ISSN 3107-6459 (Online)
ISSN 3107-6440 (Print)

KIJEIS

Volume 01 (Issue 01) | January-June 2025

KISS INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP, INNOVATION AND SUSTAINABILITY (KIJEIS)

A peer reviewed and refereed journal

Centre for Indigenous Innovation and Entrepreneurship

KALINGA INSTITUTE OF SOCIAL SCIENCES

Deemed to be University Bhubaneswar, Odisha, India
(Established U/S 3 of UGC Act, 1956)

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BI-ANNUAL (JANUARY & JULY)

Published by Head, Center for Indigenous Innovation and Entrepreneurship (CIIE), KISS Deemed to be University, Bhubaneswar, India- 751024

Printed at: Print-Tech Offset Pvt. Ltd., Bhubaneswar

Editorial

The *KISS International Journal of Entrepreneurship, Innovation and Sustainability (KIJEIS)*, a peer-reviewed and refereed journal published by KISS Deemed to be University is an initiative to foster cutting-edge research, inspire innovative solutions and promote sustainable practices that empower communities, transform institutions and shape a better future for the world.

We take great pride in launching the inaugural issue of the *KISS International Journal of Entrepreneurship, Innovation and Sustainability (KIJEIS)* brought forth under the inspiring vision of Prof. Achyuta Samanta, Founder KISS and KIIT. Aligned with KISS Deemed to be University's longstanding mission of promoting impactful and inclusive research, *KIJEIS* aspires to become a vibrant platform for scholarly exchange across disciplines- bridging the gaps between theory and practice, between global challenges and local solutions.

KIJEIS emerges at a crucial time when the world seeks sustainable solutions, inclusive innovation and entrepreneurial pathways that uplift communities often left at the margins. This journal aims to inspire new frameworks, challenge dominant paradigms and spark cross-sectoral dialogues. We envision the sections featuring the emerging trends highlighting social innovation labs, green entrepreneurship, circular economy models, digital empowerment of rural communities and regenerative development practices. By connecting global scholarly insights with lived realities, *KIJEIS* is committed to advancing research that is actionable, inclusive and future-focused.

The journal welcomes original research papers, conceptual papers and case studies that address pressing contemporary issues and advance theoretical, empirical and practical oriented knowledge in the field of entrepreneurship, innovation and sustainability. Special attention is given to work that deep dive into the indigenous knowledge system, community-driven initiatives and inclusive development models.

As we embark on this exciting journey, we invite researchers, practitioners and change makers worldwide to join us in shaping a more sustainable, equitable and innovative world. Together, let us redefine the frontiers of entrepreneurship, innovation and sustainability for the benefit of all.

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ISSN 3107-6459 (Online) and ISSN 3107-6440 (Print)

Content

FDI and FII: Drivers of National Sustainability Growth in India

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DOI : https://doi.org/10.65901/KIJEIS.2025.v1i1.5-13

Abstract

Foreign Direct Investment (FDI) and Foreign Institutional Investment (FII) have become crucial components in the economic development of emerging economies, particularly in India. The primary objective of this study is to examine the relationship between FDI, FII, and GDP growth in India over a significant period using time series data. Data will be gathered from the World Development Indicators (WDI), with FDI, FII, and GDP being the central variables for analysis. Preliminary findings suggest that both FDI and FII play vital roles in boosting national growth, but their effects may differ in terms of duration and intensity.

Keywords: FDI, FII, National Growth, GDP, Time Series Analysis

1. Introduction

FDI and FII have played roles in accelerating India's advancement over the past few years (E. Lipsey et al. 2016). FDI involves investments, from companies or individuals in India whereas foreign institutional investment entails investments from entities, such as pension funds, mutual funds, and hedge funds. India has become a spot, for investments with a substantial influx of capital, from investors worldwide (Sahoo 2006). India's appeal has been bolstered by the liberalization that took place in 1991 along, with the reforms that followed making it a sought-after investment location(Desai and Roy 2016). Industries that have attracted direct

investment include services such, as telecommunications and construction as well as sectors, like computer software and hardware and automobiles(Liu and Wang 2003).

