civilization unfolded through distinct periods, with the first being termed the "First Industrial Revolution." This transformative period was catalysed by the development of the steam engine and prominently featured the economic theories of Adam Smith, who is widely regarded as its foremost proponent and the founder of economic liberalism. The onset of the initial industrial revolution, which began in the middle of the 18th century and extended well into the early years spanning the nineteenth century, marked a phase of profound societal transformation. During this era, there were significant expansions in manufacturing capabilities, encompassing a wider array of consumer goods and extending beyond the borders of England to international locations (Tang & Ho, 2019).

The mid-nineteenth century witnessed a revolution in transportation and communication, characterized by the proliferation of railways, the invention of the telegraph, and the introduction of transoceanic steamboats with robust steel hulls. These advancements facilitated activities that transcended national boundaries, blending elements of both business and adventure, and integrating them into the economic framework of expansion. These activities were seen as a fusion of entrepreneurial enterprise and adventurous endeavours. Following the commencement of the First Industrial Revolution, the "Second Industrial Revolution" emerged during the latter part of the 19th century. This transformative period was characterized by significant advancements across multiple industries, including chemical, electricity, oil, and steel. It brought forth a wide array of innovations, ranging from steam-powered steel ships, the

inception of aviation, improvements in food preservation, the mass production of consumer goods, mechanical refrigeration, preservation techniques, to the establishment of modern corporations. Crucially, this era marked a substantial shift in the global industrial landscape, with Germany, the U. S., France, and the U. K. rising as dominant industrial powers. In the United States, second industrial revolution is closely linked to Frederick Winslow Taylor's groundbreaking concept of scientific management, which he meticulously researched and implemented, leading to a revolution in the organization and execution of work. The transition from the First Industrial Revolution to the Second was driven by the integration of new sources of raw materials and energy, particularly focusing on the increasing adoption of electricity and, to a growing extent, oil as a source (Ngo et al., 2018). Toward the end of the 19th century, a noticeable cyclical momentum enveloped economies worldwide, a phenomenon that continues to resonate today. The development of the automobile and aviation industries, combined with advancements in telephony and radio transmission, hastened the revolution in communication and transportation that began in the early 20th century. The Second Industrial Revolution, spanning from the latter half of the nineteenth century into the early twentieth century, diverged from its predecessor, which relied on iron and coal-driven steam power. Instead, it hinged on electricity and steel, ushering in significant advancements in the realms of communication, chemistry, and the utilization of petroleum. However, it's essential to note that initially and in general, these innovations didn't completely supplant their older counterparts. Their full realization only came to the forefront in the twenty-first century, marking a moment when they truly distinguished themselves (Winroth et al., 2016).

The Third Industrial Revolution, which commenced during 1970s, fundamentally reshaped the architecture of capitalism and introduced a novel economic paradigm emphasizing collaboration as the cornerstone of success. It asserted that organizational goals could only be attained collectively, fostering a substantial rise in the number of businesses embracing this ethos. The growth of these enterprises was increasingly propelled by the pursuit of robust partnerships grounded in reciprocity. This revolution

revolutionized economic management, promoting a more horizontal and adaptable negotiation approach. It encouraged corporations to unite for more precise and cohesive economic endeavours. This transformative method of economic governance emerged as a direct outcome of the Third Industrial Revolution. Furthermore, the Third Industrial Revolution broadened the influence of financial system tools, often referred to as the market economy. This expansion accelerated advancements in communication and transportation, facilitating the global integration synonymous with globalization. Notably, this revolution is renowned for its technological advancements, particularly in Japan during the mid-1970s. These advancements covered a range of domains, including biotechnology, computer science, Computer Numerical Control (CNC), microelectronics, and integrated telematics systems, among others (Morales-Velazquez et al., 2017).

3.0 Industry 4.0 and its Prominent Characteristics

The Fourth Industrial Revolution, often referred to as Industry 4.0, is a term coined to describe a significant technological shift in how we live, engage in tasks, and interface with the world. It signifies the integration of multiple cutting-edge technologies such as artificial intelligence (AI), the Internet of Things (IoT), robotics, big data, blockchain, and various other digital advancements (Boyes et al., 2018). Key characteristics of the Fourth Industrial Revolution include:

(i) Automation and Smart Manufacturing: The integration of AI and IoT into manufacturing processes allows in the automation and optimization of output. Manufacturing facilities and supply chains gain intelligence and enhance efficiency, ultimately resulting in higher productivity and reduced expenses. Even , hazardous processes are becoming workerless due to such smart robotics and automatic technologies.

(ii) Artificial Intelligence: AI plays a central role in the Fourth Industrial Revolution, enabling machines to perform tasks that traditionally required human intelligence, such as learning from data, recognizing patterns, and making decisions.

(iii) Internet of Things (IoT): IoT entails linking everyday objects and devices to the internet, allowing them to gather and share data. This connectivity leads to more informed decision making and improved services across various sectors, from healthcare to transportation.

(iv) Big Data and Analytics: The massive amounts of data generated by IoT devices and digital interactions are analysed using advanced analytics techniques to gain valuable insights. This data-driven decision-making is essential for businesses and governments.

(v) Blockchain Technology: Blockchain, originally developed for cryptocurrencies like Bitcoin, offers secure and transparent ways to record and verify transactions. It has applications beyond finance, such as supply chain management and identity verification.

(vi) Biotechnology: Advancements in biotechnology, including gene editing and personalized medicine, are transforming healthcare and agriculture, leading to tailored treatments and improved crop yields.

(vii) Renewable Energy and Sustainability: Industry 4.0 places a greater emphasis on sustainability and clean energy solutions. Technologies like solar power and energy-efficient systems are becoming more prominent. Capacho et al. (2025) observed that monitoring is easier in Indutry 4.0 which is critical aspect in achieving operational efficiency.

(viii) Augmented Reality (AR) and Virtual Reality (VR): AR and VR technologies are changing the way we interact with digital information and our environment, with applications ranging from gaming to education and training. **Metaverse** like emerging tech buzz words are attracting everyone's attention.

(ix) Cybersecurity: With increased connectivity and data sharing, the importance of robust cybersecurity measures has grown significantly to protect against cyber threats and breaches.

The Fourth Industrial Revolution has far-reaching implications for industries, economies, and societies. It has the potential to disrupt traditional business models, create new opportunities,

and reshape the labour market. It also raises ethical and social questions related to privacy, data security, and the impact on jobs and human society. The term "Fourth Industrial Revolution" was popularized by the World Economic Forum (WEF) and has been the subject of extensive discussions in academic, business, and policy circles as the world adapts to the profound changes brought about by these technological advancements. Smart plants, smart manufacturing, and smart logistics all come together at the intersection of industry 4.0, which is the intersection of these three overarching considerations. The concept of the "smart plant" has evolved from the idea of the "digital factory" and is a critical component of the envisioned "smart infrastructure" of the future (Hamilton Ortiz et al., 2020). The "smart plant" not only places significant importance on advanced production systems and processes but also emphasizes the integration of network distribution within production facilities, essentially shaping the layout of the factory. Within this framework, "intelligent production" encompasses broader aspects such as industry-wide production logistics management, human-machine interaction (H2M), and the utilization of 3D/4D technology in industrial operations. This comprehensive approach forms a highly adaptable industrial chain that can cater to flexibility, personalization, and active maintenance within a networked environment. Furthermore, "intelligent logistics," facilitated primarily through the Internet and network integration of logistics resources, synergizes with enhanced logistics source competence on the supply as well as demand sides. This collaborative effort ensures that services align seamlessly with the logistical support required. These three fundamental elements function independently but collaboratively, culminating in the industry 4.0 production system through coordination and mutual interaction. It is interesting that the foundation of this new sector, whose goal is to produce items that are customised for clients, is smart manufacturing (Kagermann, 2015).

4. Principles of Industry 4.0

Industry 4.0 integrates six fundamental design concepts inside its framework. These principles, including decentralisation, virtualization, interoperability, modularity, real-time capabilities, and service orientation, serve as the guiding pillars of this

paradigm. The aforementioned concepts are commonly referred to as "design principles" because to their significant contribution to the design or transition process from the conventional industry, also known as Industry 3.0, to the advanced Industry 4.0 (Gabriela Pereira Carvalho & Walmir Cazarini, 2020).

(i) Decentralization

Decentralization, entails enhancing the capacity of local businesses, specific operations, and machines to independently make decisions. Instead of relying on central computers or hierarchical decision-making structures, this principle fosters flexibility and simplifies the utilization of expertise. It grants local operators the capability to swiftly react to alterations and adjust accordingly. This represents a shift away from the traditional production hierarchy, laying the groundwork for businesses to transform into decentralized self-organizing entities. It's important to note that the decentralization principle extends beyond machines, encompassing the independence granted to human coworkers within Industry 4.0. These individuals enjoy increased liberty to find critical attributes, analyse constraints, and make decisions, when necessary, all while keeping the broader interests of their industry sector and its overall well-being in mind.

(ii) Virtualization

The concept behind virtualization is that through machine-to-machine (M2M) connections and continuous monitoring, a simulated replication can be possible after the industrial setting. It involves linking sensor data to virtual plant and computer models, thereby enabling the creation of a simulated representation of the real world. If something goes wrong, an employee can be told. Also, all the important details, like the next steps to take or the safety rules, are still accessible. In business 4.0, virtualization is used by people as a very useful tool to help them do their work. This concept saves employees and established teams time, analysis, and decision-making by letting them get information, share it, and put it all together virtually, quickly, and in actual time. In a popular work , Ghobakhloo et al. (2025) explored that value cration is possible through virtualization in Industry 4.0.

(iii) Interoperability

Within the manufacturing landscape of Industry 4.0, interoperability signifies the capability of smart machines, intelligent storage systems, and advanced facilities to communicate, exchange information, initiate actions, and manage one another independently, without external assistance. This is called a cyber-physical system (CPS). By linking software and programmes, the integrated manufacturing systems are linked to both business processes inside industries and the value chain across the board. The capacity for humans to collaborate effectively with machines in harmony is also part of interoperability. This means that all industrial tasks can be done at the same time and with the same amount of effort.

(iv) Modularity

The concept of modularity involves the use of modular systems capable of flexible adaptation to evolving demands. These systems allow for the replacement or expansion of individual production modules, simplifying the process of adding or removing modules. Consequently, these modular systems demonstrate a high degree of adaptability, enabling them to seamlessly accommodate seasonal variations or shifts in product production requirements, including the integration of new technologies. This adaptability ensures that production remains agile, capable of responding to changing environmental factors, systemic shifts, and evolving Meeting customer requirements flawlessly, without any errors, disruptions in productivity, or customer dissatisfaction. This characteristic is highlighted in a review study by Narkhede et al. (2024) which says that "suitability of Industry 4.0 technologies is quite important in the areas like New Product Development, Supply Chain Management, Logistics Management, Production Planning and Control, Quality Management, and Maintenance Management". In this way, modularity is quite important facet of Industry 4.0.

(v) Real-time capability

It can be defined as the ability of intelligent machines, equipped with specialised software, to autonomously adjust to the manufacturing process and make decisions based on

Cyber-Physical Systems (CPS) in response to the production requirements. This enables continuous monitoring of product quality and facilitates timely decision-making as per the specific demands of the moment. The establishment of this link will serve to mitigate the occurrence of resource misuse, waste generation, material wastage, and concurrently enhance efficiency of energy. The ability to operate in real-time concept is a prominent feature of industry 4.0, as it plays a crucial role in enabling the industry to achieve optimal time it takes to react to stimuli from both within and outside the system. This is achieved by instantaneously exchanging, receiving, and analysing data and information.

(vi) Service Orientation

In alignment with the principle of service orientation, the availability of human, business, and CPS (Cyber-Physical Systems) services via the Internet, accessible to diverse stakeholders, facilitates the advancement of product-service systems (PSS).

These PSS are intentionally designed to be accessible both within and beyond the confines of the organization. This approach enables Industry 4.0 to uphold its network performance by engaging in collaborations with a wide spectrum of stakeholders, encompassing customers, partner industries, suppliers, and others. Through the utilization of virtual and digital platforms that remain consistently accessible to users, individuals can easily tap into valuable services, products, and industry-related information. **Stöber (n.d.) emphasizes the significance of responsible stewardship of these innovative technologies and informed decision-making, as the choices we make today will influence the future of society, economy, and industry. In a study by** Abulibdeh et al., (2024), it is indirectly observed that role of educational institutions is prominent in enabling other industries with intelligent and capable people who can maintain their service quality.

5. Conclusion

In this chapter, the development of Industry 4.0 has been described in a comprehensive manner. The history and prominent phases of Industry 4.0 have been narrated based on their industrial linkages and usages. Key dimensions of first

Industrial Revolution to Fourth Industrial Revolution (Industry 4.0) have been explained thoroughly with their prominence. Present study explores that Industry 4.0 have promoted the growth of financial systems and technologies, which in turn facilitated globalization and introduced sophisticated tools to a no. of industries which can be observed in modern organisations. The Fourth Industrial Revolution, also referred to as Industry 4.0, was a transformative force that was supported by advanced technologies such as blockchain, IoT, and artificial intelligence (AI). It revolutionized production processes and business models by ushering in an era of automation, smart manufacturing, and interconnectedness. It is important to note that metaverse is another big segment in technology and Industry 4.0 which will influence major factors contributing to production and performance in industries to diverse set of business and social organisations.

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17

Identifying Major Problems in Sports Entrepreneurship: A Comprehensive Study in Guwahati City at Assam

Manoj Khaund* & Sartaz Aziz**

Abstract

Sports entrepreneurship is a vital driver of economic growth and industry innovation, contributing significantly to employment generation and the development of the sports ecosystem. However, entrepreneurs in the sports sector encounter numerous challenges that impede their growth and sustainability. This study critically examines the key constraints faced by sports entrepreneurs in Guwahati, Assam, through an extensive analysis of financial, infrastructural, regulatory, and market-related barriers. Utilizing primary and secondary data sources, including surveys and expert interviews, the research identifies certain major obstacles that hinders the growth of sports entrepreneurship. The findings underscore the need for strategic policy reforms, enhanced financial accessibility, and robust infrastructural development to foster a thriving sports entrepreneurial ecosystem. This research contributes to the existing body of knowledge on sports entrepreneurship in emerging economies and offers policy recommendations for sustainable growth in the sector.

Keywords: *Sports Entrepreneurship, Business Challenges, Problems.*

* Assistant Professor, Department of Commerce, Girijananda Chowdhury University, Guwahati, Assam

** Student, Dibrugarh University, Dibrugarh, Assam

Introduction

The field of sports entrepreneurship plays a crucial role in economic development and job creation, yet it often encounters various hurdles that hinder its progress. This study seeks to examine and understand the primary challenges faced by sports entrepreneurs in Guwahati City at Assam, which is an emerging centre for sports activities in Northeast India. Using a mixed-method approach, this research incorporates both qualitative and quantitative techniques including structured interviews and surveys conducted with entrepreneurs' industry stakeholders, and experts. The study identifies significant barriers such as inadequate sports infrastructure, limited funding opportunities, insufficient awareness about entrepreneurial prospects in the sports sector, restrictive policies, and a lack of support mechanisms. Additionally, it delves into the socio-cultural and economic factors respectively, which are affecting the region's sports entrepreneurship ecosystem. The initial findings suggested that entrepreneurs in this domain encounter difficulties stemming from a scarcity of financial and institutional resources. The absence of specialized training programs and effective networking opportunities further inhibits the growth of innovative sports ventures. The research underscores the importance of creating targeted policies, establishing sports-focused incubation facilities, and fostering collaborations among stakeholders to develop a supportive entrepreneurial framework. This study offers valuable insights for policymakers, educators, and industry professionals aiming to strengthen the sports entrepreneurship landscape in Guwahati. It also encourages further investigation into developing strategies for overcoming these challenges and ensuring sustainable development within the sector. Keywords: Assam, Sports Entrepreneurship, Problems Introduction The field of sports entrepreneurship is expanding rapidly in India, with opportunities growing alongside the nation's increased enthusiasm for sports. However, as suggested by Kumar Malhotra (2016), the potential for entrepreneurial ventures to succeed in sports remains constrained by several challenges. A significant factor contributing to these constraints particularly in Assam, is the inability of entrepreneurs to convert potential business ideas into sustainable operations. Previous studies (Hazarika & Goswami,

2016; Deka & Goswami, 2020) have highlighted similar issues, focusing on the unique barriers faced in emerging regions like Assam. Thus, through this study, an attempt has been made to understand and identify the major problems that affect sports entrepreneurship in the State of Assam and to suggest measures for overcoming these challenges

Conceptual Framework:

The following concepts have been taken into consideration to carry out this study.

Sports: Sports encompass various physical activities or games that involve competition, skill, and physical exertion. These activities are often organized according to specific rules or regulations, with the aim of determining a winner or achieving a particular objective. Beyond the physical aspect, sports also hold cultural, social, and economic significance, serving as platforms for community bonding, cultural expression, and economic activity. Overall, sports play a multifaceted role in society, impacting individuals, communities, and nations in various ways.

Sports Entrepreneurship: It refers to newly established businesses that operate within the sports industry, offering innovative products, services, or technologies aimed at addressing specific needs or challenges within the sports ecosystem.

Problems: Problems refer to challenges, difficulties, or obstacles that sports entrepreneurship encounter in their operations, growth, or overall business endeavours. These problems can vary widely and may include issues related to funding, competition, regulations, market access, technology, and sustainability, among others.

Review of Literature

In this section an attempt has been made to study the different problems surrounding sports entrepreneurship. To conduct the same, different literatures have been reviewed in context to identify these problems in India as well as in Assam to find out the tentative variables that will be taken into consideration for the study. The gist of the same has been highlighted below:

There are numerous studies which have highlighted access to capital as one of the major problems of sports entrepreneurship. The lack of access to capital is a significant challenge faced by sports entrepreneurship in both India and Assam. Despite the growing interest in sports entrepreneurship, entrepreneurship in this sector often struggles to secure adequate funding to support their growth and operations. Several factors contribute to this problem, including perceived risks, limited investor understanding of the sports industry, and the absence of a mature ecosystem for sports entrepreneurship (Kumar Malhotra, 2016; Hazarika & Goswami, 2016: Deka & Goswami, 2020; Kumar, 2021)

In Assam, the lack of access to capital for sports entrepreneurship is particularly acute due to the region's relatively underdeveloped entrepreneurial ecosystem. Compared to major metropolitan areas in India, Assam has fewer venture capital firms, angel investors, and other funding sources available to support entrepreneurship ventures. As a result, entrepreneurs in Assam face greater challenges in securing investment capital to launch and grow their sports entrepreneurship. Furthermore, the socio-economic disparities prevalent in Assam may further exacerbate the problem, as entrepreneurs from marginalized communities or rural areas may have limited access to financial resources and support networks.

The research studies conducted by Gadiraju (2016), Dhayanithy & Mukherjee (2018), Riyas & Chawathe (2022) and Barve (2023) showed problems in seeking financial support from financial institutions as another major problem surrounding sports entrepreneurship. One of the significant challenges faced by sports entrepreneurship in both India and Assam are the difficulty in seeking financial support from traditional financial institutions. Despite the increasing recognition of the sports industry's potential for economic growth and innovation, sports entrepreneurship often encounters hurdles when attempting to secure funding from banks and other financial entities. This problem arises due to several factors. Firstly, financial institutions may perceive the sports industry as inherently risky, particularly for entrepreneurship with unproven business models or products. This perception is further compounded by the lack of understanding among lenders about the nuances and

dynamics of the sports entrepreneurship landscape. Additionally, sports entrepreneurship may face challenges in providing traditional forms of collateral, such as property or assets, which can make it challenging to qualify for loans or lines of credit. In regions like Assam, where the entrepreneurial ecosystem is still emerging, the lack of familiarity with sports entrepreneurship may exacerbate these challenges, leading to greater reluctance from financial institutions to extend support. As a result, sports entrepreneurship often struggles to access the capital needed to launch and scale their ventures, hindering their growth and sustainability. Moreover, to address this issue, collaborative efforts are needed to raise awareness about the potential of sports entrepreneurship, build trust between financial institutions and sports entrepreneurship, and develop innovative financing mechanisms tailored to the unique needs of the sports industry in India and Assam. By overcoming these barriers, it is possible to unlock the full potential of sports entrepreneurship and drive economic development and innovation in the sports sector.

Various other studies highlighted that Managing cash flows is a critical challenge for sports entrepreneurship in India and Assam due to the irregular and often unpredictable nature of their revenue streams. Unlike established businesses with steady income, sports entrepreneurship frequently experiences significant fluctuations in their earnings, which can complicate financial planning and stability. This irregularity arises from several factors, including the seasonal nature of sports activities, dependency on sponsorship deals, ticket sales, and event-driven revenues (Bhattacharjee & Boro, 2018; Mochahari & Barman, 2021).