2. Review of Literature

Raut Rameshwar babasaheb, (2019)Haruki Murakami always comes up with excellent ideas of surrealistic stories. The Postmodern condition is evident in most of Murakami's novels. A sense of alienation of character and world is evident by a language medium invented to form a kind of rhythmic syntax structure which complements the illustration of the main characters' subconscious fears and paranoia in the course of his exploration of a seemingly chaotic world. His portrayal of characters is unique and significant that expresses the dichotomy of characters who fight between reality and fantasy. Nevertheless, their ambition to be free from the structures that bound them do not always come true. Some of them left their symbolic mechanism to enter another one. In the end, the characters cannot be the Other; as long as they are still in the clutches of a particular token device they would only be able to be the other. His Characters explore themselves in search of meaning of their existence. His characters often utter speeches which directly contradict their subsequent actions.They are male, middle-aged, leading aimless existences. They enjoy preparing and eating such western foods as spaghetti; they love American pop culture, particularly music of the 1960s and 1970s; and they are hedonistic and idle. They either engage in casual love affairs or fantasize about having them. His novels like After dark(2004 deduced that the endowment of foreign institution investment, primarily among firms included in the sensitivity index (Sensex) of the National Stock Exchange. Further this study explored the interplay between foreign institutional investment and firm-specific characteristics in terms of ownership structure, financial performance, and stock performance.

Tarai et al. (2021)GOI-FDI Newsletter (SIA Newsletter explored that FDI is treated as a important developmental tool in Indian context, which support in attaining self-reliance in various sectors and in the all-round upliftment of the economy. In post liberalization the economy to the outside world in 1991, there was a huge in-flow of foreign direct investment.

Sahu et al. (2014) got that the arena of foreign investments and their impact on host countries has received significant attention from researchers due to its growing important in economic development. Foreign investment enhances the financial stability of firms and brings in expertise that can contribute to business efficiency.

Pujari and Mamilla (2022)foreign institutional investments and Index of Industrial Production (IIP revealed that FII and FDI play vital role in the economic

development of a country. These capital flows are domestic saving and the targeted capital formation.

Lakshmy (2014) explore that one of the significant basis triggering the economic development of India has been the emanate competition and accelerated the innovations. As an effect an in-pour of foreign capital has become a standard of economic development. FIIs have become a media of international integration and growth incentive. Foreign capital offers domestic markets with advanced technology, improved and innovation products and services.

Raja Mannar (2018) explain that financial market of India has experienced remarkable fluctuation since the year 2022, the market in India has heightened from a unstable situation to a growth phenomenon, forming a SENSEX point of 5500 in the month of December 2003 to 13,787 in the month of December 2006 in the year 2007 and further in 2013. Due to the stock market has also seen a sharp decline to even less than 8,000 points in 2008.

Karthikeyan and Mohanasundaram (2012) examines the effect of foreign institutional investor (FII) flows on the Indian equity market, especially the Bombay Stock Exchange (BSE), National Stock Exchange (NSE), and S&P CNX 500, OVER A 10-YEAR PERIOD FROM 2001 TO 2010. The study indicates that the performance of the Indian equity market is influenced by other factors beyond FII activity, such as domestic investors, inflation, interest rates, and government policies. India has experienced a significant rise in capital inflows, especially Foreign Institutional investment in equity and derivative since the 1990s. However, FII flows are considered "hot money" due to their volatility, influenced by domestic and global macroeconomics factors. This paper aims to predict daily aggregate FII flow the Indian Capital market.

Tarai and Patra (2020) checked that the intricate relationship among foreign FDI inflows and key macroeconomics indicators like GDP growth and employment generation. Foreign direct investment serves as a formidable driver of economic expansion by channeling capital, forecasting technology transfers, and stimulating competition and innovation. It also impact employment dynamic by creating job opportunities, enhancing skill and generating spill over effect across sectors, thereby bolstering livelihoods and promoting socio-economic inclusivity.

2.1. **Objective**

The prime objective of the study is to examine the long-term and short-term interplay among FDI, FII, and GDP.