Different studies also found that high operating costs are a major problem surrounding sports entrepreneurship across the Nation. Studies also showcase that high operating costs are a significant challenge for sports entrepreneurship in India and Assam, creating substantial barriers to growth and sustainability. The nature of sports industry often necessitates significant initial and ongoing investments in various areas, including infrastructure, equipment, technology, marketing, and personnel. Similarly, those involved in manufacturing sports equipment face high production costs, particularly if they aim to meet international standards of quality and safety. Moreover, the cost of employing skilled professionals

such as coaches, trainers, and medical staff adds to the financial burden (Ansari & Hussain, 2015; Mochahari & Barman, 2021).

Different studies confirms that another major issue is budget constraints for marketing initiatives. Unlike established brands, sports entrepreneurship often operates with limited financial resources, making it difficult to invest in comprehensive marketing campaigns that can effectively promote their products and services. This financial limitation means that entrepreneurs must be highly strategic with their marketing spend, often resorting to cost- effective digital marketing techniques that may not have the same reach or impact as traditional advertising methods. Additionally, sports entrepreneurs face significant challenges in identifying and reaching their target audience effectively. With the sports market being highly fragmented, understanding consumer preferences and behaviour requires substantial market research and data analytics, which can be costly and complex. This problem is exacerbated by the difficulty in competing with established brands that have greater resources, extensive market presence, and loyal customer bases. These larger brands can outspend entrepreneurship in marketing and advertising, making it hard for new entrants to gain visibility and traction (Rosner & Shropshire, 2011; Lakshman & Akhter, 2013; Kishore, 2021)

For entrepreneurs without a legal background, understanding and complying with regulations related to contracts, licensing, and intellectual property rights is particularly challenging. This can lead to inadvertent violations that result in costly legal disputes and penalties (Kumar Malhotra, 2016; Hazarika & Goswami, 2016: Deka & Goswami, 2020; Kumar, 2021)

Lastly, various scholars also specify that the limited access to advanced technological tools and resources hinders innovation within sports entrepreneurship. Cutting-edge technologies such as performance analytics, virtual reality training, and advanced sports equipment can significantly enhance an entrepreneurship's offerings. However, the high costs associated with acquiring and implementing these technologies are often prohibitive. Additionally, a lack of technical knowledge among entrepreneurs can further impede the adoption of innovative solutions. Keeping up with rapidly evolving technological trends and developments relevant to the sports industry require continuous learning and

investment, which many entrepreneurships struggle to afford (Mili, 2016; Bhattacharjee & Boro, 2018; Deka & Goswami, 2020).

In this section, an attempt has been made to study the different problems surrounding sports entrepreneurship. Various studies have consistently highlighted access to capital as one of the significant challenges faced by sports entrepreneurs. For instance, Bhattacharjee and Boro (2018) discuss the scarcity of financial resources as a pervasive issue. Entrepreneurs in Assam particularly, struggle to secure funding (Hazarika & Goswami, 2016). Additionally, Malhotra (2016) highlights the limited understanding of the sports industry by potential investors, further constraining entrepreneurial growth. Other literature (Deka & Goswami, 2020) suggests that the absence of a supportive ecosystem exacerbates these challenges, leading to slower development of sports ventures. These insights have formed the basis of this research to identify and explore the major barriers in Assam.

Thus, from the above section, it is quite clear that sports entrepreneurship in India and Assam face an array of challenges that span financial, marketing, legal, and technological domains. Budget constraints limit their ability to conduct effective marketing campaigns and compete with established brands. The difficulty in identifying and reaching target audiences, coupled with a lack of reliable analytics tools, further complicates their marketing efforts. Navigating the complex legal and regulatory environment requires significant resources and expertise, which many entrepreneurships lack. Lastly, the high cost of innovation and limited access to advanced technologies hinder their ability to keep pace with industry advancements. Thus, these above-mentioned variables have been taken into consideration for further study.

Research Gap & Importance of the study:

After reviewing existing literature, it becomes clear that a research gap exists in understanding the unique challenges faced by sports entrepreneurs in Assam. While national studies cover sports entrepreneurship broadly, localized research is limited. This study

seeks to fill that gap by focusing on the specific obstacles within Assam's entrepreneurial ecosystem, including capital limitations operational inefficiencies, and socio- cultural challenges (Barve, 2023). By addressing these gaps, the study will provide valuable insights for both policymakers and entrepreneurs encouraging the development of tailored strategies to foster growth in the sports sector.

Objective of the Study:

To analyze the major problems of sports entrepreneurship in Assam.

Methodology of Study:

In order to carry out the research, a descriptive research approach has been adopted. The study area and the target population of the study consists of the sports entrepreneurs of Assam. In total, a sample of 64 has been taken though convenience sampling method, who are associated / own sports entrepreneurship in Assam. The data has been collected through a questionnaire and the responses have been recorded and analysed using SPSS 23.

To obtain a high degree of reliability of the collected data, Cronbach's alpha was used. Generally, it is considered reliable when the value is > 0.7 (Malhotra, 2004). The results of the reliability analysis are shown in Table 1 below:

Table 1: Reliability Analysis Using Cronbach's Alpha

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.878	.877	17

Analysis & Findings

In this section, the data collected have been analysed and interpreted. The same is shown and explained in the below segment respectively.

Demographic Profile

a. Distribution of Respondents' Age

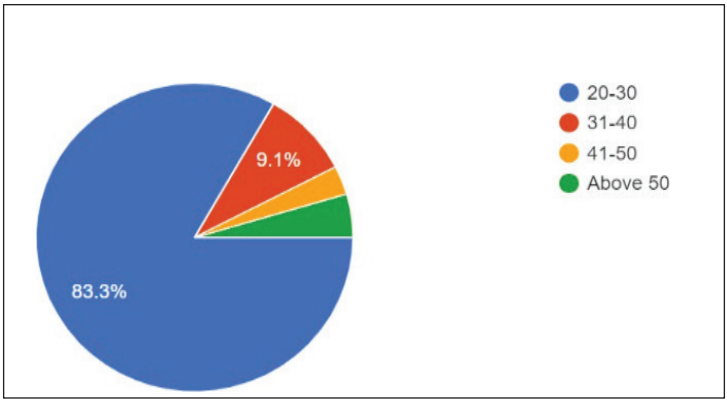

Fig 1

Fig 1 presents the pie chart on age distribution of respondents, which illustrates the certain population across different age groups. Here is an interpretation of the results: Age Group 20-30 (Blue Segment: This segment makes majority of the population with 83.30 percent). This indicates that the bulk of the population falls within this age range, suggesting a youthful demographic. This could have implications for workforce planning, marketing strategies, and social services tailored to younger adults. Entrepreneurship is mostly operated by young people who believe it is more beneficial to start a business than to pursue a job. This demographic distribution suggests the potential for a vibrant, active workforce primarily consisting of younger individuals, but it also raises questions about the sustainability of services and support systems for older age groups, given their smaller numbers. Understanding these demographics is crucial for policymakers, businesses, and social planners as they design strategies and allocate resources to meet the needs of this population.

b. Distribution of Respondents' Gender

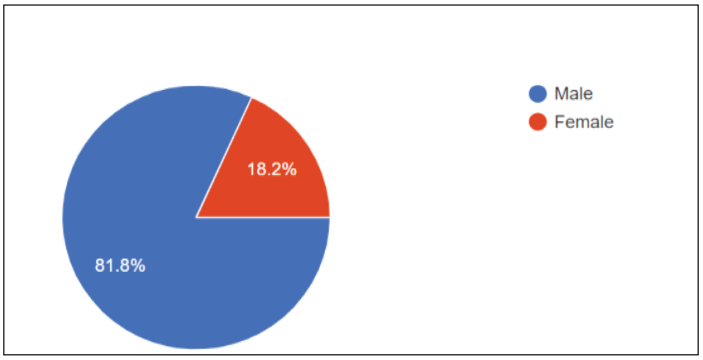

Fig 2

Fig 2 presents the pie chart on gender distribution of respondents, which clearly shows a significant gender disparity in sports entrepreneurship in Assam, with men overwhelmingly dominating the field. Addressing this disparity could involve concerted efforts from various stakeholders to create a more inclusive and supportive ecosystem for women in sports entrepreneurship. Male which is represented by the blue segment highlight that this segment accounts for 81.80 percent of the population involved in sports entrepreneurship. This indicates that a significant majority of the individuals engaged in sports entrepreneurship are male. This dominance suggests that men are much more likely to participate or take leadership roles in sports-related entrepreneurial ventures in Assam. The female segment, which is represented by the red segment highlight that this segment represents 18.20 percent of the population involved in sports entrepreneurship. This suggested that women are considerably underrepresented in sports entrepreneurship in Assam. This could reflect broader societal trends where fewer women are engaged in entrepreneurial activities within the sports sector, potentially due to cultural, economic, or social barriers.

c. Distribution of Respondents' Educational Qualifications

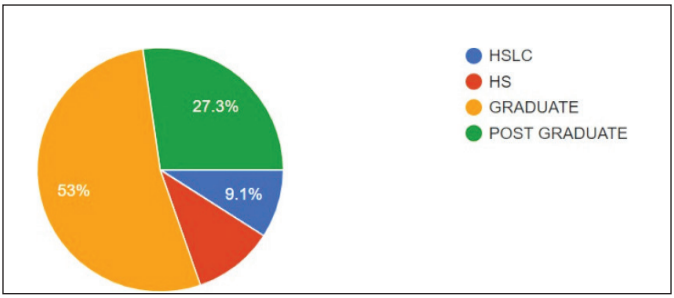

Fig 3

The chart reveals that a significant majority (80.30 percent) of sports entrepreneurs in Assam have at least a graduate-level education, with a notable portion holding postgraduate degrees. Higher levels of education among entrepreneurs might contribute to more sophisticated business strategies, better management practices, and potentially higher success rates for entrepreneurship. Education provides critical thinking skills, financial literacy, and other competencies that are advantageous in the entrepreneurial world. With a small percentage of entrepreneurs having only HS or HSLC education, there might be a need for additional support systems such as mentorship programs, business training workshops, and access to resources that can help these individuals succeed. The correlation between higher education levels and entrepreneurship success can encourage aspiring entrepreneurs to pursue further education or continuous learning to enhance their business acumen and increase their chances of success. The educational profile of sports entrepreneurs in Assam is skewed towards higher education levels, with a majority holding graduate and postgraduate degrees. This suggests that formal education plays a crucial role in the entrepreneurial landscape, potentially contributing to the growth and success of sports entrepreneurship in the region. Providing support for less educated entrepreneurs and encouraging further education could help in fostering a more diverse and inclusive entrepreneurial environment for sports entrepreneurship. Thus, to achieve our main objective, i.e. to identify the major problems of sports entrepreneurship in Assam, an attempt has been made to find out the major factors

(problems) which have been identified from the literature review as highlighted in the previous segments. To achieve the same, exploratory factor analysis has been conducted to find out the major problems. The results of the same have been highlighted and discussed below.

The analysis is conducted in two stages. Initially, the factorability of collected data is tested with Bartlett test and Kaiser-Meyer-Olkin test and then finally, factor analysis is carried out. The result of the Bartlett Test is presented in the following Table 2.

Table 2: KMO & Barlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.814
Barlett's Test of Sphericity		430.813
Approx. Chi-Square	df	136
	Sig.	.000

The above table shows that the KMO value and the P value of the Bartlett's Test on problem variables is less than 0.5 and therefore, the test is statistically significant. In other words, Bartlett's test suggests that there is a co relation between some variables and also indicates that factor analysis can be carried out.

Table 3 represents the results of factor loadings, which are indicated below:

Table 3: Factor Loadings

Rotated Component Matrix					
Factors	**Components**				
	1	2	3	4	5
Access to capital	.079	-.101	.111	.796	.086
Problem in seeking financial support from financial institutions	.242	.363	.321	.317	-.500
Irregular revenue streams	-.168	.376	-.109	.719	.100
High operating costs	.048	.182	.069	.217	.747
Availing Sponsorships	.259	.526	.031	.267	.451

Budget constrains	.094	.079	.830	.065	-.030
Identifying and reaching target audience	.385	.065	.410	.083	.548
Competition with established brands	.749	-.140	.200	.345	.218
Lack of analysis tools and metrices	.700	.130	.115	-.081	.282
Complex legal framework	.455	.211	.544	.363	-.059
Complying with standardprotocols for business issued by government	.308	.464	.352	.480	.253
Limited access to advanced technological tools	.529	.623	.142	.114	-.074
Lack of technological knowledge	.754	.256	.040	.109	-.214
High innovation costs	.608	.253	.212	-.165	.055
Rapid technological changes	.553	.574	.137	-.056	.192
Understanding business contracts and negotiations	.069	.725	.483	.060	.115
Extraction Method: Principal Component Analysis Rotation Method: Varimax with Kaiser Normalization					
Rotation Converged in 6 Iterations					

From the above table, it is seen that a total of 5 components has been extracted. Within these five components, the factors which have a value of more than 0.7 have been taken into consideration and the rest of the factors have been eliminated (as identified by red) due to lesser value and as such, the major problem factors are identified.

Lastly, the reliability of the selected factors has been checked using Cronbach's Alpha to ensure the reliability of the selected factors, wherein the results are highlighted in Table 4.

Table 4: Reliability Analysis Using Cronbach's Alpha

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.773	.777	8

Discussion

One of the most critical challenges for sports entrepreneurship in Assam is access to capital. Entrepreneurship requires substantial initial investment to cover the costs of setting up operations, purchasing equipment, and hiring skilled personnel. Additionally, ongoing financial resources are necessary to support growth and expansion activities. Unfortunately, securing adequate funding can be particularly difficult in Assam due to several reasons. Firstly, the financial ecosystem in Assam is not as developed as in more metropolitan regions. Venture capitalists, angel investors, and other funding entities are less prevalent, making it harder for entrepreneurship to find investment opportunities. This scarcity of local investors forces many entrepreneurships to seek funds from outside the state, which can be a daunting task due to geographical and logistical barriers. Secondly, financial institutions such as banks often have stringent lending criteria that many entrepreneurships cannot meet. These criteria may include a robust credit history, substantial collateral, and proven business performance, which are challenging for new ventures to demonstrate. Consequently, many entrepreneurships face rejection when applying for loans, leaving them without the necessary funds to grow their businesses. Moreover, the lack of financial literacy among entrepreneurship founders exacerbates the problem. Many entrepreneurs lack the knowledge and skills needed to navigate the complex landscape of funding options, understand the terms of financial agreements, and manage investor relationships effectively. This knowledge gap can result in missed opportunities and poor financial decisions that hinder growth.

Irregular revenue streams pose another significant challenge for sports entrepreneurship in Assam. Unlike established businesses with stable income, entrepreneurship often experience fluctuations in their revenue due to various factors such as seasonal demand, inconsistent customer engagement, and dependency on sporadic events or sponsorship deals. Particularly, sports entrepreneurship may face periods of high revenue during sports seasons or events followed by lean periods with minimal income. This cyclic nature of revenue can create cash flow issues, making it difficult for entrepreneurship to maintain operations, pay salaries, and cover

ongoing expenses during off-peak times. Such financial instability can strain resources and limit the ability to invest in growth opportunities or new initiatives. Additionally, dependency on sponsorship deals and external funding can lead to irregular income. Sponsorships can be unpredictable and contingent on various factors, including market conditions, sponsor priorities, and the entrepreneurship's ability to deliver value. A delay or withdrawal of sponsorship funds can disrupt cash flow, causing financial strain. To manage these irregular revenue streams, entrepreneurship needs to implement robust financial planning and cash flow management strategies. However, many entrepreneurships lack the expertise and tools required to forecast revenue accurately, manage expenses efficiently, and build financial resilience. This gap can lead to short-term survival tactics that compromise long- term sustainability.

High operating costs are a significant barrier for sports entrepreneurship in Assam. Operating costs encompass a wide range of expenses, including rent, utilities, salaries, equipment maintenance, and marketing. For sports entrepreneurship, additional costs might include the purchase and upkeep of specialized sports equipment, rental of training facilities, and logistics for events and competitions. In Assam, certain factors can exacerbate these costs. For instance, the infrastructure in some areas might not be as developed, leading to higher costs for transportation, logistics, and facilities maintenance. Additionally, importing specialized sports equipment from other regions or countries can be costly due to shipping fees, import duties, and taxes. Moreover, the need to attract and retain skilled personnel adds to the operating costs. Sports entrepreneurship often requires coaches, trainers, marketing professionals, and administrative staff, whose salaries and benefits contribute significantly to overall expenses. The competitive job market means that entrepreneurship must offer attractive compensation packages to secure the right talent, further driving up costs. High operating costs can significantly impact the profitability and sustainability of sports entrepreneurship. When a large portion of revenue is consumed by operational expenses, there is less available for reinvestment into the business. This can stifle innovation, limit

marketing efforts, and reduce the ability to expand and scale operations.

Closely related to high operating costs are budget constraints, which are a pervasive issue for sports entrepreneurship. Limited financial resources restrict the ability of entrepreneurship to invest in essential areas such as marketing, research and development, infrastructure, and talent acquisition. This lack of investment can hinder the growth potential and competitiveness of the entrepreneurship. Budget constraints often force entrepreneurship to make difficult trade-offs. For example, an entrepreneurship might need to choose between investing in high-quality equipment or launching a marketing campaign. Such decisions can have long-term implications, as underinvestment in critical areas can lead to subpar performance, reduced market visibility, and missed growth opportunities. Moreover, tight budgets can limit the ability to respond to unforeseen expenses or opportunities. Entrepreneurship might not have the financial cushion needed to handle unexpected costs such as equipment repairs, regulatory changes, or market shifts. This financial inflexibility can lead to disruptions in operations and strategic plans.

Competing with established brands is a daunting challenge for sports entrepreneurship in Assam. Established brands have several advantages, including strong market presence, brand recognition, customer loyalty, and substantial resources. These advantages enable them to dominate the market, making it difficult for new entrants to gain traction. Established brands can leverage their resources to engage in extensive marketing campaigns, offer competitive pricing, and maintain a wide distribution network. They also benefit from economies of scale, allowing them to produce goods or offer services at a lower cost per unit compared to smaller entrepreneurship. For sports entrepreneurship, differentiating themselves from established brands requires innovative approaches, unique value propositions, and exceptional customer service. However, achieving this differentiation with limited resources is challenging. Entrepreneurships need to invest in branding, marketing, and customer engagement strategies to build their market presence, which can be difficult under financial constraints. Additionally, customer loyalty to established brands means that entrepreneurship must work harder to attract and

retain customers. This often involves offering superior products or services, creating memorable experiences, and building strong relationships with customers. The effort and resources required to compete effectively with established brands can be overwhelming for new entrepreneurship.

In the modern business environment, data-driven decision-making is crucial for success. However, many sports entrepreneurship in Assam lack access to advanced analysis tools and metrics that are essential for understanding market trends, customer behavior, and operational performance. Data analysis tools help entrepreneurship gather, process, and interpret large volumes of data to make informed decisions. These tools enable entrepreneurship to track key performance indicators (KPIs), measure the effectiveness of marketing campaigns, optimize operations, and identify growth opportunities. Without these tools, entrepreneurship may rely on intuition and guesswork, leading to suboptimal decisions and missed opportunities. Moreover, the ability to analyze data is critical for strategic planning and competitive analysis. Entrepreneurships need to understand their market position, identify strengths and weaknesses, and benchmark against competitors. This requires sophisticated analytical capabilities that many entrepreneurships lack due to financial constraints or insufficient expertise. The absence of robust data analysis tools and metrics can also impact customer engagement and retention. Understanding customer preferences and behavior is essential for tailoring products and services to meet their needs. Without this insight, entrepreneurship may struggle to deliver personalized experiences and build lasting customer relationships.

Effective negotiation and a clear understanding of business contracts are crucial for securing favorable terms with suppliers, partners, and clients. However, many sports entrepreneurship in Assam lack the legal expertise and experience needed to navigate complex contracts and negotiations. Contracts define the terms and conditions of business relationships, including payment terms, delivery schedules, responsibilities, and liabilities. A poorly drafted or understood contract can result in unfavourable terms, financial losses, or legal disputes. For entrepreneurship with limited resources, the consequences of such issues can be

particularly damaging. Negotiation skills are equally important for establishing beneficial partnerships and securing the best possible terms. This includes negotiating with suppliers for better pricing, with sponsors for more favorable deals, and with clients for profitable contracts. Entrepreneurship that lacks negotiation expertise may settle for suboptimal terms, which can impact profitability and growth. Furthermore, understanding legal and regulatory requirements is essential for compliance and risk management. Entrepreneurships need to navigate various legal issues such as intellectual property rights, employment laws, tax regulations, and industry-specific regulations. Failure to comply with these requirements can lead to penalties, legal challenges, and reputational damage. To mitigate these risks, entrepreneurship need access to legal advice and resources to understand and manage their contractual and regulatory obligations. However, the cost of legal services can be prohibitive for many entrepreneurships, leading them to overlook or inadequately address these critical aspects of their business.

Thus,the findings of this research align with previous studies, reaffirming that access to capital remains a core issue for sports entrepreneurs in Assam. Kumar (2021) and Malhotra (2016) also emphasize similar challenges Furthermore, the results from the exploratory factor analysis suggest that irregular revenue streams, high operational costs, and budget constraints are additional barriers. These findings are consistent with the work of Bhattacharjee & Boro (2018), who have highlighted the financial instability caused by seasonal demand and limited sponsorship opportunities in the region. By addressing these challenges, as suggested by Gadiraju (2016), sports entrepreneurship in Assam could achieve sustainable development.

Policy Implications

The findings from this study on the problems of sports entrepreneurship in Assam highlight several critical policy implications that need to be addressed to foster a more supportive and thriving environment for these enterprises. To mitigate the identified challenges and enhance the growth and sustainability of sports entrepreneurship, policymakers, industry stakeholders, and financial institutions must collaborate on the following strategic initiatives:

Enhanced Access to Capital: Governments and financial institutions should develop dedicated funding programs aimed specifically at sports entrepreneurship. This could include grants, low-interest loans, and venture capital funds tailored to the unique needs of the sports industry. To attract more investors, there needs to be increased awareness and education about the potential and opportunities within the sports entrepreneurship sector. Initiatives such as investor workshops, pitch events, and networking forums can help bridge the gap between sports entrepreneurship and potential investors.

Financial Literacy & Support Services: Implementing comprehensive financial literacy programs for sports entrepreneurs can equip them with the necessary skills to navigate the funding landscape effectively. These programs should cover topics such as financial planning, investment management, and understanding financial agreements. Establishing mentorship programs where experienced entrepreneurs and financial advisors can guide sports entrepreneurship can significantly improve their financial management practices and strategic planning.

Revenue Stability: Encouraging sports entrepreneurship to diversify their revenue streams can help mitigate the impact of seasonal fluctuations. This could include developing multiple income sources such as merchandise sales, digital content, and community-based programs. Providing training on robust cash flow management techniques can help entrepreneurship better manage irregular revenue streams and maintain financial stability.

Infrastructure Development: Investment in sports infrastructure in Assam can reduce operational costs for entrepreneurship. This includes developing affordable training facilities, sports complexes, and logistical support services. Offering subsidies for equipment purchases and tax incentives for entrepreneurship can help alleviate the financial burden of high operating costs.

Competitive Strategies & Market Access: Government and industry bodies should support sports entrepreneurship in building strong brands and marketing strategies. This could include funding for marketing campaigns, access to professional marketing services, and participation in national and international sports events.

Market Research and Data Access: Providing entrepreneurship with access to market research and data analytics tools can help them better understand market trends, customer preferences, and competitive landscapes. This support can enable data-driven decision-making and strategic planning.

Technological Integration and Innovation: Introducing grants and funding opportunities specifically for the adoption of advanced technologies in sports can drive innovation. This includes funding for performance analytics, wearable technology, and digital platforms. Establishing technical training programs can enhance the technological capabilities of sports entrepreneurs, enabling them to leverage cutting-edge technologies effectively.

Legal Support and Regulatory Compliance: Providing affordable legal advisory services can help entrepreneurship navigate complex contracts and regulatory requirements. This could include pro bono legal clinics, partnerships with law firms, and online legal resources.

Simplification of Regulatory Processes: Simplifying regulatory processes and reducing bureaucratic hurdles can make it easier for sports entrepreneurship to comply with legal requirements and operate efficiently. Streamlined procedures and clear guidelines can significantly reduce the administrative burden on entrepreneurship.

Gender Inclusivity and Diversity: Initiatives to encourage and support women in sports entrepreneurship should be prioritized. This includes providing funding, mentorship, and networking opportunities specifically for female entrepreneurs. Conducting awareness campaigns to highlight the importance of gender diversity in sports entrepreneurship can help create a more inclusive entrepreneurial ecosystem.

Suggestions:

Thus, by addressing the critical challenges related to access to capital, financial management, operational efficiency, competitive strategies, technological integration, and legal compliance, stakeholders can create a more conducive environment for sports entrepreneurship. Collaboration among government bodies, financial institutions, industry experts, and the entrepreneurship

community is essential to implement these policies effectively. Such efforts will not only drive the growth and sustainability of sports entrepreneurship in Assam but also contribute to the broader economic and social development of the region. By unlocking the potential of sports entrepreneurship, Assam can position itself as a hub for innovation, community engagement, and talent development in the sports sector. The study on the problems of sports entrepreneurship in Assam has revealed a complex web of challenges that these enterprises must navigate to achieve growth and sustainability. Access to capital emerges as a critical issue, with entrepreneurship struggling to secure necessary funding due to an underdeveloped financial ecosystem and stringent lending criteria from financial institutions. The scarcity of local investors in Assam, combined with a lack of financial literacy among entrepreneurs, further exacerbates this problem, hindering the ability to launch and expand sports entrepreneurship effectively.

Conclusion

Sports entrepreneurship in Assam faces a myriad of challenges that span financial, operational, competitive, technological, and legal domains. Addressing these challenges requires a multifaceted approach involving targeted support, improved access to resources, and strategic planning. Stakeholders, including policymakers, investors, and industry experts, must collaborate to create a supportive ecosystem that fosters the growth and sustainability of sports entrepreneurship. By overcoming these obstacles, Assam can unlock the potential of its sports entrepreneurship sector, driving economic development, community engagement, and talent development in the region.

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18

Impact of Climate Change on Agricultural Productivity: Challenging Global Food Security

Sraddha Sarmah*

Abstract

Global climate change as in the 21st century, is climate variability characterized by the long-term shift in the temperature, precipitation levels and extreme weather events. It is one of the most concerning global challenges, with severe natural, climatic and socio-economic repercussions. This poses a serious threat to the agricultural productivity as a whole and also challenges the global food security. With the changing global climatic conditions, the crop yields of various staple food crops like paddy, wheat, maize etc. have decreased over the decades. These crops are essential for feeding the majority of the world population. However, with the ever-changing global climatic conditions, the crop yields have reduced drastically in due course of time. The reduction in the crop yields, largely affects the global food security and the SDG 2 due to shortages of food supply, increase in the prices of food and also the market availability of food.

1. Introduction:

Climate change has been described as the most significant environmental threat of the 21st century. Global climate change as in the 21st century, is climate variability characterized by the long-term shifts in the temperature, precipitation levels and extreme

* PhD Research Scholar, Department of Economics, Assam University, Silchar

weather events. It is one of the most concerning global challenges, with severe natural, climatic and socio-economic repercussions. Agriculture being heavily dependent on suitable climatic conditions, is greatly influenced by the rapid change in the climatic conditions (Gornall et. al. 2010). This poses a serious threat to the agricultural productivity as a whole and also challenges the global food security. With the changing global climatic conditions, the crop yields of various staple food crops like paddy, wheat, maize etc. have decreased over the decades. These crops are essential for feeding the majority of the world population. However, with the ever-changing global climatic conditions, the crop yields have reduced drastically in due course of time. The reduction in the crop yields, largely affects the global food security and the SDG 2 due to shortages of food supply, increase in the prices of food and also the market availability of food. The challenge to meet global food security is compounded by the impact of climate change on agriculture (Onyutha C., 2018).

In addition to longer-term, more permanent shifts in seasonal climatic patterns are near term increases in the frequency and intensity of weather extremes. These are already disrupting agriculture, fisheries, and the natural resources. Developing nations with largely rural economies and limited agricultural variety face the greatest vulnerability, as they lack the adaptability to cope with significant changes in their production systems (ICWG-CC, 2008).

In many nations where farming output is already minimal and resources to handle challenges are scarce, climate change is predicted to further decrease productivity and increase instability in production. Over time, shifts in temperature and rainfall patterns due to climate change are anticipated to alter growing seasons, influence pest and disease trends, and change which crops can be grown, impacting production levels, costs, earnings, and, in the end, people's livelihoods and well-being.

2. Empirical Review:

Climate change, agriculture, and food security have become a topic of worldwide attention.

With the global shifts in temperature, precipitation levels and other climatic factors, agricultural yields have been decreasing

rapidly over the years. The following section discusses the impact of climate change induced natural hazards on agricultural productivity and the rising pressure on achieving food security.

2.1 Impact of flood on food insecurity

As a consequence of rising temperature, floods have become more frequent and devastating because of raised temperatures not only change rainfall patterns but also increases the frequency and severity of flood (Oskorouchi R. and Sousa-Poza, 2020). In the long run, climate change is going to affect agriculture in terms of productivity, growth rate and yield. The overall agricultural productivity for the entire world is projected to decline between 3 and 16% by 2080 (Mahato, 2014). Despite extensive evidence that flood exposure reduces household calorie consumption, (eg., Del Ninno et al., 2003), neither floods nor climate change in general influence food security solely through short-term availability and food prices; floods may also be responsible for lowering household income and assets (Del Ninno et al., 2003). One very important mechanism through which flood affects food security in the longer term is their effect on income and poverty (Oskorouchi R. and Sousa-Poza, 2020).

Flooding affects food security negatively, which ultimately affects the SDG2. With floodwaters washing away the standing agricultural crops in every flood event, there stands a big threat to food security in both global and household level. Food security has been understood by many as the availability of food in the world marketplace (FANTA, 2003). However, global food availability does not translate into household food security. This is because food in the world market may not be affordable to the poor and the vulnerable, especially in the developing countries (Akudugu A. et al., 2012). The reasons for the high percentage of extreme food insecurity recorded by the households were the decrease in the household food supply with associated reduction in children's and adult's food intake as a result of inadequate resources to acquire food (Akukwe et al., 2020). To achieve food security, water must be available at the right place, at the right time, in the right quantity and be of the right quality. Water related disasters negatively affect the agricultural areas and crop production which can threaten food security (Pratiwi et al., 2020).

Flood affecting the agricultural lands directly triggers food insecurity. Majuli world's largest inhabited riverine island with an area of 1256 km2 has been shrinking over the years primarily due to river bank erosion rendering hundreds homeless especially during floods. This has also decreased the amount of agricultural land and has affected the quality of land used for agricultural produce (Chaliha et al., 2011). Loss of agricultural produce leads to the shortage in the food supply which results in the rise in price of food. The shortage and unavailability of food makes it inaccessible for the poor. The poor people living in the rural areas have to live on insufficient food or starvation. Mandal and Sarma, (2020) in their study have found that around 28% of the household in the country are food insecure.

After every flood event there was basic food scarcity and the growth and development of the crops are affected when flood washes away farmland. The ability of the plants to absorb nutrients necessary for growth greatly decreases due to flood leading to poor plant produce. This results in increased food insecurity and unavailability of staple food (Week and Wizor, 2020). Flood results in acute food insecurity which affects the livelihood of the residents. Individuals and households are also found pilfering other person's food without permission.

Households with poor access to land and markets and those relying on casual labour are most likely to be food insecure. The farming communities were found to be most sensitive to the impacts of erratic land degradation, poor access to quality inputs and unsupportive agricultural policies (Boori et. al., 2017). In a similar study by Amrah et al., 2010 found that the levels of diseases in the communities depend on the nutrition standard, the general standard of living, and environmental tragedies like flood. Floods also directly limit the access to food resources either distributed through aid, sold in distant markets or available from relatives in areas not affected by flood.

Access to adequate food for many households varies over time due to the household's proneness to shocks and other risks such as floods, land degradation due to flooding, extreme climatic conditions and their capacity to recover (Sileshi et. al.2019).

Emergency food aid has been talked about by Devereux, 2007. He has mentioned that, food aid apart from saving lives during emergencies can help address in reducing vulnerability. Hoddinott et al., (2003) has noted the importance of food aid in smoothing consumption and protecting assets among households facing food stress. One limitation of food aid is the high transaction cost. Barrett and Maxwell (2005) estimate that more than half (53%) the value of the U.S food aid in 2000 was spent on shipping and handling costs. Clay et al., (1998) claim that whenever it is systematically analysed, financial aid is more cost-effective than food aid. Cash transfers are often more preferable because they are cheaper to administer and avoid risks associated with commodity transfer. They also provide flexibility to choose for the use of cash (Devereux, 2007).

2.2 Climate change and challenges of food security and agricultural productivity

According to the Intergovernmental Panel on Climate Change (IPCC, 2007), agriculture accounted for approximately 14% of global human-induced greenhouse gas (GHG) emissions in 2004. Agriculture is highly susceptible to the effects of climate change. Forecasts for 2050 indicate rising global average temperatures and greater weather unpredictability, which will influence the nature and geographic spread of agricultural production worldwide (Shaw et al, 2007). Climate change exacerbates hardships for many already at-risk populations, especially in developing nations, where limited resources and insufficient insurance amplify vulnerabilities. It affects all four pillars of food security: availability, stability, access, and utilization. Climate change directly impacts the availability of agricultural goods by altering crop yields, increasing crop pests and diseases, and affecting soil fertility and water retention. Indirectly, it influences availability through its effects on economic growth, income disparities, and demand for agricultural products. Furthermore, erratic weather patterns destabilize crop yields and food supplies. Climate change also hinders physical, economic, and social access to food as production drops, food prices climb, and purchasing power diminishes. Additionally, it jeopardizes food utilization by impacting human health and expanding the reach of diseases into previously unaffected regions. By 2080, agricultural production

in developing countries could fall by 20% due to climate change, compared to a 6% decline in industrialized nations. Yields in developing countries may also drop by an additional 15% on average by 2080 as a result of these changes (FAO, 2008).

3. Potential Options to Manage Food Security and Climate Change

Various approaches can be employed to tackle the challenges of food security and climate change. These include expanding agricultural land, adopting enhanced crop varieties or species, and implementing advanced production techniques (such as adjusting planting schedules, utilizing precision and smart farming methods, upgrading irrigation and water supply systems, optimizing inputs and management practices, and refining tillage methods).

Cropping systems might need adjustments, such as adopting suitable crop varieties to address shortened growth periods, boosting crop intensity (the number of crops grown per area annually), or switching to alternative crop types. Enhancing productivity could involve diversifying crops by introducing new varieties, hybrids, or plant types in place of existing ones and tweaking the cropping schedule by altering sowing, planting, and harvesting times. Farmers could also adapt by modifying irrigation schedules or the application of inputs like fertilizers. Adjusting planting timing and incorporating cultivars from various maturity groups could serve as a practical approach to increase yields. To achieve consistent and high productivity, extending the growing season is key to optimizing a crop's output.

Likewise, better short term and long-term climate forecasts can pinpoint weaknesses in current farming systems exposed to extreme weather, aiding in risk reduction. Additionally, the resilience of innovative agricultural strategies to address food security and climate change could be simulated to guide policymakers. As a result, sophisticated methods to safeguard food security could be precisely evaluated using models. Furthermore, collaboration among diverse research teams and facilities is essential for crafting a national adaptation strategy to counter climate change. In the same vein, effective communication can deliver research findings to key stakeholders (such as policymakers and farmers), helping to address food insecurity.

4. Threats of climate change for developing countries and food insecure people

Climate change poses a greater danger to developing nations, partly because of their geographic locations. Many poorer countries lie in tropical and subtropical areas, which are highly susceptible to increasing temperatures, as well as in semi-arid regions where water scarcity is a growing concern. By 2080, climate change could reduce agricultural production in developing countries by 20 percent, compared to a 6 percent drop in industrialized nations (Cline, 2007). Additionally, crop yields in developing countries might fall by an average of 15 percent by 2080 due to climate effects (Fischer et al. 2005). In Sub-Saharan Africa, the number of malnourished individuals could triple between 1990 and 2080 as a result of these changes. Furthermore, climate change disruptions may hinder long-term human development prospects and widen inequality gaps within nations (UNDP 2007).

Climate change influences all four essential aspects of food security—availability, stability, access, and utilization (e.g., Schmidhuber and Tubiello 2007). It directly reduces the availability of agricultural goods by affecting crop yields, increasing crop pests and diseases, and altering soil fertility and its capacity to retain water. Moreover, the stability of crop production and food supplies suffers due to unpredictable weather patterns. Access to food—whether physical, economic, or social—is diminished as climate change lowers agricultural output, drives up food costs, and weakens purchasing power. Finally, food utilization is threatened as climate change impacts human health and extends the reach of diseases into regions previously unaffected.

5. Policy Direction

Agriculture plays a vital role in food security by supplying the food people consume and, perhaps more crucially, serving as the main livelihood for 36 percent of the global workforce (FAO 2008). To safeguard and improve food security, agricultural systems must evolve toward greater productivity and reduced output fluctuations despite climate-related and agro-ecological or socio-economic risks. For output and income stability, these systems need to become more resilient, meaning they must better withstand disruptive events. Achieving more productive

and resilient agriculture demands changes in managing natural resources—like land, water, soil nutrients, and genetic materials—along with more efficient use of these resources and production inputs. Shifting to such systems could also yield significant mitigation advantages, such as enhancing carbon sinks and cutting emissions per unit of agricultural output. Von Braun et al (2008) emphasized that addressing climate change and other emerging threats requires a swift, coordinated, and multidisciplinary response tailored to specific local conditions, while also considering non-climatic factors affecting food security, such as rising energy and food prices and biofuel production. This response should integrate adaptation measures to lessen the vulnerability of impoverished populations to climate change and other shocks, alongside mitigation efforts to temper climate change impacts after they occur.

6. Conclusion

Addressing the problem of declining agricultural productivity and food insecurity is the need of the hour. Amid the current global issue of climate change and its negative impact on food security and farming output, steps must be taken to adapt and lessen its effects. One effective approach is to enhance agricultural production. Projections based on population growth and food consumption trends suggest that by 2050, agricultural output will need to rise by at least 70 percent to meet demand. Most forecasts also suggest that climate change will likely lower agricultural productivity, stability, and incomes in regions already struggling with food insecurity. Therefore, developing climate-smart agriculture is essential for ensuring future food security and meeting climate change objectives. Every country should create and carry out a practical national action plan that considers future development trajectories, anticipated climate change effects, and the costs of adaptation and mitigation. National governments can significantly contribute to climate mitigation and adaptation in five key ways: offering information and guidance on climate risks and strategies, providing training and support for designing and applying measures, encouraging effective adaptation through public policies, requiring adaptation to protect public health and safety, and establishing adaptation capacity and policies while fostering collaboration across government departments (Yohe, Burton, and Rosegrant, 2008).

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Role of Entrepreneurs Towards Viksit Bharat 2047: A Study with Special Reference to Entrepreneurs of Diphu, Karbi Anglong

Bitupon Borah*, Soumendra Bhattacharjee & John Lalsansouk Hmar*****

Abstract

This study aims to comprehend the role of entrepreneurs from Northeast India to the "Viksit Bharat 2047" initiative. The study utilized a descriptive research design that incorporated both primary and secondary data sources. The collection of primary data was conducted using a structured questionnaire, while secondary data was gathered from various sources such as websites, journals, books, and government papers. The survey emphasized economic variables and entrepreneurial activities. Data collection was undertaken in July 2024 and included all 53 entrepreneurs from Diphu Town, Karbi Anglong. The process of data analysis entailed the organization of data into tables and the calculation of descriptive statistics such as the mean and percentage. The study illustrates the main features of the entrepreneurial environment, characterized by young, well-educated persons who are primarily involved in manufacturing and operate as sole owners.

* Research Scholar, Department of Commerce, Assam University Silchar

** Associate Professor, Department of Commerce ,Assam University Silchar

*** Assistant Professor, Department of Humanities(Commerce), Golaghat Engineering College Orcid

The dependence on personal funds and restricted availability of external financial assistance indicate that self-reliance is a crucial determinant in the initial phases of business growth. Although many firms operate on a small scale and have a limited number of employees, they play a crucial role in supporting local economies and creating jobs. With continued support and resources, these ventures have the potential for significant growth, highlighting the need for policies that foster access to financial and institutional support for small businesses.

Keywords: *Entrepreneurs, Viksit Bharat 2047, Makein India, Economy, Small Business.*

1. Introduction

The vision of Viksit Bharat 2047 envisions India as a fully developed and self-reliant nation by its centennial year of independence. In achieving this ambitious goal, entrepreneurship is expected to be pivotal in driving economic growth, fostering innovation, and addressing key societal challenges. By 2047, entrepreneurship in India is projected to evolve into a cornerstone of the nation's development strategy, transforming sectors such as agriculture, manufacturing, technology, and services.

Entrepreneurs are seen as critical agents of change in Viksit Bharat 2047, as they can create jobs, promote technological advancements, and address pressing social and environmental issues. The government's focus on initiatives like Make in India, Startup India, and Digital India reflects the commitment to nurture a vibrant entrepreneurial ecosystem. By providing better access to finance, infrastructure, and training, these programs aim to empower a new generation of entrepreneurs who can propel India towards becoming a global innovation hub.

Furthermore, entrepreneurship will be essential in bridging regional disparities and ensuring inclusive growth. By supporting startups and small enterprises in rural areas, including the underdeveloped regions like Northeast India, entrepreneurship can contribute to reducing poverty, improving living standards, and promoting sustainable development. The emergence of sector slike agritech,edutech, healthtech, andfintechwillenableentrepreneurstoleverage technology to solve local challenges, helping India reach its full potential by 2047.

Thus, entrepreneurship is not only seen as a driver of economic development but also a way to achieve the broader goals ofe quity, sustainability,and social transformation that are central to the vision of Viksit Bharat 2047.