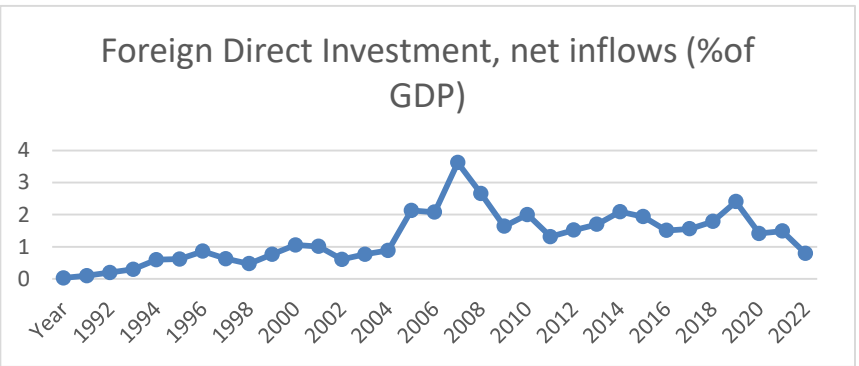
3. Methodology

The current research utilizes a time series econometric technique to evaluate the short-term and long-term links between FDI, FII, and GDP. The Data will be sourced from WDI database over a prolonged time, spanning FDI, FII, and GDP. The analysis will begin with unit root tests (such as the Augmented Dickey-Fuller test) to ensure the variables' stationarity. Next, Johansen co-integration analysis will be performed to assess whether there is a long-term equilibrium connection between FDI, FII, and GDP. For short-term dynamics, the Vector Error Correction Model (VECM) will be used. Granger causality tests will also be carried out to determine the directional relationship between FDI, FII, and GDP. The statistical study will be conducted using EViews software, which will provide insights into the short- and long-term contributions of FDI and FII to India's economic growth.

3.1. Foreign Direct Investment

FDI can be defined as the net inflows of capital intended to acquire a long-term management stake (10 percent or more of voting shares) in a firm that run in a different economy than the investors . It is the total equity capital, earnings reinvested, other long-term capital, and short-term capital, as mentioned by the balance of payments. This data, which GDP splits, explain net inflows (new investment inflows less disinvestment) from foreign investors into the reporting economy.

Figure 1: Foreign Direct Investment (1991-2023)

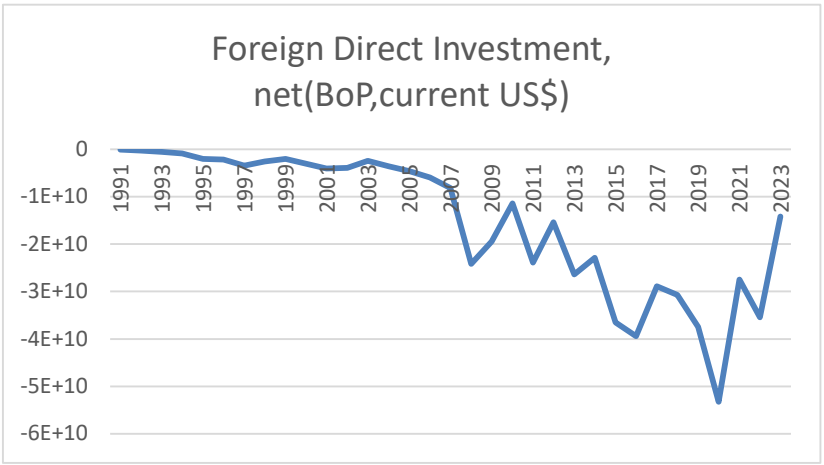


Source: World development Index (WDI)

The net inflows of capital intended to obtain a long-term management stake (10 percent or more of voting shares) in a business that operates in a different foreign direct investment refers to what the investors are referred to as in the economy. It consists of all equity capital moreover short-term, another long-term, and reinvested earnings capital. The sum net FDI is illustrated in the above series. Financial account balances in BPM6 are set on by subtracting the change in liabilities from the change

in assets. Liabilities are net FDI inflows, and assets are net FDI outflows. Current U.S. dollars are utilized for the data.

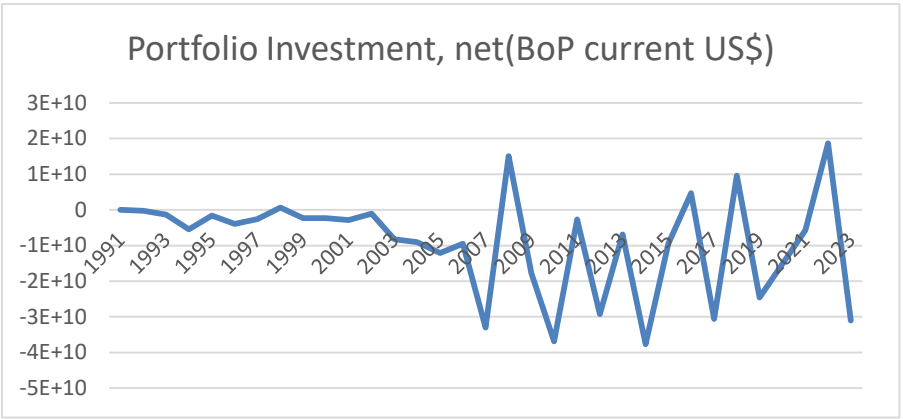
Figure 2: Foreign Direct Investment (1991-2023)



Source: World Development Index (WDI)

Portfolio Investment: Investments in debt and equity instruments are included in a portfolio. Current U.S. dollars are used for data.