Entrepreneurs are the dynamic forces behind innovation and economic growth, acting as catalysts for change in both local and global economies. They are individuals who not only identify gaps in the market but also take on the risk of transforming these gaps into profitable ventures. With a vision for the future, entrepreneurs are often the first to introduce new products, services, or business models that challenge the status quo. Their ability to see opportunities where others see obstacles is what sets them apart. This visionary mindset, coupled with a willingness to embrace risk, drives them to invest their time, resources, and creativity into building businesses from the ground up. As these businesses grow, they create jobs,stimulateeconomicactivity, and contribute to the GDP, there by playing a crucial role in reducing poverty and improving living standards.

Moreover, entrepreneurs are often the pioneers of technological advancements and social innovation. By addressing unmet needs and solving pressing problems, they not only generate wealth but also bring about significant social and environmental benefits. For instance, many modern entrepreneurs are focusing on sustainable practices, creating businesses that are not only profitable but also environmentally friendly and socially responsible. The ripple effects of entrepreneurship extend beyond the economic sphere, influencing cultural and societal norms and driving globalization by connecting markets and people across the world. In developing regions, entrepreneurs are particularly vital, as they often spearhead efforts to bring new technologies and services to underserved areas, fostering inclusivity and bridging economic divides. In essence, entrepreneurs are the architects of progress, continuously pushing the boundaries of what is possible and shaping the future through their relentless pursuit of innovation and growth.

Entrepreneurs are individuals who identify opportunities, innovate, and take the initiative to bring new ideas to life. They play a crucial role in economic development by creating jobs, fostering innovation, and driving economic growth. Entrepreneurs

are often risk-takers, willing to invest time, resources, and effort into ventures that may not have guaranteed success. Their contributions extend beyond mere profit generation; they also solve problems, meet needs, and improve the quality of life in society.

Current scenario of entrepreneurship in India

The entrepreneurial landscape in India is vibrant and rapidly evolving, making it one of the world's most dynamic startup ecosystems, characterized by a significant surge in entrepreneurship driven by widespread internet access, government support, and a growing middle class with increased disposable income. Initiatives such as Startup India, Make in India, and Digital India have provided robust frameworks for startups and small and medium enterprises (SMEs), facilitating easier access to funding, streamlined regulatory processes, and improved infrastructure. As a result, India has emerged as a global hub for unicorn startups valued over $1 billion, particularly in technology, agriculture, healthcare, education, and fintech sectors. Entrepreneurs today actively address critical national challenges, such as improving agricultural productivity through agritech, enhancing healthcare accessibility via healthtech, and bridging the digital divide with technological innovation. The government's emphasis on Atmanirbhar Bharat (self-reliant India) aligns with the broader vision of Viksit Bharat 2047, promoting local manufacturing and reducing import dependency. Despite this promising scenario, challenges persist, including uneven access to capital, skill gaps, and regional disparities in entrepreneurial activities, necessitating targeted policies that support rural entrepreneurship, encourage women-led businesses, and foster innovation in underdeveloped regions to ensure inclusive and sustainable growth towards achieving the goals of Viksit Bharat 2047.

The Entrepreneurial landscape in north East India

Northeast India is rapidly emerging as a vibrant hub for innovative startups and socially conscious enterprises, leveraging its cultural diversity, abundant natural resources, and youthful population to drive dynamic entrepreneurial growth in sectors such as

agriculture, tourism, handloom, and technology. Historically underrepresented in India's economic narrative, the region is now witnessing transformative entrepreneurial ventures like Zizira in Meghalaya, which promotes organic products with fair trade practices, and Assam's Arohan Foods, pioneering sustainable pork processing value chains. Initiatives such as the North East Rural Livelihood Project and state-specific startup policies have further strengthened the entrepreneurial ecosystem through financial assistance, mentorship, and infrastructure development. Improved digital and physical connectivity is facilitating access to broader markets, while innovative startups like AgSpert in Assam are enhancing agricultural productivity through technological solutions, and Salooni is reshaping the wellness sector by creating employment opportunities, especially for women. Despite persistent challenges, including limited access to venture capital and infrastructural constraints, the entrepreneurial spirit in Northeast India remains resilient, successfully blending local cultural heritage with modern innovation, thereby carving a distinctive identity within India's entrepreneurial landscape and contributing significantly to sustainable regional development.

The Entrepreneurial landscape in Karbi Anglong

The entrepreneurial landscape in Karbi Anglong, a picturesque district in Assam, is gradually emerging as a promising hub for innovation and sustainable development. This region, known for its lush landscapes and rich tribal culture, has traditionally relied on agriculture, handicrafts, and forest resources. However, recent years have seen a rise in local entrepreneurship, driven by a desire to preserve the region's unique heritage while creating new economic opportunities. One inspiring example is the initiative by *Karbi Anglong Agro Products*, a local enterprise that focuses on processing and marketing organic spices and indigenous agricultural products like turmeric and ginger. By adding value to these locally grownproducts and connecting wit hwidermarkets, this ventureis not only boosting the local economy but also providing farmers with better incomes and more sustainable farming practices.

Another noteworthy effort is the promotion of eco-tourism in Karbi Anglong. Local entrepreneurs are developing homestays

and eco-friendly tourism ventures that offer visitors an immersive experience of the region's natural beauty and cultural richness. This not only attracts tourists but also generates income fo rlocal communities while promoting environmental conservation. The district administration, along with NGOs and state government initiatives, has been supporting these entrepreneurial activities through training programs, financial assistance, and infrastructure development. Despite challenges such as limited access to markets and financial resources, the entrepreneurial spirit in Karbi Anglong is gaining momentum, with local businesses playing a crucial role in driving socio-economic progress while preserving the region's unique cultural and natural heritage.

II Problem Statement

In Northeast India, despite rich cultural diversity, abundant natural resources, and strategic geographic positioning, traditional economic activities like agriculture, handicrafts, andsmall-scale industries have historically struggled to generate sufficient income and employment, limiting substantial socio-economic growth. Recently, entrepreneurship has emerged as a promising catalyst for economic transformation, with entrepreneurs uniquely positioned to leverage local resources and cultural heritage for innovation and sustainable development. Given this context, this study examines how entrepreneurship contributes to achieving the goal of "Viksit Bharat 2047" by influencing key socio-economic indicatorssuch as income levels, employment rates, and social inclusion, while simultaneously preserving the region's distinct cultural identity. Insights from this research can guide targeted policies and interventions to enhance entrepreneurial activities, promoting inclusive and sustainable regional development aligned with India's broader developmental vision.

III Objective of the Study

1. To understand the role of entrepreneurs of Karbi Anglong District in Assam towards "Viksit Bharat 2047"

IV Data and Methods

With regard to the fulfilment of the objective of the study, a descriptive research approach was carried out which is narrated sequentially below

Research Design: This study is descriptive and employs both primary and secondary data. Primary data was collected using a structured questionnaire and secondary data were collected from various websites, journals, books, govt reports, etc.

Research Instrument: Since the study wasbased on th eacquisition of primary data, a structured questionnaire (refer to Appendix 1) was adopted to gather entrepreneurs' opinions on the subject matter. The questionnaire was partitioned into two sections: section 1 comprised of questions enquiring about respondents' select socio-economic variables, and Section 2 questions related to their entrepreneurial activity.

Population & Sample: The population considered for this research comprised all the entrepreneurs of Diphu Town. According to the data gathered from the field survey, there were 53 entrepreneurs in the Diphu town of Karbi Anglong. All 53 numbers of entrepreneurs were taken into account for the study.

Data Analysis: The period of collecting data was July 2024. Afterthecollectionofdata, data tabulation, and filtration was done using Microsoft Excel version 2023. For analysis purposes, descriptive statistics such as mean, and percentage were used.

V Discussions and Findings:

Table No.1 Demographic Characteristics of the Respondents

Gender	**n**	**%**	**Marital Status**	**n**	**%**	**Age**	**n**	**%**
Male	36	68	**Married**	29	55	**35 years and under**	37	70
Female	17	32	**Single**	24	45	**36 years and above**	16	30
Total	53	100		53	100		53	100

Source: Field Survey

The above data provides an overview of the demographic characteristics of a group of 53 entrepreneurs, focusing on their gender, marital status, and age distribution.

In terms of gender, the majority of the entrepreneurs are male, accounting for 68% i.e. 36 out of 53, while 32% i.e. 17 out of 53 are female. This indicates a male-dominated group of entrepreneurs, though a significant number of women are also represented. Looking at marital status, 55%of the participants were married, while 45%, 24 out of 53 are single. This balance shows that entrepreneurship attracts individuals from both married and single demographics, though slightly more are married.

Interms of age, 70% (37 out of 53) of the entrepreneurs are aged 35 years and under, with the remaining 30% (16 out of 53) aged 36 years and above. This suggests that younger individuals are more actively involved in entrepreneurship, making up the majority, while older entrepreneurs represent a smaller, but notable, portion of the total.

Overall, the sample respondents' entrepreneurs in this study were characterized by a predominantly male and relatively young demographic, with a balance between married and single participants.

Table No.2 Level of Education and Type of Enterprise Owned by the Respondents

Education	n	%	Type of Enterprise	n	%
Primary Education	6	11	Sole proprietorship	37	70
Secondary Education	14	26	Partnership	14	26
Bachelor's Degree	29	55	Any others	2	4
Post-graduation and above	4	8			
Total	53	100		53	100

Source: Field Survey

The above data reveals that most entrepreneurs (55%) hold a bachelor's degree, indicating higher education's significant role in entrepreneurship. Smaller groups have completed Secondary Education (26%), Primary Education (11%), or post-graduation (8%).

In terms of business type, 70% operate sole proprietorships, showing a preference for independent ownership. Partnerships make up 26%, while only 4% fall under other types of enterprises. This highlights a strong association between education and entrepreneurship,with sole proprietorship being the dominant business model.

Table3 Type and Age of Enterprise Owned by the Respondents

Nature of Enterprise	**n**	**%**	**Age of your Enterprise**	**n**	**%**
Manufacturing	41	77	0-5 years	28	53
Trading	12	23	6-10Years	21	39
Service	0	0	11-15Years	3	6
			16 years and above	1	2
Total	53	100		53	100

Source: Field Survey

The above table data highlights that the majority of entrepreneurs, 77% (41 out of 53), are engaged in manufacturing enterprises, while 23% (12 out of 53) operate in tradingbusinesses. Notably, no respondents are involved in service-based enterprises, suggesting a strong focus on production and trade within this group.

Regarding the age of these enterprises, most (53%, or 28 out of 53) are relatively new, having been established within the last 0-5 years. Another 39% (21 out of 53) have been operating for 6-10 years, while a smaller number, 6% (3 out of 53), have been in business for 11-15 years. Only 2% (1 out of 53) have enterprises that are 16 years or older.

This data indicates that manufacturing dominates the entrepreneurial landscape, and most businesses are relatively young, reflecting a dynamic and growing sector.

Table 3 Source of finance for Establishing enterprises by the Respondents

Source off in an ceat the time of establishing your enterprises	**n**	**%**
Own Funds	31	58
Promoting agencies	4	7
Own and Loan from relatives & Friends	17	32
Own and Loan from Financial Institutions	2	3
	53	100
Source: Field Survey		

The table data on the sources of finance usedby entrepreneurs when establishing their enterprises reveals that the majority, 58% (31 out of 53), relied on their own funds. This suggests a strong preference for self-financing among entrepreneurs. Additionally, 32% (17 out of 53) used a combination of their own funds and loans from relatives and friends, highlighting the importance of personal networks in securing financial support.

A smaller portion, 7% (4 out of 53), received assistance from promoting agencies, indicating limited reliance on external support programs. Only 3% (2 out of 53) utilized a mix of their own funds and loans from financial institutions, reflecting a minimal dependence on formal lending institutions.

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Overall, the data suggests that most entrepreneurs prefer to use their own savings, with personal networks playing a secondary role, while external financial institutions and promoting agencies are less frequently relied upon.

Table 4 Average Net Revenue during the last five years from Entrepreneurial Activity

Average Net Revenue during the last five years from Entrepreneurial Activity	**n**	**%**
0- 5 Lakhs	7	13
5-10 Lakhs	13	24
10 - 15 Lakhs	22	41
15 - 20 Lakhs	8	15
20 Lakhs andAbove	3	7
Total	**53**	**100**
Source: Field Survey		

The data on the average net revenue from entrepreneurial activity over the last five years shows that the majority of entrepreneurs, 41% i.e. 22 out of 53 respondents, earned between 10-15 lakhs annually. This indicates that a significant portion of businesses have achieved moderate revenue levels.

Following this, 24% i.e. 13 out of 53 of entrepreneurs reported revenues in the ₹5-10 lakh range, and 15% i.e. 8 out of 53 earned between ₹15-20 lakhs. Only a small percentage, 7%

i.e. 3 out of 53 entrepreneurs generated revenues exceeding ₹20 lakhs, reflecting a minority of high-performing businesses. On the lower end, 13% i.e. 7 out of 53 had earnings below ₹5 lakhs.

Overall, the data suggests that while most entrepreneurs fall within the ₹5-15 lakh revenue range, only a small group has achieved high revenue, and some businesses still generate lower income levels.

Table 5 Employment Provided by the Sample Respondents

Employment Created	**n**	**%**
1-3 persons	20	38
4-7 persons	14	26
8-11persons	9	17
12-15 persons	7	13

15 and above persons	3	6
Total	**53**	**100**

Source: Field Survey

The data on employment creation shows that a significant portion of enterprises are small- scale employers. The majority, 38% (20 out of 53), have created jobs for 1-3 people, indicating that many businesses are run on a modest scale. Following this, 26% (14 out of 53) employ 4-7 persons, showing a moderate level of job creation.

Additionally, 17% (9 out of 53) of the enterprises provide employment for 8-11 individuals, while 13% (7 out of 53) support 12-15 employees. Only 6% (3 out of 53) of businesses employ more than 15 people, reflecting a small number of larger enterprises with significant employment capacity.

Overall, the data suggests that most enterprises are small, with a majority employing fewer than 7 people, while only a few have grown large enough to create substantial employment opportunities.

5. Conclusion

The study reveals key insights into the entrepreneurial landscape of 53 respondents. A majority of entrepreneurs are male (68%), relatively young (70% under 35 years), and hold a bachelor's degree (55%), demonstrating the important role of education in entrepreneurial ventures. The dominant business model is sole proprietorship (70%), with most entrepreneurs involved in manufacturing (77%), and a notable portion of these businesses are relatively new, having been established within the last five years (53%).

In terms of finance, most entrepreneurs rely on their own funds (58%), with some support from personal networks (32%), and limited engagement with promoting agencies or financial institutions. Revenue generation varies, with a majority earning between ₹5-15 lakhs annually (65%), while a smaller group reports higher earnings. Employment creation is modest, with most businesses employing fewer than seven individuals, indicating that entrepreneurship in this group tends to operate on a small

scale, with limited but vital contributions to local job creation and economic development.

Overall, the findings highlight the importance of education, self-financing, and the dominance of manufacturing within the entrepreneurial sector, while showcasing a trend toward modest-scale operations with potential for growth.

Policy Implications: The data presents several policy implications for supporting entrepreneurship in Karbi Anglong, a region where small-scale manufacturing dominates, and entrepreneurs rely heavily on self-financing. To foster sustainable economic growth and rural development, policymakers can focus on the following recommendations:

1. **Enhancing Financial Access:** Since the majority of entrepreneurs (58%) rely on their own funds and few access loans from financial institutions (3%), improving access to affordable credit is crucial. Policymakers should promote the expansion of microfinance programs, offer low-interest loans, and encourage partnerships with financial institutions to provide more accessible funding for small businesses.
2. **Strengthening Education and Skill Development:** With 55% of entrepreneurs holding a bachelor's degree, it is evident that education plays a significant role in entrepreneurship. Policymakers should invest in vocational training, entrepreneurship development programs, and technical education, focusing on skill-building in manufacturing, trading, and service sectors to encourage more participation from individuals with varying educational backgrounds.
3. **Encouraging Business Diversification:** Manufacturing is the dominant sector (77%), while no entrepreneurs are involved in service enterprises. Policies should encourage diversification into other sectors, such as services and technology-driven businesses, by providing incentives, grants, and support services to help entrepreneurs explore and succeed in new areas.
4. **Providing Infrastructure and Market Access:** The region's enterprises, particularly in manufacturing, would benefit from improved infrastructure, including roads, electricity, and internet access. This would facilitate smoother operations

and access to larger markets. Policymakers should prioritize infrastructure development and establish business incubators or industrial clusters to support small and medium-sized enterprises (SMEs).

5. **Promoting Women's Entrepreneurship:** Although 32% of the entrepreneurs are women, more targeted policies can be introduced to further support female entrepreneurship. This can include gender-focused financing programs, mentorship, and networking opportunities specifically designed for women entrepreneurs to increase their participation and success rates.

Future Research Directions

To gain a comprehensive understanding of entrepreneurship's impact and the factors influencing it, several future research directions should be considered. Comparative regional studies could offer valuable insights by contrasting Karbi Anglong with other regions of similar socio-economic profiles, highlighting unique challenges and best practices from areas with more developed entrepreneurial ecosystems. Longitudinal studies are crucial for tracking the progress of entrepreneurs over time, observing how businesses evolve, and evaluating the effectiveness of various support programs and policies. Research on the impact of government policies can shed light on the effectiveness of financial schemes, infrastructure projects, and educational initiatives in promoting entrepreneurial growth. Additionally, a sectoral analysis could delve into the specific challenges and opportunities within sectors such as manufacturing, trading, and services, providing tailored recommendations. Exploring gender-specific challenges and opportunities in entrepreneurship through comparative studies could reveal barriers faced by different genders and the success of gender-targeted support. Examining the impact of technology and innovation on rural entrepreneurship could highlight how digital tools and new technologies influence business performance. These research directions will enhance the understanding of the entrepreneurial landscape in Karbi Anglong and inform policies aimed at creating a vibrant and sustainable entrepreneurial ecosystem.

involved in manufacturing (77%), and a notable portion of these businesses are relatively new, having been established within the last five years (53%).

In terms of finance, most entrepreneurs rely on their own funds (58%), with some support from personal networks (32%), and limited engagement with promoting agencies or financial institutions. Revenue generation varies, with a majority earning between ₹5-15 lakhs annually (65%), while a smaller group reports higher earnings. Employment creation is modest, with most businesses employing fewer than seven individuals, indicating that entrepreneurship in this group tends to operate on a small scale, with limited but vital contributions to local job creation and economic development.

Overall, the findings highlight the importance of education, self-financing, and thedominance of manufacturing within the entrepreneurial sector, while showcasing a trend toward modest-scale operations with potential for growth.

Policy Implications: The data presents several policy implications for supporting entrepreneurship in Karbi Anglong, a region where small-scale manufacturing dominates, and entrepreneurs rely heavily on self-financing. To foster sustainable economic growth and rural development, policymakers can focus on the following recommendations:

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Insurance Penetration and Density: A Study with Reference to Life Insurance Sector of India

Kingshuk Adhikari * & Ankita Ghosh**

Abstract

Life Insurance business in India has shown growth since the liberalization of economy. The growth in life insurance sector also influences the economic development of a country. The present research paper makes an attempt to analyze the growth of life insurance coverage in India by using insurance density and penetration. It also analyses the new business growth in life insurance products in India. However, challenges such as low purchasing power in rural areas, lack of consumer awareness and education, mis-selling of the life insurance products continue to hinder penetration and density in the Indian life insurance market.

Keywords: *Insurance Penetration, Insurance Density, Financial Literacy, Inclusion.*

* Associate Professor, Department of Commerce, Assam University Silchar, Assam

** Assistant Professor, Department of Commerce, Cachar College, Silchar, Assam

Introduction

Insurance industry plays a pivotal role in the economic development of a country by sharing risk of individuals or group and pooling their funds and investing the same in productive areas for economic growth and development. Policyholders generally pay an agreed amount called premium to the insurance company with a promise to indemnify their loss in case of any uncertainty (Bawa and Chattha, 2013). These pooled funds are invested in various sectors like infrastructure, healthcare, and manufacturing, thereby boosting economic growth. Additionally, insurance fosters financial stability, promotes entrepreneurship by mitigating risks, and supports social security systems. After the enactment of IRDA, a paradigm shift took place in the Indian insurance market with liberalization of the economy which brought significant change in the composition of the insurance market. Private players along with their foreign counterparts entered the insurance market and since then the whole scenario of the market has been changed. Privatization of the sector has increased the insurance penetration and density in both the life and non-life sectors of India, expanding coverage and enhancing competition. The insurance policies mainly cover the urban population with adequate disposable income for investing in insurance policies. The economically weaker section hardly gets any benefit of insurance coverage, though they are most vulnerable to any uncertainties. Very recently insurance sector has also started contributing to the financial inclusion by introducing various schemes for low-income groups with low premiums for their easy affordability. These schemes have been specially designed for rural and urban poor for inclusive growth and promoting equity. Government of India has launched several life insurance products for reaching the bottom of the pyramid (Adhikari & Ghosh, 2024). Some of the schemes are Atal Pension Yojana, Pradhan Mantri Vaya Vandana Yojana, Aam Admi Bima Yojana, Janashree Bima Yojana, Pradhan Mantri Jeevan Jyoti Bima Yojana and Pradhan Mantri Suraksha Bima Yojana.