Figure 3: Portfolio Investment (1991-2023)



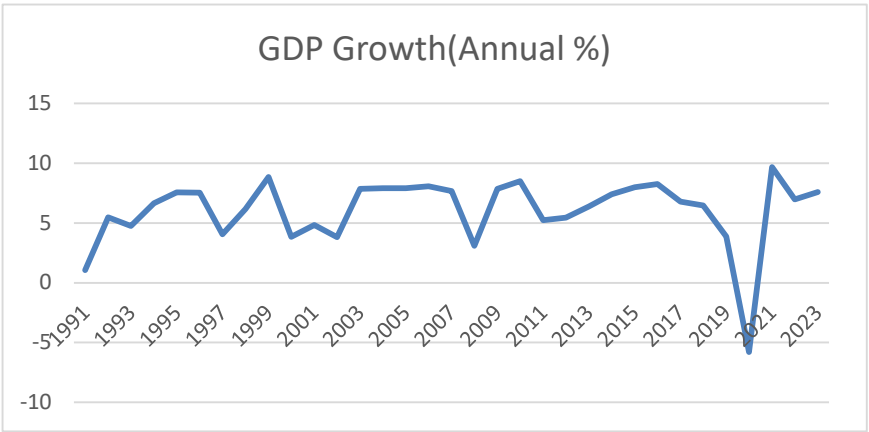
Source: World Development Index (WDI)

3.2. **Gross Domestic Investment**

The yearly percentage rate of GDP growth at market prices expressed in constant local currency. The aggregates are provided in US dollars and are based on constant prices from 2015. GDP is the total gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the

value of the products. It's estimated without taking into account the wear and tear on natural resources or the depreciation created by human assets.

Figure 4: Annual % growth rate of GDP (1991-2023)



Source: World Development Index (WDI)

4. Results

This section summarizes the findings of a time series econometric study undertaken to examine the link between Foreign Direct Investment (FDI), Foreign Institutional Investment (FII), and GDP of India. Two major statistical studies were carried out: co-integration analysis to investigate long-term relationships and a Vector Error Correction Model (VECM) for short-term dynamics. Granger causality tests were also utilised to analyse the directional relationships between FDI, FII, and GDP.

Table 1: Johansen Co-integration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	p-value
None	0.65	45.23	29.68	0.0003
At most 1	0.37	18.78	15.41	0.027
At most 2	0.10	3.56	3.76	0.081

Source: Computed by Authors using Eview Software

The Johansen co-integration test findings, presented in Table 1, reveal the presence of at least one co-integrating vector between FDI, FII, and GDP, implying a long-term equilibrium link between these variables. The trace statistic (45.23) surpasses the crucial value (29.68) at the 5% level, indicating a substantial co-integrating connection. This suggests that, while FDI and FII may fluctuate in the near term, their fluctuations are consistent with long-term growth tendencies in GDP.

Next, in presence of one co-integrating vector lends credence to the concept that FDI and FII together drive GDP development in the long run, and that these factors run in a balanced fashion over course of time. The 2nd row refers that there are no significant vectors beyond the initial co-integrating connection, indicates that the variables have a single long-term equilibrium correlation.

Table 2: VECM Short-Term Dynamics and Error Correction Term

Variables	Coefficient (ECT)	t-Statistic	p-value	Short-term Impact (β)	t-Statistic	p-value
ΔFDI	-0.43	-4.22	0.001	0.12	2.87	0.034
ΔFII	-0.37	-3.76	0.008	0.18	3.14	0.019
ΔGDP	-0.51	-4.98	0.000	0.09	2.56	0.047

Source: Computed by Authors using Eview Software

Table 2 indicates the findings of the VECM, which incorporates short-term dynamics as well as the rate of correction to long-term equilibrium. The error correction term (ECT) coefficients for FDI, FII, and GDP are all negative and statistically significant, implying that when there are deviations from long-term equilibrium, adjustments are made to restore balance.

For FDI, the ECT coefficient of -0.43 implies that nearly 43% of the previous period's disequilibrium is rectified in the present period, implying that FDI returns to its long-term connection with GDP. The short-term coefficient (β) of 0.12 shows a moderate but favourable immediate impact of FDI on GDP. The p-value (0.034) supports the statistical significance of this short-term association.

Similarly, FII's ECT coefficient of -0.37 indicates that around 37% of disequilibrium is rectified each period, which is somewhat slower than FDI. FII has a higher short-term impact (β = 0.18) than FDI, indicating that it contributes more to GDP growth in the near term, despite its volatility. The p-value (0.019) indicates that this link is statistically significant.

For GDP, the error correction coefficient (-0.51) indicates a rapid adjustment toward the long-term equilibrium, with about 51% of any disequilibrium corrected each period. However, the short-term impact of FDI and FII on GDP is smaller (β = 0.09), though still statistically significant with a p-value of 0.047.

Granger Causality Test Results (GCTR)

The GCTR found that FDI causes GDP with a statistically significant p-value, but FII drives GDP to a lower extent. However, GDP did not Granger-cause FDI or FII,

indicating that the direction of effect is predominantly from foreign investments to economic growth, rather than vice versa.

4.1. **Analysis**

The co-integration and VECM results demonstrate the complimentary roles of FDI and FII in fueling India's GDP development. The co-integration study reveals a long-term equilibrium relationship between FDI, FII, and GDP, implying that these variables are interdependent and move together in the long run. This study lends weight to the notion that both types of foreign investment are necessary to sustain national prosperity.

In the near run, the VECM results reveal that, while both FDI and FII contribute favorable to GDP growth, their effects vary in intensity. FII has a high immediate but fluctuating effcet on GDP, owing to its impact in improving the market liquidity and investors' confidence. FDI, on the other aspect, has a high constant and consistent effect since it invests in asset forming, infrastructure development, and industrial expansion.

The outcomes are congruous with prior studies, but they add fresh insights into the unique contributions of FDI and FII when viewed combined. By capturing both long-term and short-term dynamics, this study provides a thorough picture depict of how foreign investments influence Indian economic growth.

The current study emphasis the need of promoting both FDI and FII to support national prosperity. FDI provides coherent, long-term contributions, whereas FII delivers rapid economic stimulus via capital inflows and liquidity. To achieve long-term economic growth, policymakers should pursue balanced plans that attract both forms of investment.

5. Conclusion

The current research focuses on the significance of both FDI and FII in accelerating India's economic growth. In long run co integration of FDI, FII and GDP highlights their ongoing contribution to economic growth. While FDI has a consistent, long-term impact on industrial development and asset creation, FII increases short-term liquidity and investor confidence. Policymakers should implement measures that balance FDI and FII inflows in order to maximize growth, ensure economic stability, and support long-term development. The outcomes offers useful insights into advancing policies for managing foreign investment in India.

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Water for Sustainable Development in India

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DOI : https://doi.org/10.65901/KIJEIS.2025.v1i1.14-25

Abstract

The Sustainable Development Goals provide a roadmap for the world to achieve an equitable and sustainable future. One of the distinguishing characteristics of these goals is that they are interconnected. Harvesting the synergies of these SDGs is critical to Agenda 2030's success. The current study's aim is to examine the role of water as an agent of interconnectedness among the SDGs. It was discovered that access to water is critical and central to reducing poverty (SDG1), eliminating hunger (SDG 2) and malnutrition, achieving good health (SDG 3), reducing inequalities (SDG 10), particularly gender inequality (SDG 5), and achieving quality education (SDG 4). Water has also been found to increase people's income levels, which increases their resilience and adaptive capacity and decreases their vulnerability to shocks (SDG 13). Given this significance and India's continuously deteriorating water situation, the paper recommends that a strong policy initiative be launched to address the nation's rising water woes if India is to sustain its growth progress.