India with huge population having large size of insurable population gives wide market to the insurers for their growth. Since 1991, the insurance market in India has seen a tremendous rise. Insurance business, penetration and density rose for more

than a decade (Adhikari & Ghosh, 2018). Insurance coverage and its performance in any country is assessed by two parameters, insurance penetration and insurance density. Both the levels reflect the level of development of insurance sector in the country. However, a clear picture of insurance market development could be visualized if the new business premium growth is analyzed. The Indian life insurance market has also expanded since liberalization. It was also found that people of India prefer saving their life than saving their properties (Rakshit, 2017). It shows that the insurance market in India is dominated by life insurance. Thus, the present paper analyses the growth of life insurance sector in India with regards to insurance density and penetration. It also analyses the new business growth in life insurance and also outlines the issues for low insurance penetration and density in Indian life insurance sector.

Review of Literature

Rakshit (2017) highlighted that insurance density and penetration of India was much lower in comparison to the world as well as other Asian countries. However, the growth rate increased after deregulation and inflow of private players in the insurance market. It was revealed from the study that the people of India preferred to spend on insuring their life than on property. Kaur (2015) also revealed that insurance penetration and density increased after liberalization. However, due to high population growth rate it showed a declining trend after 2010. The researcher opined that with little modification in the regulatory framework and growing awareness among the insurable population, the insurance industry will have a bright future in India. Kumar et al. (2022) also expected a tremendous change in Indian insurance market in future.

Devarakonda (2016) found a linear correlation between economic development and insurance penetration & density. The study stressed upon the raising the density and penetration of insurance in India. Prasad & Sharma (2017) outlined various challenges in the growth of Indian insurance market and suggested various measures to improve insurance penetration and density. The suggestions included conducting consumer education programme and regulating the problem of mis-selling of insurance products by the agents.

Vimala & Alamelu (2018) found a significant difference in insurance density and penetration between life and non-life insurance companies of India. It was further suggested that insurers should focus on involving rural and backward areas under the purview of insurance. Rao & Periyasamy (2014) found that the growth of life insurance was mostly from urban and semi urban areas and affluent section of the rural areas. The rural poor were not addressed by life insurance policies due to absence of right product for their small disposable income.

Thus, above mentioned studies have highlighted the status of insurance penetration and density in India. These studies have also outlined the various challenges in the growth of the insurance sector of India. Keeping in view the existing literature, the present study focuses on analyzing the insurance penetration and density in life insurance sector of India for a period of ten years.

Objectives of the Study

1. To assess the growth of insurance penetration and density with reference to life insurance sector of India.
2. To study the growth of life insurance premium in India.
3. To identify the issues hindering the insurance penetration and density in India.

Methodology of the Study

The present paper is descriptive in nature. The data has been collected from Handbook of Indian Insurance Statistics 2022-23. There are twenty-four life insurance companies operating in India, Out of these, twenty three companies are in private sector and the only public insurance company is Life Insurance Corporation of India (LICI) which is the oldest as well as the largest insurance company operating in India. The data relating to life insurance density and penetration, new business premium and renewal premium have been used to analyze the status and growth of life insurance sector in India.

Results and Discussion

The present status of insurance sector in India can be measured using two important tools namely Insurance Penetration and Insurance Density. These metrics are widely recognized as

essential for evaluating the development of the insurance industry in any country (Vimala and Alamelu, 2018; Prasad and Sharma, 2017). Insurance penetration is measured as ratio of premium to GDP. It is the total premium collected towards life insurance as a percentage of GDP. Insurance Density is measured as ratio of premium (in US Dollar) to total population. It is the per capita spending on insurance by the people of India. Table 1 depicts the growth in insurance penetration and density of life Insurance products in India. The results revealed an Annual Average Growth Rate of 6.33% in insurance density but a negative growth of -0.07% in insurance penetration. While the similar picture can be seen in the overall industry too. A very slow growth in the insurance density and penetration is clearly evident from the data.

Table 1: Insurance Penetration & Density of India

Year	Life				Industry			
	Penetration (in %)	Growth (%)	Density (in USD)	Growth (%)	Penetration (in %)	Growth (%)	Density (in USD)	Growth (%)
2013	3.1	-	41	-	3.9	-	52	-
2014	2.6	-16.13	44	7.32	3.3	-15.38	55	5.77
2015	2.72	4.62	43	-2.27	3.44	4.24	55	0
2016	2.72	0	47	9.3	3.49	1.45	60	9.09
2017	2.76	1.47	55	17.02	3.69	5.73	73	21.67
2018	2.74	-0.72	55	0	3.7	0.27	74	1.37
2019	2.82	2.92	58	5.45	3.76	1.62	78	5.41
2020	3.2	13.48	59	1.72	4.2	11.7	78	0
2021	3.2	0	69	16.95	4.2	0	91	16.67
2022	3.0	-6.25	70	1.45	4.0	-4.76	92	1.1
AAGR (%)	-	-0.07	-	6.33	-	0.54	-	6.79

Note: Data relates to financial year

Source: Handbook of Indian Insurance Statistics 2022-23

In case of life insurance penetration, as revealed in Handbook of Indian Insurance Statistics 2022-23, the status of India (3.1%) in 2013 is far below than that of some other developing countries of Asia like Taiwan (14.5%), Thailand (3.8%), Singapore (4.4%) and

even after ten years India could not increase the life insurance penetration as compared to these countries in 2022 [Taiwan (8.2%), Thailand (3.4%), Singapore (7.4%)]. It is to be mentioned that the life insurance density of India in 2013 was 41 USD which is way lower than the world average of 366 USD. The picture remained almost same in 2022 where India's average is 70 USD and the world average is 354 USD. Indian life Insurance density in the Global Scenario shows a grim picture. Keeping in view the bleak scenario, the policymakers and the regulators of life insurance sector of India need serious introspection over the matter.

To further assess the growth of insurance business, new business premium collected over the years must be analyzed. Table 2 shows the growth in the life insurance business in India as depicted through new business premium and total premium. The average annual growth rate of new business premium is 13.71% and renewal premium is 8.72% and the overall growth in total premium is 10.70%. The new business growth reveals inclusion of new person under insurance or higher coverage for the same person. The renewal business showing low growth rate due to prevailing 3-8% lapsation rate of life insurance business as revealed by Handbook of Indian Insurance Statistics 2022-23.

Table 2: Life Insurance Business in India

(Premium in ₹ Crore)

Year	New Business Premium	Growth (%)	Renewal Premium	Growth (%)	Total Premium	Growth (%)
2013-14	120,325.22	-	193,976.44	-	314,301.66	-
2014-15	113,329.53	(5.81)	214,772.48	10.72	328,102.01	4.39
2015-16	138,765.99	22.44	228,177.24	6.24	366,943.23	11.84
2016-17	175,202.68	26.26	243,273.93	6.62	418,476.61	14.04
2017-18	194,153.90	10.82	264,655.54	8.79	458,809.44	9.64
2018-19	215,003.04	10.74	293,128.99	10.76	508,132.03	10.75
2019-20	259,262.38	20.59	313,647.81	7.00	572,910.19	12.75
2020-21	278,699.92	7.50	350,031.11	11.60	628,731.04	9.74
2021-22	314,867.82	12.98	377,746.32	7.92	692,614.14	10.16
2022-23	371,225.82	17.90	411,278.15	8.88	782,503.97	12.98
AAGR (%)	-	13.71	-	8.72	-	10.70

Source: Handbook of Indian Insurance Statistics 2022-23

The new business of life insurance sector has been severely affected due to covid 19 in the year 2020-21 as has been revealed from table 2.

Issues for Low Insurance Penetration and Density in Life Insurance Sector

The life insurance sector plays a crucial role in providing financial security and risk mitigation for individuals and families. However, despite its significance, insurance penetration and density remain relatively low in India. Various structural, economic, and behavioral challenges hinder the widespread adoption of life insurance, preventing it from reaching a large section of society, particularly the rural and economically weaker populations. Addressing challenges are essential for achieving inclusive insurance coverage and ensuring the long-term growth of the sector. Some key issues contributing to the low insurance penetration and density in India's life insurance sector are as follows:

1. ***Lack of Consumer Awareness and Financial Literacy:*** Low financial literacy across India prevents people from making informed decisions about insurance. Even formally educated individuals often lack financial knowledge to allocate their savings efficiently. Inadequate awareness about insurance benefits hampers insurance penetration, making it difficult to achieve the goal of "insurance for all."
2. ***Inadequate Agent Training:*** Consumers need to be educated through various channels about insurance benefits. Proper training should be provided to agents to prevent mis-selling and ensure customers receive policies that suit their needs. Increased awareness can lead to higher insurance adoption rates.
3. ***Agent-Based Selling Issues:*** Agent based model is the most common model for selling policies by many insurance companies. Many agents prioritize policies with high commissions rather than customer needs. Aggressive sales tactics lead to mis-selling, causing policy lapsation and a loss of customer trust.

4. ***Rural Insurance Penetration Challenges:*** The difficulty and cost of penetration in rural areas for undertaking small policies from the economically poor class does not motivate agents to put efforts rather they prefer to contact the same group of clients for additional policies. Agents prefer selling to urban clients instead of making efforts to cover the lower-income population. The uniform channel of distribution does not cater to diverse socio-economic groups, resulting in lower insurance penetration and density in rural areas.
5. ***Slow Technological Adaptation in Insurance Distribution:*** Due to multi-channel distribution, the acquisition cost rises and hence rural penetration of insurance policies gets hindered. It was observed that there was a huge rise in online purchase of insurance products nowadays (Chauhan & Singh, 2023). Many private insurers sell their policies online however LICI still follows the traditional agent based model. As technology is advancing, the adaptation of the businesses to the updated technology will provide competitive advantage.
6. ***Low Purchasing Power and Economic Constraints:*** Low purchasing power linked with poor income of majority of the population and rising essential commodities leave little room for insurance expenditure. Since the benefits of growth didn't adequately percolate down to lower economic strata of the society even today, people of lower middle income class and lower income class of the society are yet to adopt insurance coverage after meeting their daily requirements. Except few developed states of India, large section of the society of most of the Indian states still strive to fulfil their transaction motive and it becomes extremely difficult for them to think about putting their money for precautionary motive.
7. ***Impact of Mis-Selling on Industry Reputation:*** Mis-selling of the life insurance products by the agents ignoring the need and capacity of policyholders also affects the image of the insurance company as well as the industry as a whole. Mis-selling in any form may lead to lapsation of life insurance policy, which results in loss of confidence of customers as well as negative publicity. Although many companies over the years could attract new people within the orbit of life

insurance, lapsation of policies linked with mis-selling move the stream in the opposite direction to a certain extent.

Conclusion

The present status of insurance sector in India as measured by Insurance density and penetration shows a slow growth since the past ten years. However, the situation was quite fruitful soon after the liberalization when private companies entered Indian life insurance market and the sector grew tremendously. The development of the market however can be properly understood from the new business premium growth which was found to be favourable. Various factors hinder the growth of the life insurance penetration and density. If the issues are addressed by appropriate authorities on time, IRDA's aim 'Insurance for All by 2047' will be achieved within the specified time.

To increase the penetration of insurance in India, consumer awareness programmes should be undertaken on a wider basis to increase awareness of people regarding importance of insurance. The agents should be trained to spread awareness and reduce mis-selling which obstructs people to trust insurance policies. The regulatory frameworks laid down by IRDAI should be relieved by simplifying the rules and regulations for the insurers. Bancassurance is rapidly growing all over the world. If it is spread in India, will lead to wider insurance coverage for all. Further, the economically weaker population residing in rural areas, should be brought under the umbrella of insurance which will not only insure their lives but also develop the economy inclusively and sustainably.

Further the government of India may initiate a comprehensive reassessment of income tax structure by including life insurance policy especially term insurance as deduction under new tax regime thus enhancing life insurance density in India. Further if income tax treatment for receiving annuity under pension policy of life insurance companies can be reviewed in the line of treatment of tax for NPS at the time of retirement, it will allure people to consider such policies as important component of retirement planning and thereby increase the insurance density. The rate of GST is also expected to be reviewed for increasing

the insurance penetration by providing pricing benefits to potential policyholders.

The venturesome insurers through right combination of distribution model and customized insurance products with affordable premium can penetrate into the virgin market of rural India and slums of urban India. Further leveraging appropriate technology and creating more accessible models of distribution can go a long way to bring a sizeable section of the population under life insurance coverage. Although income level of the population is one of the robust determinants of insurance consumption, the role of government sponsored insurance schemes and developmental role of regulator can hardly be ignored in deepening life insurance penetration and density across the states of India.

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Prospects and Problems of Start-Ups in North-East India

Masum Gulgulia* &
Soma Roy Dey Choudhury**

Abstract

This paper explores the prospects and problems faced by the startups in North East India, a region known for its rich cultural diversity and unique geographical characteristics. Despite significant potential driven by abundant natural resources and a growing entrepreneurial spirit, startups in this region encounter various challenges that hinder their growth and sustainability. Through a combination of descriptive and exploratory research methods utilizing secondary data sources, this study identifies key factors influencing the startup ecosystem. These include infrastructural deficiencies, limited access to funding, bureaucratic hurdles, internal conflicts and socio-political instability. By analyzing existing literature, reports, and case studies, the paper provides a comprehensive overview of the startup landscape in North East India. Tables have been used to analyze the data. It has been found from the study that border trade is one of the major prospect of startups as the North-East region is of strategic importance for the country on account of the fact that nearly 98 percent of its borders form India's international boundaries and the government is also giving priority to the startups with the help of various initiatives such as Start-up India, MUDRA Yojana, Make in India etc so that the youths of this region may earn their own livelihood without being much dependent on the government for jobs.

Keywords: *Startups, Innovation, DPIIT, Present Status, Prospects, Challenges*

* Research Scholar, Department of Commerce, Assam University, Silchar
** Associate Professor, Department of Commerce, Assam University, Silchar

Introduction

India is a country with a vast population and a large number of youth reside here. Similarly, North-East India is no exception, as the majority of its population consists of young males and females. However, compared to the rest of India, industrialization is limited in this region, and that is why people of this region have to depend on central government jobs, state government jobs, or other service sectors. Therefore, startups are an important area of study. The present generation is inclined toward startups and the government is also prioritizing the young generation to earn their own livelihood instead of being dependent on the government for jobs, as the focus is on creating more job creators than job seekers to address the problem of unemployment.

Understanding this need, the Government of India started the Startup India program in January 2016. On 16th January, 2016, the Prime Minister of India, Shri Narendra Modi, inaugurated the "Start-up India" initiative at Vigyan Bhawan in New Delhi. Startup India is a major initiative by the Government of India aimed at fostering a startup culture and creating a robust, inclusive ecosystem for innovation and entrepreneurship across the country. Startup India will be beneficial because India has a young population that can contribute to economic growth and innovation, which is important for the country's future development.

The northeastern states, known as the seven sisters, are rich in natural resources like forests, oil, tea, and water but lag behind the rest of India due to resource limitations. Despite being among the least visited parts of India, this region is experiencing rapid development, driven by its natural beauty and the unique cultural heritage. The north-eastern region of India which is renowned for its rich cultural diversity and abundant natural resources, remains one of the nation's most underdeveloped areas in terms of industrialization. The North East of India remains a hidden paradise, highly desired by trekkers, wildlife enthusiasts, and nature admirers. Comprising eight interconnected states including Sikkim this region is celebrated for its fresh and scenic environment, rich natural resources, and diverse cultures and communities. Despite its significant potential, the region's economic growth has been hindered by a range of structural and

infrastructural challenges. Against this background, the rise of startups in North East India provides a hopeful opportunity for economic growth and innovation.

North East India- A Glimpse into few Statistics

The North East of India constitutes the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura, flanked by hills and with the mighty Brahmaputra River slashing a central path between its north and south. The western side of the North East is connected to the eastern part of the Indian subcontinent by a narrow land corridor, sometimes referred to as the Siliguri Neck or Chicken's Neck.

Demographic Profile of North-East India

Total Population	**45772188**
Male	23361207
Female	22410981
Urban	**8403283**
Urban Male	4290486
Urban Female	4112797
Rural	**37368905**
Rural Male	19070721
Rural Female	18298184
Literacy Rate	**78.50%**
Human Development Index	**0.73**

Source: Census of India, 2011

Geographic Information

Arunachal Pradesh	Meghalaya	Sikkim
Assam	Mizoram	Tripura
Manipur	Nagaland	Total (Eight)

Source: Yadav and Kumar (2016)

The region accounts for 7.9 percent of the total land space of the country. The region is of strategic importance for the country on account of the fact that nearly 98 percent of its borders form India's international boundaries.

International Boundaries

North	China
South West	Bangladesh
North West	Bhutan
East	Myanmar

Source: Yadav and Kumar (2016)

The region shares a 5,484 km international border with Bangladesh (1,880 km), Myanmar (1,643 km), China (1,346 km), Bhutan (516 km), and Nepal (99 km).

Significance of the study

This study on startups in North East India is crucial and significant for several reasons. Firstly, the North-Eastern region of our country is home to abundant natural resources and this region of the India has a rich cultural diversity which are the great prospects for startups to grow, but there has been a notable lack of study and research focused specifically on this region or we can say almost no study has been made on the startups of North-Eastern. Another major significance of the study is that the North-east region of India also shares international boundaries and so this region is of strategic importance for the country as 98 percent of its borders form international boundaries of India.

Despite the region's tremendous potential, startups in North East India face challenges that hinder their growth. This research aims to indentify these issues such as regulatory hurdles, infrastructural gaps and skill shortages. By illuminating these issues, the study will empower policymakers to craft targeted support mechanisms and informed policies These measures can create a more conducive environment for startups, ultimately fostering sustainable economic development and harnessing the region's entrepreneurial potential.

Literature Review

Patel (2019) examined the opportunities and challenges faced by Startup India. It revealed that large population, connectivity due to growth in Indian telecom industry, change in the mindset of the working class, innovation in society due to largest youth population are the opportunities but poor revenue generation, financial constraints and lack of infrastructure are the challenges faced by the start-ups in India. Bairwa and Chand (2019) examined the issues of startups in India. The study revealed that financial resources, skilled workforce, supporting infrastructure, branding, regulations and market awareness are the issues faced by Indian startups. Kumar and Aquil (2024) examined the challenges such as an unorganized Indian market, inadequate infrastructure, unclear policies and risk aversion. Mishra (2017) examined the opportunities and challenges of start-up in India. The study revealed that the government initiatives like Make in India and Digital India are the opportunities but social, financial, sustainability, regulatory issues as challenges. Rao (2017) examined the opportunities, challenges, problems and action plans of startups in India. It was found that the large population, mobile penetration, and financial inclusion were the opportunities. The challenges include complex regulations, lack of mentoring, funding and infrastructure. The action plans may include tax exemption on capital gains, credit guarantees, faster exit for startups etc. Kumar and Shobana (2023) examined the challenges and efforts of entrepreneurship education in North East, India. The opportunities include the region's abundant natural resources, cultural diversity and tourism whereas some of the challenges include risk aversion, infrastructural gaps, limited finance. Efforts include government initiatives, training and financial support for women entrepreneurs. Das (2023) investigated the challenges of entrepreneurship in north-east India. Secondary sources of data were used in the study and it revealed that some of the major problems faced by the entrepreneurs of NE region include lack of central help, infrastructure, market, funding, man-made and natural disasters and ethnic conflicts the entrepreneurs of the NE region fails.

Research Gap

The research gap lies in the absence of detailed studies specially examining the unique prospects and problems for startups in North East India. While there is substantial research on startups in India as a whole, there is a clear need for focused investigations that delve in the various specific challenges faced by the startups in North East India. The study on the prospects and problems of startups in North East India aims to address a significant research gap. Despite the region's rich natural resources, cultural diversity, and strategic international borders, there is a notable lack of comprehensive research focused specifically on startups in this area.

Objectives

The objectives of the study are as follows:

i) To study the present status of startups in North East India

ii) To study the prospects and problems of startups in North East India

Research Methodology

This research aims to explore the prospects and problems of startups in the North-East Region (NER) of India. To achieve this objective, the study adopts a descriptive and exploratory research design. The descriptive approach is utilized to present the characteristics and current status of startups in the region, while the exploratory approach is employed to identify the challenges and opportunities these startups face.

The study is based entirely on secondary data collected from a variety of reliable sources. A thorough literature review was conducted, including online and printed articles, research papers, and journals. It covers all the eight states of the North-East Region, collectively referred to as the "Seven Sisters" (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura) along with Sikkim, which is often called the “Brother” state.

The North East region of India holds significant strategic importance due to its unique geographic location, sharing approximately 98% of its borders with international countries such as China, Bhutan, Myanmar, Bangladesh, and Nepal. This

positioning makes the region a critical gateway for trade, cultural exchange, and geopolitical stability. Tables were used to organize and present numerical data effectively.