Keywords*:* Water; Sustainable Development; Education; Health; Gender equity; Vulnerability

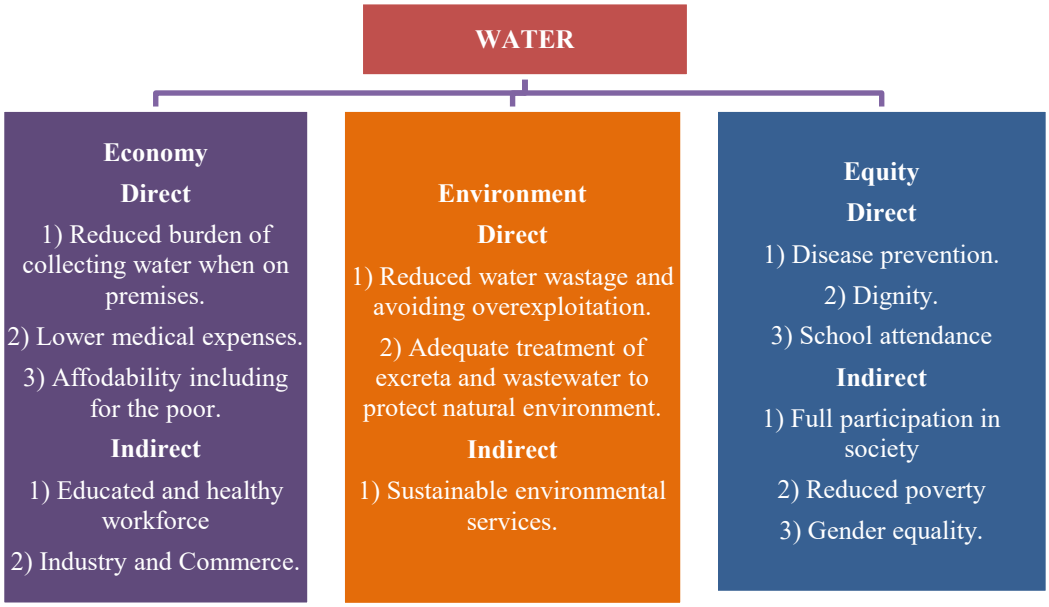
1. **Introduction**

The United Nations' Agenda 2030, launched in 2015, serves as a framework for global progress toward sustainable development (Kroll et al., 2019). The 2030 vision, which consists of 17 goals and 169 targets, focuses not only on economic growth but also on a wide range of development issues that are global challenges, such as eradicating hunger, ending poverty, environmental protection, access to quality health and education, and more (Pedercini et al., 2019; Ramos and Laurenti 2020). With the recognition that the world has entered a new era known as the Anthropocene, i.e., the human-driven age of the planet, and its disastrous impact on the earth's ecosystem, the concept of sustainable development goals expanded the Millennium Development Goals (MDGs) and is primarily based on a triple bottom line approach to human wellbeing (Rey and Sachs, 2012; Janouskova et al., 2016).

The innovative and distinguishing feature of the Sustainable Development Goals is that they were created through an inclusive and comprehensive process, and thus the goals and targets are intertwined (UN 2018). A number of scholars have investigated the interlinkages and synergies between the goals (Breuer et al., 2019; Pradhan, 2019). Association between adaptation to climate change and mitigation (Smith and Olesen, 2010); poverty with health, education, and inequality (Pradhan et al., 2017); good health and well-being with quality education (Ramos and Laurenti 2020); energy with other sustainable development goals (Nerini et al., 2018) have been studied. Research has also shown the association between social and environmental goals (Scherer et al., 2018). Apart from positive relations, trade-offs between sustainable development goals have also been investigated (Lally 2017; Scherer et al., 2018; Fader et al., 2018).

Among these synergies and trade-offs, the association of water with other sustainable development goals is of particular interest. Given the inevitability of water for human survival and development, as well as the proper functioning of the ecosystem (see Figure 1), it is without a doubt that it serves as the planet's central nervous system (UNDP, 2021). Improving access to water, combined with proper wastewater management, reduces the risk of malnutrition and waterborne diseases. It also has a positive impact on education and the economy, which reduces poverty and inequalities. Water security is also a must for agricultural production. Poor irrigation practices are frequently the leading cause of increased soil salinity, which leads to land degradation (UNESCO, 2019). Poor irrigation, coupled with land degradation and a reduction in food production, leads to an increase in hunger, and poverty which might lead to an increase in reliance on foreign aid, which leads to state instability and insecurity, particularly in third-world countries (UNESCO, 2019).

Figure 1: Inter linkage between water and sustainable development



Source: UN 2015

It is owing to the centrality and criticality of water that it has been recognised as a human right (IUCN, 2004). Despite this, as per the recent reports of WHO (2019) 2.2 billion people globally do not have access to safe drinking water. Every year, approximately 297,000 children worldwide die because of diarrhoeal diseases. According to statistics, 11 percent of maternal mortality worldwide is caused by infections that are caused by a lack of proper hygiene due to a lack of water. Globally governments have formulated different policies and management strategies to combat the rising water crisis. Many international water treaties have been signed, but their efficacy is questionable due to political disputes or a lack of proper implementation.