The data was critically interpreted to understand the demographic and geographic context of the North-East Region. This helped in identifying the factors contributing to or hindering the growth of startups in the region. The study also evaluated the impact of government initiatives, policies, and support systems on the startup ecosystem.

This research is particularly relevant as the North-East Region faces a significant industrialization gap compared to other parts of India. By focusing on the potential of startups to create jobs and reduce dependency on government employment, the study aims to provide valuable insights for policymakers, entrepreneurs, and researchers. This structured methodology ensures a comprehensive understanding of the prospects and problems of startups in North-East India.

Data Analysis

Present Status of Startups in North East India

If it is to be asked someone to describe India's startup map, they would likely mention cities like Delhi, Hyderabad, Bengaluru, Mumbai, and others. These big cities are known for their strong networks and infrastructure, attracting investors and talented individuals from around the world. However, the Northeast region of India is also developing its own startup ecosystem. With support from state governments that encourage entrepreneurship and provide spaces for business innovation, startups in the Northeast are growing steadily.

In recent times, small towns and cities across India are also becoming hubs for entrepreneurship. This trend is fueled by the country's vibrant startup culture and supportive environment. Currently, small towns and cities in India are increasingly becoming focal points for entrepreneurship.

To understand the diverse characteristics and rich ecosystem of the states of North East, let's explore some key facts:

1. Assam alone produces nearly half of India's tea that is almost 50% of the tea production in India is being produced by Assam alone.
2. Arunachal Pradesh is known for producing unique types of natural silks like Mulberry, Eri, Muga, and Oak tasar.
3. Manipur hosts one of India's largest cottage industries.
4. Meghalaya provides strong support through various state and central government organizations.
5. Mizoram stands out for its extensive bamboo production, covering about 57% of its land, which makes the state as one of the giant producers or manufacturer of Bamboo in India.
6. Nagaland has English as one of its official languages, contributing to its high literacy rate of 80.11% with most of the people residing in Nagaland speak in English.
7. Sikkim leads in the production of giant cardamom in India.
8. Tripura ranks as India's second-largest producer of natural rubber.

Major Thrust Areas of Business and Industry in North East India (State Wise)

Table No. 1

States	Identified Areas
Arunachal Pradesh	Power, Agriculture and Forest Based Industries, Mineral Based Industries, Tourism and Textile
Assam	Tea, Power, Cement, Limestone, Medicinal Plants, Agriculture and Horticulture
Manipur	Handloom, handicrafts, Khadi and Village Industry, Sericulture, Food Processing, Bamboo Processing and Tourism
Meghalaya	Horticulture, Agriculture and Food Processing, Cement, Mining, Tourism, Dairy and Livestock, Hydroelectric Power, Handlooms, Handicrafts and Steel Processing

Mizoram	Sericulture, Bamboo, Agriculture, Horticulture, Khadi and Handloom, Tourism, Food Processing, Minerals and Stones
Nagaland	Agriculture and Allied Industries, Bamboo, Horticulture, Sericulture, Handicrafts, Handlooms and Tourism, Minerals and Mining
Sikkim	Agriculture, Agro Processing, Tourism, Handlooms and Handicrafts, Minerals, Tea, Hydro electric Power, Minerals, Tea, Horticulture and Sericulture
Tripura	Power, Natural Gas, Food Processing, Tea, Rubber, Bamboo, Handicrafts, Handloom, Tourism, Sericulture, IT and Medical Plants

Source: North East Vision 2020 and Italian Trade Commission (ITC), 2011

The startup ecosystem in Northeast India is nascent but promising, supported actively by state governments across all eight states. More than 900 startups in the region, recognized by DPIIT, have collectively generated over 8,800 jobs, with 42% having at least one female director. Recognizing the immense potential, Startup India organized ASCEND (Accelerating Startup Calibre & Entrepreneurial Drive) workshops across seven Northeastern states in November 2022. These workshops aim to foster entrepreneurship and accelerate growth within the startup ecosystem of the region. The following is the tabular representation showing the growth of startups in Northeast India following the launch of Startup India as a national initiative.

Table No. 2: Growth of Startups in North East India since the Launch of Startup India

State	2016	2017	2018	2019	2020	2021	2022	Total
Assam	9	34	67	67	119	188	154	638
Manipur	-	4	7	6	12	37	18	84
Tripura	-	-	2	7	23	12	24	68
Nagaland	1	4	2	2	5	7	3	24

Meghalaya	-	-	2	5	-	9	8	24
Arunachal Pradesh	-	-	2	2	-	4	4	12
Mizoram	-	-	2	1	1	2	2	8
Sikkim	-	1	-	2	1	3	1	8
Total	10	43	84	92	161	262	214	866

Source- Startup India

From the above table we can clearly understand the growth of startups in Northeast India from 2016 to 2022 across various states. Assam has shown consistent growth, leading with 638 startups by 2022. Manipur and Tripura also demonstrate steady increases, reaching 84 and 68 startups respectively by 2022. Nagaland, Meghalaya, Arunachal Pradesh, Mizoram, and Sikkim have also contributed to the region's startup ecosystem, collectively totaling 866 startups by 2022.

Prospects for Startups in North East India

Despite various challenges, the startups in North East India still have access to several opportunities to develop their businesses. Here are some key opportunities:

1. Cultural Diversity and Indigenous Knowledge: The North Eastern region is rich in diverse cultures and traditional knowledge. Startups can use this cultural diversity to inspire unique business ideas and promote innovation.
2. Natural Resources and Agro-based Industries: The region's abundant natural resources provide opportunities for ventures in agriculture, horticulture, and eco-tourism. Startups can use these resources sustainably.
3. Handicrafts and Handloom Industries: The North Eastern states are renowned for their exquisite handicrafts and handloom products. Startups can use these skills of local artisans with the help of marketing, management, and design to build successful startups.
4. Tourism and Hospitality: The region's scenic landscapes, cultural festivals, and diverse cuisine offer potential for growth in tourism and hospitality. Startups can support the

development of professionals in hospitality and tourism operations.

5. Changing Mindsets: Many people, especially the youth, are moving away from traditional job-centric mindsets. There is growing interest in establishing startups, driven by advancements in technology and innovation. This shift has led to the emergence of numerous startup ventures across the North-eastern region of India.
6. Immense Indian Population- The large population of the country offers great opportunities for startups that are expected to convert a large unemployed population into a working population. Currently, India is enjoying demographic dividend since, over 65% of India's population is under 35 years old, presenting a significant advantage.
7. Innovation and Transformation- Talented and innovative future entrepreneurs present significant opportunities for startups to address various emerging business challenges.
8. Hydroelectric Power Generation- The North East region, with its plentiful water resources and mountainous terrain, holds substantial potential for hydroelectric power generation.

Government Support to Improve the Startup Ecosystem:

The Indian Entrepreneurship Foundation (IEF) stands as India's pioneering collaborative network for small-scale entrepreneurs, focusing on the education and empowerment of businesses across various sectors. Similarly, the Meghalaya Institute of Entrepreneurship is dedicated to promoting enterprise development and enhancing the skills of individuals in the state.

The Northeast Entrepreneurship Fellowship fosters entrepreneurship in the Northeastern region through networking, and training local entrepreneurs. The presence of prestigious institutions like IIM and NIFT in the region is expected to significantly contribute to establishing the Northeast as a key hub for resources and educational opportunities.

Several government and semi-government initiatives exist to support startups. They include:

Start-Up India- It offers three-year tax exemptions and compliance relaxations aimed at reducing government regulations and bureaucratic hurdles.

MUDRA Yojana- It enables startups to obtain loans from banks to establish, expand, and stabilize their businesses.

SETU (Self-Employment and Talent Utilization) Fund- The government has allocated Rs.1,000 crore to create opportunities for self-employment and new jobs, particularly in technology-driven sectors.

E-Biz Portal- The government introduced the e-biz portal, which consolidates 14 regulatory permissions and licenses into a single platform to expedite clearances and enhance the ease of doing business in India.

Royalty Tax- The Indian government has lowered the royalty tax for businesses and startups from 25% to 10%.

Problems for Startups in North East India

The northeast region is one of the least industrially developed areas in the country. Despite having abundant resources and a strong need for industrial growth, it has not developed at a sufficient pace. Some of the challenges faced by the startups in the northeast are:

1. Inadequate Funding- Lack of sufficient funding hampers startups. The northeast struggles with low per capita income and poor savings rates, leading to weak capital formation and hindering startups..

2. Industrialization Challenges- Proper industrial development requires entrepreneurial skills, which are lacking in the northeast. Despite the area's rich natural resources, industrial growth is slow due to this skill gap.

3. Inadequate Infrastructure- The northeast region lacks essential infrastructure such as transportation, power, and communication. Without a strong infrastructure foundation, the region cannot effectively utilize its resources for sectoral growth.

4. Lack of Credit Facilities- Credit facilities are hard to find in the northeast because many areas lack banking services. As a result, banks do not provide financial support to the startups and small businesses.

5. Risk Aversion: Establishing startups involves taking risks, which goes against the cautious nature of many educational systems. Encouraging students to accept failure and uncertainty poses challenges for the startups.

6. Limited Awareness and Mindset: One of the major challenges in North East India is the lack of knowledge and a mindset supportive of startups and entrepreneurship. The region has traditionally relied on government jobs and lacks a strong entrepreneurial culture.

7. Territorial Conflicts: There are existing inter-state and international territorial conflicts within the Northeast that are often based on historical border disputes and different ethnic, tribal or cultural affinities. Example; Assam- Mizoram Border Dispute.

8. Natural Calamities- Natural calamities, like floods, pose significant challenges for startups in North East India. Frequent flooding disrupts business operations, damages infrastructure, and hampers transportation. Such challenges deter investors and hinder long-term growth, making it difficult for startups to thrive

Findings

The study reveals several key insights into the region's startup ecosystem. Startups in sectors such as construction and engineering, agriculture, handicrafts, and technology show a significant potential due to the region's rich cultural heritage and natural resources. There is a growing entrepreneurial spirit among the youth, driven by a desire to create impactful and sustainable businesses, with various government initiatives and scheme providing financial aid, tax benefits, and infrastructure support. The government initiatives include Start-up India, MUDRA Yojana, Make in India etc so that the youths of this region may earn their own livelihood without being much dependent on the government for jobs.

It has been found from the study that Assam has the highest number of DPIIT recognized start-ups and the most women-led start-ups, while Sikkim, Mizoram and Arunachal Pradesh have the fewest number of start-ups.

It has been found from the study that the number of start-ups in each state is increasing, as evidenced by a linear trend line showing a consisting rise in the number of start-ups from the year 2016 to 2022. The study reveals that although there are many DPIIT registered start-ups in North-East India, but only a few are currently functioning effectively.

Suggestions

1. Improving Infrastructure- Invest in developing robust physical infrastructure, including better transportation networks, reliable power supply, and high-speed internet connectivity. This will create a more conducive environment for startups to operate and grow.
2. Enhancing Access to Funding- Establish more venture capital funds and angel investor networks focused on North East India. Provide incentives for investors to support local startups. Additionally, create government-backed grants and loans specifically for startups in this region.
3. Streamlining Regulatory Processes- Simplify and expedite the registration and compliance processes for startups. Reduce bureaucratic red tape and provide clear guidelines to make it easier for entrepreneurs to navigate the regulatory landscape.
4. Building Entrepreneurial Ecosystems- Set up more incubators and accelerators to provide startups with mentorship, resources, and networking opportunities. Encourage collaboration between universities, research institutions, and the private sector to foster innovation.
5. Promoting Skill Development- Implement training programs and workshops to enhance the skills of aspiring entrepreneurs and their teams. Focus on areas such as business management, marketing, technology, and financial literacy to equip them with the necessary tools for success.
6. Encouraging Collaboration and Networking- Facilitate platforms for startups to connect with industry experts, potential partners, and customers. Organize regular events, such as startup fairs, hackathons, and pitch competitions, to promote interaction and knowledge sharing.

By implementing these suggestions, North East India can create a more vibrant and supportive ecosystem for startups, unlocking their potential to drive economic growth and innovation in the region.

Conclusion

The startup ecosystem in North East India shows great potential due to the region's unique cultural diversity, abundant natural resources, and growing entrepreneurial spirit. Opportunities abound in sectors such as tourism, agriculture, handicrafts, and technology, supported by government initiatives. However, challenges like poor infrastructure, limited funding, bureaucratic hurdles, internal conflicts and security concerns hinder growth. Addressing these issues through improved infrastructure, better funding access, regulatory reforms, and socio-political stability is essential. With the right support and strategic interventions, the region has the potential to become a thriving startup hub, driving economic growth and integration with the broader Indian economy.

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Trend, Scope and Challenges of Green Finance in India: A Conceptual Review

Gulzar Alam Khan* & Parag Shil**

Abstract

This paper provides a comprehensive overview of the current trends, scope, and challenges associated with green finance in India. It explores the growing importance of sustainable finance in addressing climate change and promoting economic growth. The paper analyzes the various initiatives and policies implemented by the Indian government to foster green finance, including regulations, incentives, and financial instruments. Additionally, it identifies the key challenges hindering the widespread adoption of green finance in India, such as a lack of awareness, limited data availability, and regulatory complexities. The paper concludes by discussing potential solutions and recommendations to overcome these challenges and accelerate the transition towards a sustainable financial system in India.

Keywords: *Green Finance, Sustainable Development, Renewable Energy,*

1. Introduction

Green finance plays a crucial role in linking economic growth with environmental responsibility. As climate change and ecological degradation become more pressing, directing financial investments toward sustainable outcomes has become a national

* Research Scholar, Department of Commerce, Assam University, Silchar
** Professor, Department of Commerce, Assam University, Silchar

priority. For a developing country like India, where economic ambitions are high and environmental concerns are growing, green finance has emerged as a key strategy to support low-carbon and climate-resilient development.

In recent years, India has taken significant steps by introducing green bonds, funding renewable energy projects, and encouraging sustainable infrastructure. Banks and financial institutions are gradually integrating environmental concerns into their lending and investment decisions (Ansari & Anand, 2022). However, several roadblocks remain. These include gaps in regulatory policies, limited technical knowledge among stakeholders, and insufficient global financial partnerships (Bhatnagar & Sharma, 2022).

This chapter explores the current state of green finance in India, mapping its development, challenges, and potential for reform. It also draws lessons from international practices that may suit India's unique policy and financial landscape. By examining these aspects, the study aims to identify practical strategies to strengthen India's green finance ecosystem.

Advancing green finance directly supports the United Nations Sustainable Development Goals (SDGs), particularly those focused on climate action, clean energy, and sustainable economic growth. Enhancing this financial avenue is not only crucial for environmental sustainability but also essential for fostering inclusive and resilient development.

1.1 Definition:

Green finance refers to the flow of financial resources toward environmentally responsible and socially inclusive activities. It supports projects that lower carbon emissions, enhance energy efficiency, and promote a low-carbon economic transition. Key tools include green bonds, climate-focused funds, and sustainable lending practices. The goal is to achieve long-term economic growth while protecting natural ecosystems and improving societal well-being.

Scholars have examined green finance from various perspectives. Flammer (2021) found that green bonds encourage firms to adopt sustainable practices, especially when backed by clear

policies. Nedopil (2022) highlighted how China leverages green investments under the Belt and Road Initiative to promote both development and diplomacy. Weber (2021) emphasized aligning financial strategies with the UN's Sustainable Development Goals through corporate responsibility efforts.

Fig. 1 Green Finance

In the Indian context, green finance has gained momentum as part of the country's climate action strategy. The government's launch of sovereign green bonds is a step toward funding clean energy and low-carbon projects. However, challenges remain. Limited investor awareness, weak regulatory support, and shallow market infrastructure slow the sector's growth (Freytag, 2020). Addressing these barriers is vital for aligning India's financial system with its sustainability goals.

1.2 Evolution of Green Finance in India

Green finance in India has evolved substantially over the past decade, showing the country's growing commitment to sustainable development. Initially, the drive for green finance came from government actions such as the National Action Plan on Climate Change (NAPCC) and initiatives supporting renewable energy. The introduction of mechanisms like the Perform, Achieve, and Trade (PAT) scheme and the Standards and Labelling Program highlighted India's dedication to reducing carbon emissions and improving energy efficiency (Jha & Verma, 2020).

In more recent years, private sector involvement has gained momentum. Financial institutions and investors are increasingly integrating environmental, social, and governance (ESG) factors

into their decision-making, driven by the recognition of climate risks and the potential long-term financial returns of green investments. The rise of green bonds and sustainable investment funds in India reflects this shift, providing opportunities to fund projects with a positive environmental impact (Naeem et.al., 2023).

Looking forward, the future of green finance in India looks promising, with the government aiming for net-zero emissions by 2070. Efforts to enhance transparency and standardize green finance practices will likely propel growth in this sector. As India tackles its environmental challenges, the continued development of green finance will be crucial in fostering a greener economy (Naeem et.al., 2023).

1.3 Key Policies and Regulations Associated with Green Finance in India

Over the past decade, India's green finance sector has undergone significant transformation, reflecting the nation's commitment to sustainable development. Initially, government-led initiatives such as the National Action Plan on Climate Change (NAPCC) played a pivotal role in this evolution. The NAPCC introduced eight national missions targeting various climate-related challenges, including the National Solar Mission and the National Mission for Enhanced Energy Efficiency (Ministry of Environment, Forest and Climate Change, 2008). A key component of these efforts was the Perform, Achieve, and Trade (PAT) scheme, designed to set energy consumption reduction targets for energy-intensive industries, allowing them to trade Energy Saving Certificates upon achieving these goals (Bureau of Energy Efficiency, n.d.-a). Complementing this, the Standards and Labelling Programme was established to guide consumers toward energy-efficient appliances by providing clear information on energy performance (Bureau of Energy Efficiency, n.d.-b).

In recent years, the private sector's role in green finance has become increasingly prominent. By February 2023, India had issued approximately $21 billion in green bonds, with the private sector contributing 84% of this total (World Bank, 2023). This surge in private investment underscores a growing recognition of the long-term financial benefits associated with

environmentally sustainable projects. Green bonds have emerged as a crucial instrument for funding initiatives that yield positive environmental outcomes, such as renewable energy ventures and sustainable infrastructure developments.

Looking ahead, India's commitment to achieving net-zero emissions by 2070 sets a clear trajectory for future policies and financial strategies. Achieving this ambitious goal will require substantial investment, with estimates suggesting a need for over $10 trillion (ICF, 2023). To bridge this financial gap, enhancing transparency and standardization in green finance practices is essential to attract both domestic and international investments. As India continues to address its environmental challenges, the evolution of green finance will be pivotal in promoting sustainable development and transitioning to a greener economy.

1.4 Need of Green Finance in India

Green finance plays a pivotal role in India's journey toward sustainable development by channeling investments into eco-friendly projects like renewable energy and energy efficiency. This financial approach not only drives economic growth but also addresses environmental challenges. For instance, the issuance of green bonds has become a significant tool in attracting both domestic and international investors interested in supporting sustainable initiatives (Mohd & Kaushal, 2018; Bhatnagar et.al.,2025).

Beyond economic advantages, green finance contributes to social well-being. Investing in clean energy and sustainable agriculture can lead to improved public health outcomes and job creation, promoting inclusive growth. Studies have shown that green financial policies can enhance public health by reducing pollution and encouraging healthier lifestyles (Chhaocharia, 2021).

Government policies and incentives are crucial in advancing green finance. The Green Energy Open Access Rules, 2022, for example, have clarified aspects like consumer eligibility and electricity banking, facilitating greater participation in green energy projects (Institute for Energy Economics and Financial Analysis, 2024).

As urbanization accelerates, integrating green finance into city planning becomes essential. Case studies from Hyderabad and

Kolkata demonstrate how mapping green finance flows can support climate change mitigation and adaptation efforts at the urban level (Climate Policy Initiative, 2021).

2. Review of Literature

Green finance in India is steadily gaining ground, particularly in areas that promote environmental well-being. Current studies show a sharp rise in investments in renewable energy, especially solar and wind, supported by national energy goals (Keerthi, 2013). The market for green bonds is also expanding, with both government and private organizations using them to fund eco-friendly initiatives (Agrawal et.al., 2024; Desai & Prajapati, 2024). Additionally, financial institutions are beginning to integrate environmental, social, and governance (ESG) standards into their investment choices, signaling a move toward sustainability in finance (Kumar & Luthra, 2021).

The reach of green finance is wide, covering renewable energy, sustainable farming, waste handling, and efficient energy use (Ali et al.,2024). This opens up new economic opportunities while addressing environmental needs. Financial institutions play a key role here by directing funds into green ventures that can drive innovation and new technologies (Naeem et.al.,2023). Global support, particularly from the World Bank and the International Finance Corporation, is also boosting India's green ambitions (Ali & Jafar,2024; Khan & Roy, 2022).

Despite the progress, several barriers remain. A major issue is the limited understanding of green finance among key players, which affects project execution (Freytag, 2020; Sarangi,2018). Another challenge lies in the absence of common standards to measure and report the outcomes of green investments (Desai, 2023). High initial costs and perceived financial risks discourage funding, while inconsistent policies and regulations create further hesitation among investors (Soni & Baheti,2017).