1.1. Development Status of India: A Snapshot

India since liberalization has witnessed considerable growth and development. Figure 2 shows that the country's GDP has almost continuously increased since 1991. The life expectancy of people has increased from 58 years in 1991 to 70 in 2019 (see Figure 3). Although a slight increase in undernourishment is visible from 2018 to 2019, overall, the country has witnessed a decline in prevalence of undernourishment which decreases from 18.4 in 2001 to 15.3 in 2019 (see Figure 4).

Figure 2: Gross Domestic Product (GDP) (current US$)

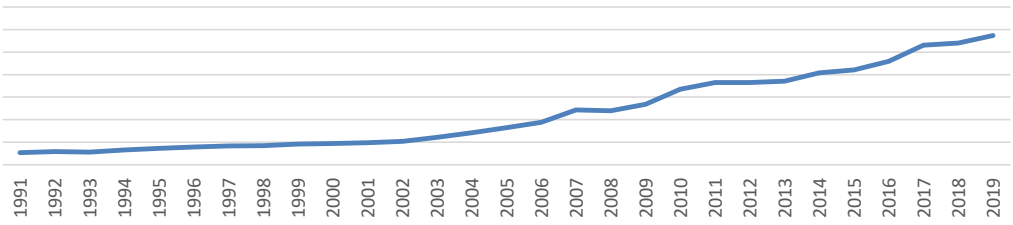


Figure 3: Life expectancy at birth, total (years)

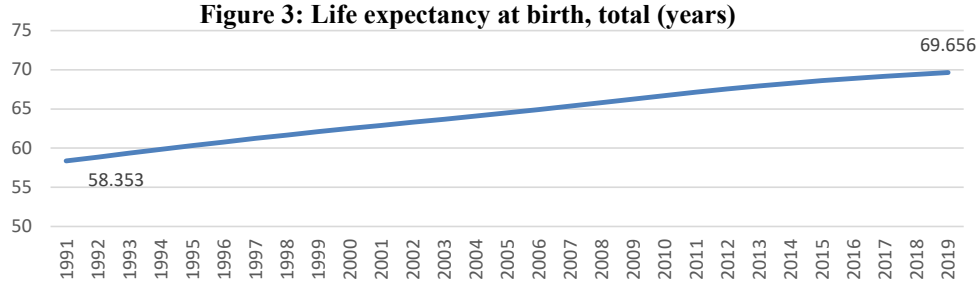
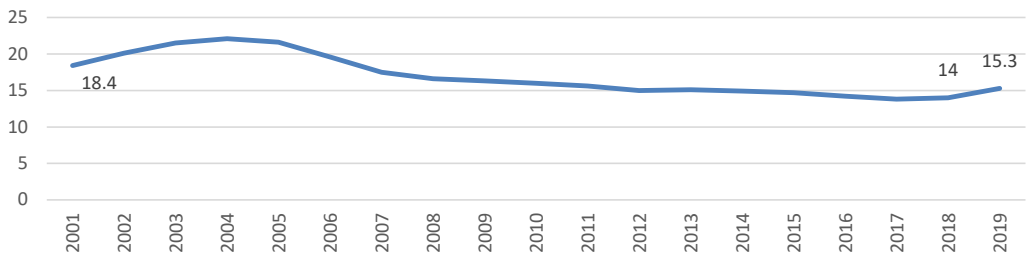


Figure 4: Prevalence of undernourishment (% of population)



Source: The World Bank

Despite being one of the fastest growing economies, the country ranks 131 in the global human development ranking (The Hindu, 2020). Also, due to growing population, increasing urbanization, climate change and changing lifestyle the country's water resources are increasingly becoming stressed. The official report of the government has identified that 256 districts in India have 'critical' or over-exploited groundwater levels (Behal and Behal, 2021). In their study on water poverty trends in India, Pandey et al., (2022) noted that the country's deteriorating environmental and water resource base poses a significant challenge for the country to sustain development in the long run. Although several policies have been implemented by both the state and central governments to curb the water crisis of

the nation yet owing to lack of proper implementation, they have failed to obtain the desired results. Given that climate change will further make the water status worse for the nation, there is a need to understand the central role that water plays in the developmental progress of any region.