To tap the full benefits of green finance, India needs to raise awareness, create unified evaluation systems, ease financial entry points, and maintain clear, long-term policy support.

3. Objectives of the Study

- To study the scenario of green finance in India
- To study the scope and challenges of green finance in India.
- To explore different kinds of green finance products available in India.

4. Research Methodology

The methodology for this paper involves a systematic literature review to synthesize existing research. Relevant studies have been gathered from various academic secondary sources like books, journals, industry reports, policy documents, etc., to understand the evolution, scope, and challenges of green finance in India. Data has been extracted focusing on trends, case studies, and regulatory impacts, with particular attention to recent advancements. The review also incorporated qualitative insights and real-life examples to offer a comprehensive perspective.

5. Trends of Green Finance in India

Green finance in India has seen strong growth in recent years, with increasing support from both the government and financial institutions. Instruments like green bonds, sustainability-linked loans, and green mortgages have been introduced to fund eco-friendly projects. A major milestone was the State Bank of India's green bond issue in 2018, which raised $650 million for renewable energy. By 2023, India's green bond market had reached a cumulative issuance of $10.8 billion, positioning the country as a leader among emerging economies (Mohanty et al., 2023).

The private sector has also become more active, especially as businesses respond to rising expectations around environmental responsibility. Large firms such as Tata and Mahindra are setting the pace. Tata Power has pledged to raise its renewable energy share to 80% by 2030. Meanwhile, sustainability-linked loans increased by 35% in 2022, showing that companies are aligning financial strategies with environmental goals (Fu et al., 2023).

However, the sector still faces roadblocks. Limited data, lack of common standards, and the high cost of green technologies make it difficult to scale up. There is also a pressing need to build awareness and strengthen the capacities of various stakeholders.

Overcoming these issues is essential for green finance to truly support India's sustainable development goals (Mohanty et al., 2023).

Comparative Analysis with Global Green Finance Trends

Globally, green finance has grown significantly, driven by climate policies, technological innovation, and heightened environmental awareness. For instance, in 2020, the global green bond market reached a record $269.5 billion in issuance, up from just $3 billion in 2007 (Climate Bonds Initiative, 2021). Countries like China and members of the European Union have established sophisticated green finance systems, integrating green bonds and sustainable investment standards. In 2020, China issued $13.4 billion in green bonds, while the EU launched a €750 billion green recovery fund as part of its European Green Deal (European Commission, 2020). These countries' proactive approach has created influential green finance markets, offering valuable frameworks for other nations.

India's green finance sector, though progressing, is still developing. The Indian government has introduced key initiatives like the National Clean Energy Fund (NCEF), launched in 2010, which supports renewable energy projects (Ministry of Finance, 2021). Furthermore, in 2017, India issued its first sovereign green bond worth $500 million, demonstrating its commitment to sustainable finance (Reserve Bank of India, 2017). However, challenges remain, including policy inconsistencies, low market liquidity, and limited investor awareness. Despite these hurdles, India has the potential to align more closely with global green finance trends by strengthening its infrastructure and regulatory framework.

6. Scope and Sectoral Reach of Green Finance in India

Green finance in India has emerged as a critical pathway for steering investments into environmentally responsible ventures. With rising concerns over climate change and resource depletion, India's development priorities now include renewable energy, sustainable farming, and efficient waste systems. Green finance supports this shift by funding projects that reduce emissions, conserve resources, and promote cleaner alternatives.

Over the years, the government has introduced several measures to encourage green financing—ranging from regulatory support

to incentives for issuing green bonds. Such tools have helped attract both domestic and international capital into sustainable projects. However, the sector still faces some bottlenecks. The absence of a clear, uniform definition of what qualifies as 'green' financing often leads to inconsistencies. Additionally, financial institutions frequently lack the skills or frameworks needed to assess the long-term value and impact of green projects.

Despite these challenges, digital technologies are beginning to make a difference—by improving the traceability of green funds and building investor confidence through better data and transparency. To unlock the full potential of green finance, India needs continued policy innovation, stronger public-private coordination, and better awareness within the financial ecosystem.

Several sectors stand out as prime beneficiaries of this green transition:

- **Renewable Energy**: India has significantly expanded its renewable energy base, surpassing 150 GW by 2023, led by large-scale solar and wind projects. This progress is largely funded by green bonds, which have become a preferred instrument for financing clean energy infrastructure. The outcome is twofold—lower carbon emissions and improved energy security.
- **Waste Management**: Cities across India generate enormous volumes of waste daily. Green finance has supported the creation of modern waste treatment and recycling plants. Some municipal bodies have even raised funds independently to build waste-to-energy units. These efforts not only reduce pressure on landfills but also improve urban sanitation and public health.
- **Sustainable Agriculture**: Agriculture, the backbone of India's rural economy, is now seeing a push toward eco-friendly practices. Green finance supports organic farming, water-saving irrigation systems, and climate-resilient crops. Financial institutions and rural development banks have played an active role in funding these projects, ensuring that small farmers can adopt sustainable methods without bearing all the costs themselves.

While Green Finance holds a vast promise for transforming key sectors, realizing its full potential depends on bridging policy gaps, building institutional capacity, and driving innovation across the financial landscape.

7. Challenges in Implementing Green Finance in India

7.1 Regulatory and Policy Barriers: India's green finance sector faces hurdles due to inconsistent regulations and a lack of cohesive policy frameworks. Despite initiatives like the National Clean Energy Fund, regulatory uncertainty and fragmented policies impede progress (Kumar et.al.,2024). The complexity of navigating different regulations across states further complicates the implementation of green finance.

7.2 Financial and Market Challenges: Green finance in India is constrained by limited access to capital and high investment risks. Green projects often face difficulty in attracting investors due to their perceived higher risk and lower short-term returns (Jha & Bakhshi, 2019). Additionally, the absence of standardized metrics for evaluating green investments can deter potential financiers.

7.3 Technological and Infrastructure Constraints: The lack of advanced technological infrastructure hampers the growth of green finance. Many green technologies are still emerging and require substantial investments for development and deployment (Keerthi,2013; Patel, 2023). Additionally, inadequate infrastructure for monitoring and managing green projects affects their efficiency and effectiveness.

7.4 Socio-economic Factors and Public Awareness: Limited public awareness and understanding of green finance contribute to its slow adoption. Socio-economic factors, such as low financial literacy and limited exposure to green concepts, hinder widespread acceptance and participation in green finance initiatives (Kumar et.al., 2024).

7.5 Institutional Capacity and Expertise: There is a shortage of skilled professionals and institutional capacity to support green finance initiatives. Many institutions lack the necessary expertise and resources to effectively manage and implement green finance projects (Jha & Bakhshi, 2019).

7.6 Reporting and Transparency Issues: The absence of standardized reporting frameworks for green investments affects transparency and accountability. Investors and stakeholders often face challenges in assessing the environmental impact of their investments due to inconsistent reporting practices (Sarangi,2018).

7.7 Political and Economic Instability: Political and economic instability can disrupt green finance initiatives. Changes in government policies, economic downturns, and political uncertainties can impact the stability and attractiveness of green investments (Kundu & Kumar, 2025).

7. Green Finance Instruments in India

7.1 Green Bonds: Green bonds are debt securities issued to finance projects with positive environmental impacts. In India, the green bond market has witnessed substantial growth, with notable issuances by companies like the Indian Renewable Energy Development Agency (IREDA) and the National Bank for Agriculture and Rural Development (NABARD). For instance, in 2022, NABARD issued green bonds worth ₹1,500 crores to support renewable energy projects.

7.2 Green Loans: Green loans are provided for projects that have clear environmental benefits. Indian banks such as SBI and HDFC offer green loans with favorable terms for renewable energy, energy efficiency, and sustainable infrastructure projects. In 2023, the State Bank of India allocated ₹2,000 crores in green loans for solar power and energy-efficient projects.

7.3 Green Taxonomy: The green taxonomy is a classification system that defines which activities and projects are considered environmentally sustainable. India introduced its green taxonomy in 2021, aligning with international standards to guide investments in sustainable projects.

7.4 Green Mutual Funds: These are investment funds that focus on green and sustainable projects. In India, mutual funds like the SBI Green Fund and Aditya Birla Sun Life Green Fund target investments in clean energy and environmental

sustainability. As of 2023, the SBI Green Fund managed assets worth ₹1,200 crores (SBI, 2023).

7.5 Green ETFs: Green Exchange Traded Funds (ETFs) track indices composed of environmentally friendly companies. The Nifty Green Index ETF, launched in 2022, includes companies involved in renewable energy and sustainable practices, offering investors exposure to green investments (NSE, 2022).

7.6 Green Project Financing: This involves financing specific projects aimed at reducing environmental impact. The Indian government's Clean Energy Fund supports large-scale green projects, including wind and solar farms. For example, the Solar Park Development Fund has been instrumental in financing solar projects worth over ₹10,000 crores.

7.7 Green Certificates: These are tradable instruments certifying the generation of green energy. The Renewable Energy Certificates (RECs) market in India, regulated by the Central Electricity Regulatory Commission (CERC), facilitates the trade of certificates to meet renewable purchase obligations.

7.8 Green Insurance: Green insurance products are designed to cover risks associated with environmentally friendly projects. The New India Assurance Company offers policies for renewable energy projects, covering risks related to equipment and operation (Insurance Regulatory and Development Authority of India (IRDAI, 2023).

7.9 Carbon Credits: Carbon credits are permits that allow the holder to emit a certain amount of CO2. India participates in international carbon trading under mechanisms like the Clean Development Mechanism (CDM). As of 2024, India has issued over 400 million carbon credits.

7.10 Green Development Bank: The Green Development Bank focuses on financing green projects. India established the Green Climate Fund (GCF) to support projects aimed at climate change mitigation and adaptation. In 2023, the GCF allocated $500 million for various green projects in India (GCF, 2023).

9. Successful Green Finance Projects in India

India has seen a range of successful green finance projects that contribute significantly to its sustainable development goals. Here are ten notable projects:

9.1 Indian Green Bond Market: India's green bond market has seen significant growth, with projects like the Green Bonds issued by Yes Bank and SBI, which fund renewable energy and energy efficiency projects (SBI Green Bond, 2021; Yes Bank Green Bond, 2022).

9.2 Re-New Power's Solar Projects: Re-New Power has implemented large-scale solar power projects across India, including a 600 MW solar park in Karnataka, funded through green financing (Re-New Power, 2023).

9.3 Tata Power's Green Bonds: Tata Power has issued green bonds to finance renewable energy projects, including solar and wind energy initiatives. These bonds support the company's commitment to clean energy (Tata Power, 2023).

9.4 India's National Electric Mobility Mission Plan (NEMMP): This project aims to promote electric vehicles (EVs) and has been funded through green finance mechanisms to reduce the carbon footprint of transportation (NEMMP, 2023).

9.5 Green Climate Fund Projects: Several Indian projects have received funding from the Green Climate Fund (GCF), including those focused on climate-resilient agriculture and renewable energy (GCF, 2023).

9.6 Indian Renewable Energy Development Agency (IREDA) Projects: IREDA provides financial support for renewable energy projects, including wind, solar, and hydroelectric projects, driving India's green energy agenda (IREDA, 2023).

10. Conclusion

India has taken meaningful steps to blend environmental concerns with financial practices through tools like green bonds, climate-linked loans, and sustainability-focused insurance. These instruments are helping direct funds into projects that support clean energy, climate resilience, and ecological conservation.

Still, some key barriers remain. These include unclear standards for measuring green impacts, low stakeholder awareness, and a need for stronger policies and coordination. Overcoming these challenges will require joint efforts from the government, financial sector, and industry leaders to design practical guidelines and build investor confidence.

Looking ahead, green finance can play a major role in achieving multiple Sustainable Development Goals. It directly contributes to SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 13 (Climate Action). Indirectly, it supports SDG 11 (Sustainable Cities) and SDG 17 (Partnerships for the Goals) by encouraging sustainable urban development and multi-sector collaboration.

As India aims for a low-carbon future, green finance will be key to aligning growth with sustainability. With the right strategies and long-term vision, it can help balance environmental protection with economic advancement, paving the way for a more inclusive and greener tomorrow.

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The Role of GST in Reshaping India's Revenue Landscape

Malay Das* & Prashanta Sharma**

Abstract

The Goods and Services Tax (GST), implemented in July 2017, marked a significant shift in India's taxation framework, aiming to unify the country's complex indirect tax structure. This paper explores the transformative role of GST in reshaping India's revenue landscape. By replacing multiple cascading taxes with a single streamlined system, GST has improved tax compliance, broadened the tax base, and enhanced revenue collection for both the central and state governments. The mechanism of input tax credit and digital tracking has increased transparency, reducing tax evasion and promoting formalization of the economy. Despite initial challenges during implementation, such as technical glitches and compliance burdens for small businesses, GST has gradually stabilized and demonstrated positive long-term impacts. This abstract provides an overview of how GST has influenced fiscal federalism, increased efficiency in tax administration, and contributed to the overall economic growth of the country by fostering a more robust and integrated revenue system.

Keywords: *Indirect Taxation, Revenue Generation, Tax Compliance, Fiscal Federalism, Economic Formalization and Input Tax Credit.*

* Lecturer in Humanities (Commerce), Chirang Polytechnic, Assam

** Head of the Department, Department of Commerce, Gauhati University, Assam

Introduction

India operated a tax structure based on Goods and Services Tax prior to its implementation which contained multiple layers that existed in separate domains. Government taxes at both national and state levels created multiple taxation layers including Central Excise Duty, Service Tax, Value-Added Tax (VAT), Central Sales Tax (CST), Octroi, Luxury Tax, and Entry Tax together with several other taxes. Every tax in the system had distinctive rules and compliance systems it with and administrative authority boundaries which generated inefficiency and caused taxing effects that spread throughout the country while creating unevenness in tax regulations. The existing system acted as a hindrance for businesses operating between different states while simultaneously making operations more expensive and straining both compliance requirements and transparency measures.

The Government of India made a historic transformation through the implementation of the **Goods and Services Tax (GST) on July 1, 2017**. Tax structure simplification alongside market unification combined with elimination of tax chain effects along and technological improvements in systems were among the main reasons behind GST establishment. GST's objective in bringing diverse indirect taxes together into one unified system aimed to enhance business conduct simplicity and it boosted both distribution networks and company participation in the official taxable sphere. The new tax system would achieve better monitoring while expanding its tax base to improve overall collection amounts.

In the context of **financial receipts**, GST holds substantial importance for both the **Central and State Governments**. The tax functions as a **destination-based consumption tax** that establishes a direct connection between economic activities and tax revenue generation thus building it as a crucial element in the country's fiscal system. Tax revenue follows transparent predictable paths under GST structure which reduces lost funds so that the government can efficiently collect funds from various sources. The introduction of GST led India to transition from production-based taxation towards consumption-based taxation methods which were compliant with international tax practices. GST has

evolved into a significant financial receipt generator for the Union Government that currently shapes national budgetary trends.

When GST came into effect it changed how taxes operated in India along with transforming the way the country generates revenue. This chapter delves into the structural aspects, performance trends, and policy implications of GST in the context of India's financial receipts from 2017 to 2025.

Structure and Mechanism of GST:

A key purpose behind the Goods and Services Tax (GST) has been to create a comprehensive indirect tax reform that integrates the Indian market structure and optimizes tax administration. The dual model design of GST functions through multiple tiers of taxation while dividing responsibilities between the Central government and state governments of India. Its operational structure together with its governance mechanisms are fundamental to understanding its operational methods, distribution processes, technological integration for taxation purposes.

1. Types of GST: CGST, SGST, IGST, and UTGST

The GST system includes four distinctive tax components that balance nationwide and state financial powers.

The Central Government administers the **Central Goods and Services Tax (CGST)** through taxation of domestic transactions of goods and services. The implementation of GST eliminates central taxation which formerly consisted of excise duty, service tax together with central surcharges.

The State Governments run a tax program named **State Goods and Services Tax (SGST)** which tracks the same intra-state supply. Among state taxes, the system substitutes and integrates VAT with purchase tax and entertainment tax.

The **Integrated Goods and Services Tax (IGST)** serves the Central Government and enables it to collect revenue from **inter-state supplies** and imports. The revenue generated from IGST will be properly divided between central government and the state where the sales occurred. Businesses can avoid paying several taxes on their interstate transactions through the implementation of Integrated Goods and Services Tax.

Union Territory Goods and Services Tax (UTGST) is applied in Union Territories without a legislature (e.g., Chandigarh, Lakshadweep, etc) in place of SGST. The system functions together with CGST when supplying goods within a Union Territory.

The dual structure of indirect taxation permission between governments creates a system of cooperative federalism that eliminates tax duplication between national and sub-national levels.

2. GST Council and Its Role

The GST Council stands as a vital element of GST structure by conducting both policy development and implementation activities. The GST Council functions as an essential group established according to Article 279A of the Constitution where the Union Finance Minister serves as chair with the Union Minister of State for Finance and Finance Ministers from each state and UT legislature.

The Council is entrusted with:

- Making suggestions regarding the GST tax rates along with their respective slabs.
- Determining exemptions and special provisions.
- Dispute resolutions in addition to maintaining consistent taxation practices throughout the country.
- Reviewing and assessing all GST legislation alongside its rules and the various threshold amounts.

The Council works as per unified agreement since participating members from states and the central government possess equal voting power. Through this decision-making method the institution includes all stakeholders while handling differences in local conditions while protecting nationwide tax uniformity.

Throughout its existence the GST Council has maintained regular meetings for tax rate adjustment as well as simplification of compliance processes and the handling of sectoral and macroeconomic challenges. Through its essential workload the GST Council maintains GST's capability to adapt to the changing economic requirements of India.

3. GST Network (GSTN) and IT Infrastructure

Although designed to enable real-time tax operations **Goods and Services Tax Network (GSTN)** serves as the **technological foundation** for the Goods and Services Tax implementation framework. The **GST portal** receives development and maintenance from this non-profit private company which is owned by the government.

The GSTN operates through an IT infrastructure that has several vital characteristics:-

- Taxpayers accomplish **registration, filing returns** and account management through the exclusive GST portal online.
- The platform matches **Input Tax Credit (ITC)** details between input tax records and output taxes for automatic verification of ITC claims while preventing both errors and instances of fraud.
- Customers can benefit from **e-way bill system** which tracks goods movements for tax compliance and evasion prevention.
- Businesses with specified turnover requirements must use **e-invoicing** which creates automatic invoice validation systems and enhances visibility.
- GSTN performs cross-verification through **interconnected systems** which include income tax databases as well as customs and banking databases for monitoring compliance.

The implementation of **technological and automated systems** through GSTN brought remarkable improvements to tax administration operations in India by raising both transparency, efficiency and scalability. Analytics within the system support tax authorities in formulating data-based policies and enhances their ability to monitor operations.

Timeline and Implementation:

Following comprehensive years of planning and constitutional adjustments India accomplished a historical shift in its taxation structure through the Goods and Services Tax (GST) implementation. The Goods and Services Tax (GST) officially started on July 1, 2017 after years of agreement formation through

constitutional amendments which were formally introduced during a midnight parliamentary session.

1. Rollout in July 2017: Phased Implementation

GST was launched officially in mid-2017 but makers chose a step-by-step framework to bring it into effect. During the initial phase businesses obtained a period of time for transitioning away from previous taxation rules into the new system. The Indian government adopted a step-by-step transition of return reporting and invoice matching procedures as well as compliance guidelines to provide relief for small and medium enterprise taxpayers.

At the time of GST rollout **five primary tax brackets from 0% to 28% with 5%, 12%, 18% and 28%** were enforced to specific goods and service categories. The selected luxury and sin goods fell under "**Compensation Cess"** which operated to help states recover lost tax revenue during five years of transition.

2. Initial Challenges and Adjustments

During the early stage of GST implementation severe operational and procedural barriers appeared. Numerous business entities particularly in the unorganized domain and small and medium enterprises faced these problems:

- Complex return filing procedures (GSTR-1, GSTR-2, GSTR-3).
- The GST portal known as GSTN experienced technical problems.
- The confusion between tax rates and HSN code classification became barriers to smooth implementation of the GST system.
- Transitional credit claims and documentation hurdles.
- User organizations needed better training about operating in the new system.

The government introduced multiple adjustive measures to address the emerging problems:-

- The government introduced **GSTR-3B** as a summary return to simplify return submission processes.
- A delay of the original invoice-based system became necessary to decrease compliance demands.

- The establishment of helpdesks as well as FAQs and outreach programs together with setting up assistance points became part of these efforts.
- Each small taxpayer now uses the **composition scheme** that enables tax payment through a flat rate system while simplifying regulatory requirements.

The new tax regime became stable because of these important steps that helped stakeholders regain confidence.

3. Major revisions and rate rationalizations over the years

The system of GST has seen multiple amendments that focus on improving operational efficiency together with expanding tax compliance and solving industry-specific problems. A major characteristic of GST implementation has become the GST Council's regular task i.e, revising tax rates through their **frequent rate rationalizations** and reclassifications.

Several important changes have occurred throughout the annual timeline:

- The tax rates for more than 400 product types underwent a cut as the government worked to control inflation and boost market consumption.
- The **merging of tax slabs** between specified categories minimizes disputes regarding product classifications by lowering various items from the 28 percent bracket into the 18 percent or lower categories.
- The GST Council provides exemptions to essential goods and necessary services which safeguard consumers from lower-income brackets.
- The adoption of Electronic invoicing called **e-invoicing** will function through multiple turnover levels to increase tax visibility and maintain compliance standards.
- The **e-way bill system** constitutes a system launch designed to boost logistics efficiency and cut down tax evasion.
- Implementation of the **QRMP scheme** for quarterly return filing with monthly tax payments for small taxpayers.

These modifications demonstrate how GST policy adopts a consultative approach because it responds to feedback from tax professionals and industry representatives together with state governments.

Trends in GST Collections (2017–18 to 2024–25):

India established the Goods and Services Tax (GST) as its fundamental indirect taxation mechanism when it was launched in July 2017. The government revenue from GST collections continues to grow each year because improved tax compliance and enhanced tax system visibility drives higher monetary intake. The GST revenue data shows a path of tax system growth and policy evolution since July 2017 until the financial year 2024–25.

1. Year-wise GST Revenue Data

The GST revenue collection demonstrates an upward movement year after year because it incorporates expanded tax base and enhanced compliance activities. The annual breakdown of GST collections can be found in the following summary:

- 2017–18 (Partial Year): Approx. ₹7.19 lakh crore (July to March)
- 2018–19: Approx. ₹11.77 lakh crore
- 2019–20: Approx. ₹12.22 lakh crore
- 2020–21: Approx. ₹11.36 lakh crore (dip due to COVID-19 lockdown impact)
- 2021–22: Approx. ₹14.83 lakh crore (sharp recovery post-pandemic)
- 2022–23: Approx. ₹18.10 lakh crore
- 2023–24: Approx. ₹20.14 lakh crore
- Ahead of 2024–25 the estimated GST collection is expected to reach over ₹22.5 lakh crore

Gross GST collections exceed ₹1.7 lakh crore per month in 2024–25 while reaching ₹1.8 lakh crore in multiple months.

2. Comparison of Pre and Post-GST Indirect Tax Collections

India obtained indirect tax revenue from central excise and service tax together with the state-level Value-added Tax system and other parallel collecting mechanisms during the pre-GST era. Indian taxes collected annually from all these sources in 2016–17 reached ₹17.1 lakh crore jointly for central and state governments. Since the initial implementation hurdles of GST were resolved there has been continuous growth in revenue which **surpasses pre-GST collection figures** after inflation adjustments and base adjustments.

Some critical differences include:

- GST has expanded the pool of taxable entities because it drew numerous small and medium businesses into the formal taxation system.
- Through the input tax credit system the economy has achieved efficiency improvement while maintaining stable revenue amounts.
- Technology-based platforms including e-invoicing and e-way bills enable the system to function better by making audits more effective and improving tax returns.

GST exhibits stronger **buoyancy behavior** based on economic growth patterns since recent years, which indicates rising GDP-generating capacity of tax receipts.

3. Seasonality, Buoyancy, and Monthly Trends

GST collections follow seasonal patterns that are influenced by business cycle patterns together with festival seasons and year-end financial processing and modifications to tax regulations.

- The fourth quarter typically records higher GST collections since businesses perform financial year-end adjustments through March and April.
- GST revenue increases during the festive period of October–December because of elevated consumption patterns.
- The first quarter months from May to June experience less revenue due to lower business operations combined with late tax submissions by taxpayers.

The **monthly** GST collection patterns have shown increased stability because taxpayers are getting accustomed to the system and filing procedures are becoming more efficient. The GST collection numbers have maintained **above ₹1.5 lakh crore threshold as a regular pattern starting from mid-2022** and reaching the highest point of ₹1.87 lakh crore in early 2024.

The **buoyancy of GST** increased significantly **beyond FY 2021-22** because better compliance standards, technological penetration and expanded taxability of services along with goods have improved collection effectiveness.

Sectoral Impact of GST on Revenue:

The implementation of Goods and Services Tax (GST) has generated deep transformation in numerous Indian economic sectors because it transformed tax compliance while boosting earnings. The combination of multiple previous indirect taxes under GST introduced an efficient tax system with transparency and uniformity which has benefited all sectors of manufacturing and services as well as small business operations. GST has become crucial for business sector migration from unregulated operations into formal operations thus expanding taxation areas which boosted tax revenue collection.

1. **GST provides a significant impact on manufacturing operations alongside services and small enterprises.**

Manufacturing Sector:

The **manufacturing industry** received a **fundamental transformation** from GST because it replaced its former tax-on-tax payment structure. The prior economic system obligating manufacturers to pay central excise duties, VAT along with state-level taxes on their inputs resulted in operational inefficiencies which raised their overall costs. Under GST, companies could claim tax credits from purchased inputs through **Input Tax Credit (ITC)** to lower production costs making them more market ready.

The Integrated GST (IGST) system has brought both supply chain organization and less inter-state tax expenses that originate from the Integrated GST mechanism. **Manufacturing organizations gained positive revenue changes** by adopting GST standards that

require automated transactions along with official procedures and complete visibility.

Services Sector:

Before GST introduction the services sector tax authority was **Service Tax** which imposed variable rates according to service specifications. GST introduced a single taxation system with an **18% standard rate** that applies to major services throughout India's service industry which represents a substantial economic portion of the GDP. Businesses in the service sector received the **benefit of Input Tax Credit** for their inputs, something that was unavailable under the previous tax system. The tax compliance of businesses in the services sector improved while formalization of their operations received motivation due to this implementation.

Several service sectors such as telecoms, banking and financial services experienced difficulties in calculating appropriate tax rates while **determining input credit availability** which resulted in short-term transitional problems.

Small Businesses:

The implementation of GST created heterogeneous effects on small enterprises. Scenarios exist for **small businesses with turnover below the GST threshold (₹40 lakh for goods and ₹20 lakh for services)** to file under the **Composition Scheme**, since this scheme offered simplified filing requirements as well as taxation at lower flat rates. The system introduced by GST decreased the amount of tax compliance requirements for businesses below specified thresholds while encouraging complete tax participation.

Small businesses faced extreme difficulties with the administrative requirements when mandatory invoice and **official document digitization** was implemented. Several smaller informal-sector businesses held back from adopting the GST system in its initial stages. **Changing to the formal economy** proved increasingly appealing since the system provided better opportunities with reduced barriers to taxation for business operations.

2. Informal to Formal Economy Transition

GST has achieved the formal structure transformation of businesses that operated in the informal sector. The economy functioned

largely outside legal boundaries since many businesses avoided tax obligations and did not obey governmental rules before the implementation of GST. The implementation of GST included multiple advantages which encouraged informal companies to register and become formal such as:

- The Input Tax Credit (ITC) system motivated companies to maintain correct documentation and file their taxes in order to claim input tax deductions.
- A digital tax system enabled better business operation monitoring through its transparent framework thus promoting accurate tax reporting by businesses.
- Compliance became simpler because GSTN introduced a system which provided a straight forward portal for businesses to register and file returns.

New GST registrations grew significantly since the taxation system started and made informal operations transition into formal entities. Most importantly the officialization process continues to face difficulties with the small business segment but it effectively strengthened the tax foundation resulting in increased government revenue.

3. Case Examples from Select Industries

Automobile Industry:

GST affected the automobile industry as one of its core business fields. Automobile manufacturers struggled with numerous taxes that made up their costs because excise duties combined with VAT and road tax rates were dissimilar between different states. The standardization of vehicle tax rates happened after GST implementation and manufacturers could apply Input Tax Credit for steel, aluminum and plastic materials used in vehicle manufacture. The standardization brought about by GST has reduced manufacturer taxation expenses to provide gains in operational performance and global market pricing advantages.

Maruti Suzuki positioned itself as India's biggest automobile producer by implementing GST which strengthened business operations and reduced costs because credit flow became seamless under this system compared to previous taxation methods.

Textiles and Garments Industry

The implementation of GST introduced substantial changes to businesses operating in traditional small-scale textile manufacturing sector. A **reduction in textile taxes down to 5%** made the market more appealing for exports and manufacturing under competitive terms. The textile industry retained costs at a minimum by using Input Tax Credit benefits to reduce expenses related to cotton and dyes for production. The small business operators in unorganized textile production began to achieve better development opportunities and market connections after formalizing under the GST framework.

Small textile manufacturers operating out of Surat and Tirupur can now obtain formal loans and simplify their sales operations while expanding their customer base because of GST registration.

Tourism and Hospitality Industry:

The tourism and hospitality sector experienced substantial changes from GST because of imposition of **different rates on hotel room prices** according to their room rates. Initial difficulties for small hotels and guesthouses became opportunities because of **reduced tax rates** for budget hotels combined with large hospitality businesses gaining **input credits**.

OYO Rooms reported that its use of GST has improved billing efficiency and simplified tax requirements which leads to benefits for hotel chains alongside budget hotels and guesthouses.

GST Compensation to States and Fiscal Federalism

Indian policymakers established the Goods and Services Tax (GST) system as an essential initiative to unite tax governance across the nation. The revenue-sharing arrangement that exists **between the central and state governments** received critical attention due to their implementation of Goods and Services Tax (GST). The **integration of various state-level taxes into GST** caused states to experience revenue concerns about financial losses mainly during the first years of the implementation period. The **GST Compensation Scheme** was created to resolve financial issues between states and the new tax system.

1. GST Compensation Act, 2017

The **GST Compensation Act, 2017** established financial protection for state governments so that they would receive support when their GST tax receipts failed to match their estimated taxes. The Central Government through the GST Compensation Act (2017) guaranteed state compensation if GST implementation caused revenue reduction during five years starting from 2017 through 2022. State governments received compensation payments from the central government based on the evaluation between the estimated pre-GST revenue and the actual GST revenue obtained post-GST regulation.

A new tax named **GST Compensation Cess** was established to benefit states with revenue shortfalls when it taxes products from both **"luxury categories"** and "**sin categories**" (which includes cigarettes, carbonated beverages and other restricted goods). The cess revenue established a **compensation fund** which would replace revenue drops states received after GST implementation.

Several important aspects anchored the **GST Compensation Act** as follows:

- States received yearly compensation according to a formula that calculated the difference between projected revenue that increased annually at 14% starting from the 2015–16 fiscal base and GST collection results.
- All collected Cess funds were directed to create a Compensation Fund to distribute funds to states as needed through monthly or quarterly allocations.

2. Revenue Shortfalls and Compensation Trends

During the five-year period from 2017 through 2022 numerous states struggled to fulfill their **revenue target predictions** under GST. These shortfalls were attributed to:

- The introduction of GST suffered technical problems on the GSTN together with **classification-rate misinterpretations** and difficulties adapting to electronic taxation processes during its inaugural financial year.
- Many states faced an additional financial loss during the **economic decline** that resulted from **COVID-19 disruptions**

along with reduced consumption and global economic stresses.

- The GST Council continuously **cut down tax rates** across numerous goods and services which reduced projected state revenue.

The amount of compensation paid to states through the compensation payouts increased substantially during specified years. States received more compensation payments in 2020-21 when the pandemic caused economic decline which resulted in major revenue loss.

The mechanism for compensation has faced substantial criticism during previous periods. Some states raised concerns about:

- The GST compensation cess provided insufficient funds which states needed to function properly. The funds available through the compensation fund fell shorter than the stated compensation amounts for states.
- State authorities voiced concerns about late central government compensation payments since these delayed payments caused monetary strain to some states.

The Central Government made two key changes to meet compensation needs when cess collections fell short. They first focused on prompt payments and then sought **borrowings from the market** as an alternative funding source.

3. Impact on Center-State Fiscal Relations

GST along with its linked compensation framework has produced major changes in how power and revenue-sharing functions happen between the national government and provincial governments in India. Through GST, the government adopts a taxation method which centralizes power between the Central Government and gives it primary responsibility for tax administration as well as revenue management. States received protection from unfair harm through the **compensation mechanism** which maintained their **financial independence and preserved federal financial relationships.**

- The GST Council functions as a lead organization under the cooperative fiscal system to unite the Central Government

and state authorities in handling tax policy endeavors along with agreeing on rates and exemptions.

- The compensation arrangement made states financially dependent on the Center to receive funds in case revenue falls beneath expectations. The ongoing need for compensation despite its purpose to safeguard state revenue created worries about the system's lasting sustainability because the compensation cess must end in 2022.
- As noted by critics central compensation reduced the ability of states to act independently in budgetary matters. States maintained their opinion that **cess revenue** often failed to deliver the results they needed and argued that central government interference with the compensation system had undermined their autonomous financial control.

GST created two main positive developments in how the central and state governments interacted with each other:-

- The implementation of a consistent tax structure enabled unfettered trade relations between states throughout the country.
- The **GST Council serves as a platform for the Center and States** to improve partnership by making consensus decisions about tax rates, exemption policies and administrative reforms.

Future Outlook and Policy Suggestions

The financial success of India's **Goods and Services Tax (GST)** system depends on three key factors which are the **expansion of taxable entities, simplified tax framework and improved implementation capabilities of essential institutions**. The GST regime achieved successful unification of the tax system but several aspects need additional reforms to maximize tax collection and increase economic growth. This segment presents essential policy recommendations which will advance GST success and boost its impact on India's fiscal stability.

1. Fuel along with alcohol and real estate should be incorporated within GST coverage to expand its tax base.

The base of the **GST system** needs immediate improvement because it currently applies to only select sectors that have limited

coverage and special exemptions. To create a more inclusive and tax-revenue-improving system, the GST coverage needs expansion.

Fuel:

Petrol, diesel and natural gas currently remain outside of GST taxation because states collect these taxes under VAT and excise duty systems. The omission of fuel from GST implementation has introduced irregular tax patterns price, variability and **regional economic disparities** between states. Placing fuel within GST jurisdiction would unite prices across states while raising total revenue by expanding the base of taxation. Introduction of fuel products into GST requires thoughtful examination about **price stability** together with **inflation effects** and **consumer purchasing strength modifications**.

A **progressive method** can introduce fuel into GST through an initial **pruned tax** which will get evolved as the national economy gains stability. A **compensation system** should be developed to support states that enhance their revenue through fuel taxation while the transition takes place.

Alcohol:

Each state functions as its own authority to levy taxes on alcoholic beverages because alcoholic beverages remain a state-subject under GST taxation. GST has introduced an **inconsistency** which slows down the expansion of the **alcohol market**. When alcohol becomes part of GST it will improve tax compliance and stop the existence of **tax cascading** (tax on tax). A single uniform alcohol tax in every Indian state would benefit consumers through minimized prices and would also **enhance revenue collection processes**.

A thorough stakeholder consultation and controlled **alcohol-tax integration process** needs to proceed in order to protect the financial positions of the states.

Real Estate:

Real estate stands as a primary economic sector in India yet it exists **entirely outside GST jurisdiction**. The tax base under GST **excludes the sale of land and buildings** together with residential

construction which has entered a concessional taxation system. The inclusion of real estate deals under GST would boost both sector compliance and maximize real estate-based revenue contributions to national finances.

To prevent tax avoidance and ensure transparency, a uniform **GST on under-construction projects** should become applicable to all sites with potential benefits for both owners and builders throughout this modification process. Such reform necessitates particular attention to safeguard the **affordability levels** within this sector.

2. Simplification and Rate Unification

The GST system encounters its biggest challenge through the numerous complex tax rate structure. A high number of rates between **5% to 28%** makes the system confusing so it creates difficulties for businesses and consumers while promoting **misclassification** alongside **non-compliance**.

Simplification of Tax Slabs:

A reduced number of **simplified tax slabs** in the rate structure enables businesses to meet compliance requirements more easily and at the same time it decreases administrative costs for tax authorities. Standardization of tax collection and clarification of tax administration would become possible through the implementation of a tax structure that divides essential from non-essential goods. A simplified tax system promotes **broader tax compliance** among small and medium-sized enterprises along with their clients due to lower complexities of the multi-tier system.

A tax policy should apply **zero-rated taxation to essential goods** and **reduced rates for basic services** which protects **common citizens** while **luxuriously priced items** face elevated tax rates. Application of these standards will result in both **efficiency and fairness** of the system.

Uniformity in Classification:

The establishment of explicit classification standards for tax rate purposes should be implemented by India to eliminate product-service disputes under various tax levels. **Regular audits under**

GST regulations together with improved **product coding systems** supported by **automation for classification** will help businesses perform correctly and maintain stable tax applications. The implementation of these measures would significantly lower the number of rate classification controversies between taxpayers.

3. **The GST Council along with dispute redressal mechanisms needs stronger institutional support to develop efficiency in the system.**

The future success and smooth operation of GST depend on having a strong governing structure that was created for this purpose. The GST Council needs improved organizational strength together with robust **dispute redressal mechanisms** in order to properly handle evolving challenges and deliver clear guidance to taxpayers.

GST Council's Role:

Excellence in decision-making applies to the **GST Council** as it serves as the top authority in the GST framework for tax rate and classification choices. The Government needs to make the GST Council more flexible in its operations to address the challenges which emerge as the tax system develops. The GST regime gains valuable information through **continued discussions with industry associations** and **stakeholder representatives** which allows adjustments to **market changes** and **business practices**.

The role of the Council will remain essential if it develops more capabilities for handling problems that span between states and **resolving conflicts**. The Council should obtain authority to simplify its decision-making capabilities for resolving complicated matters involving **dispute settlements** as well as **policy updates**.

Dispute Redressal Mechanisms:

The intricate structure of the GST system resulted in expanding the number of conflicts between taxpaying individuals and tax authorities. **Dispute resolution frameworks** that receive enhanced strength will deliver faster remediation of grievances which will boost the operational effectiveness of GST structure. The GST system can reduce its court-related disputes by adding

pre-litigation settlements and **mediation procedures** that let parties handle smaller disputes outside formal legal proceedings.

The process of dispute resolution becomes faster when **GST appellate tribunals** expand their operations and **digital dispute management platforms** become more accessible to users. The tax authorities need to receive better clarity in **assessment** and **audit guidelines** to reduce the occurrence of initial disputes.

Conclusion

Since its implementation, Goods and Services Tax (GST) constructed a new face for Indian taxation while continuing to advance from the preceding complex tax system. GST has positively impacted **India's financial receipts** through a dual function that **expands tax collections** while **enhancing tax compliance**. Government revenue generation has strengthened via GST because the tax structure unification combined with tax cascade elimination and increased formal taxation broaden the formal tax base and produce a more **transparent and efficient tax system** throughout India.

1. **GST has substantially contributed to India's financial receipts through its dual role in tax collection enhancement and better tax compliance management.**

GST initiated its operation in July 2017 to **strengthen revenue generation** through improved compliance practices which reduced tax evasion and increased the number of taxable entities. The GST system has progressively improved its monetary performance since inception despite facing three major obstacles which include **rate multiplicity** mixed with **structural issues** and **dispute resolution problems**. GST has shown its ability to **transform the formal sector** while improving **transparency** in corporate operations through its operation. The system facilitates uninterrupted **interstate trading** which will produce an **enhanced tax buoyancy** level in future.

GST collection numbers demonstrate steady growth during the period from 2017 to 2024 because the system successfully adjusts to changing economic conditions in India. **Regular tax rate revisions** alongside **service inclusion within the system**

has broadened the size of taxable activities while distributing tax liabilities equally to taxpayers.

2. Overall Effectiveness and Policy Learnings

The implementation of GST brought major changes to tax regulations while its efficiency has developed throughout the years. GST has encountered major **execution problems** (**techie issues, tax avoidance methods, and tax category confusion**) but these issues generated important conclusions about taxation policy for government officials.

GST experience showed the significance of **streamlining tax systems** alongside maintaining **uniform tax prices** which together require strong **compliance and enforcement systems**. To achieve successful adaptation it has proved itself essential to **engage stakeholders** particularly businesses along with small and medium enterprises (SMEs) and state governments.

GST has evolved from being a disputed policy into being an efficient revenue tool which proves that public policy must demonstrate adaptability. The successive updates of the system including **technology advancements** and **dispute settlement processes** prove that GST has developed mechanisms for learning from challenges to enhance its methods.

3. The future potential of GST demonstrates its ability to create a better fiscal situation for India.

In the future, GST presents significant prospects to reinforce the fiscal stability of India. GST improves Indian Government's **financial stability** while providing **equal tax opportunities** that diminish previous burdensome indirect taxes from ordinary citizens. GST can develop an equilibrium revenue system through constant **tax net expansion** which may involve sectors such as fuel, alcohol, and real estate.

Reusing **tax simplification efforts** that combine **unification of tax rates** alongside **expansion of the taxable base** should create an **environment of business friendliness** which supports regular revenue growth. GST processes will achieve better and efficient administration as well as enhanced tax collection accuracy through e-invoicing, AI-driven compliance tools and participating **technological innovations**.

GST will establish itself as the foundation for India to strengthen its **economic condition** while advancing **business expansion** and **international market competitiveness**. A completed GST framework provides **transparency** and welcomes **inclusivity** plus resilience while establishing **economic progress** and **fiscal solid ground**.

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