The current study is an investigation into existing research on the importance of water for sustainable development. The study is divided into four sections. The first section introduces the topic; the second section gives a brief overview of the development status of India; the third section gives a review of the studies. The final section summarizes the results and discusses the policy implications. It is hoped that the study will shed light on the centrality of water for development and growth, as well as assist policymakers in developing appropriate policies.

2. Literature Review

2.1. Literature Appraisal

Access to water is linked with various dimensions of sustainable development. Within it, the importance of water for achieving zero hunger and food and nutritional security, which is inextricably linked with agricultural production, cannot be overstated. As is widely acknowledged, access to irrigation is a prerequisite to having higher crop intensities, higher yield, and improving total factor productivity (Huang et al., 2006; Hanjra et al., 2009). The growing water scarcity by impacting food production is likely to have a profound impact on food security as was noted by Gulati et al., (2012) in their study on the economy of South Africa. This water-food link was also noted by Evenson and Gollin, (2003) who in their study on the developing countries for the period 1960 to 2000 found that the increase in food production via lowering the food prices has a significant impact on the average calorie intake which result in improvement of health and life expectancy. Hussain and Hanjra (2003) in their comprehensive study on Asia and Africa noted that access to irrigation impacts the poverty level both directly and indirectly. Direct links, according to them, have localized and household-level effects, whereas indirect links have aggregate or national-level effects. Overall, they identified five key dimensions i.e., improved production, enhanced food security employment, income, reduced vulnerability via which access to water contributes to higher growth and improved welfare.

The direct, as well as indirect impacts of access to water in rural areas, were also examined by Berg and Ruben (2006). Using a partial equilibrium and general equilibrium framework, the authors discovered in their study on Ethiopia that access to water for agriculture raises household income and thus reduces their reliance on

public programs that offer food-for-work. The authors emphasized that achieving this is the first step toward a region's long-term development. Furthermore, it was discovered in their study that by increasing the demand for agricultural labor as well as lower food prices because of increased productivity, the spill-over effect of access to irrigation has an impact on non-irrigated households as well. Emphasizing the criticality of agricultural growth for sustained economic growth, Smith (2004) also notes that enhanced access to water for agriculture has significant spill-over effects that can contribute to a rise in growth for the whole economy. He notes that owing to the inter-linkages within the rural economy there will be a multiplier effect of enhanced access to irrigation. In fact, in their paper on the Indian economy, Bhattarai et al., (2007) discovered that over 75 percent of irrigation benefits are spillover, i.e., it is induced effects of irrigation, which have an impact on the service and industrial sectors in addition to the agricultural sector.

Water is also essential for livestock production (Wilkinson, 2003; Mugagga and Nabaasa, 2016), which is critical for the livelihood and income of the rural economy, especially in developing countries. Growing water stress and as a result increase in starvation and animal death (Mugagga and Nabaasa, 2016), will pose serious threats to the livelihoods of billions of people (World Bank, 2022). Besides agriculture and livestock, water also plays an important role in the industrial sector (Dupont and Renzetti, 2001). Bingbing and Manhong (2015) in their study on the significance of water resources for industrial growth in China, found that water shortages have the potential to significantly impede industrial development. Water is also intimately interlinked with energy. Many studies like Siddiqi and Anadon (2011) in the Middle East and North Africa; Rasul (2014) in the Himalayan region of India; Shannak et al., (2018); and Zarei (2020) in Iran, Iraq, and Turkey have explored this water-energy nexus.

Besides these, several empirical pieces of evidence suggest the importance of water for the maintenance of human health. Chen et al., (2021) in their study in North China found that owing to the contamination of groundwater by nitrate, nitrite, and fluoride the people in the study area are highly exposed to noncarcinogenic health risks. Further, in the study, they found that children are more prone to these health risks when compared to both men and women. Similarly, Sarkar and Pal (2021) discovered in their study in the Malda District of West Bengal, India, that high concentrations of arsenic and iron in the region's groundwater are associated with a high risk of health problems. Cha et al., (2015) in their study in Ghana found that improved access to water improves the incidence of diarrheal prevalence by about 11 percent. Water stress is also found to be associated with mental health. Slekiene

and Mosler (2019) in their study in Malawi found a significant relationship between mental health and access to safe drinking water. Similarly, Cuthbertson et al., (2016) in their study in Michigan found that because of the worsening water situation in the region, there is an increase in the prevalence of stress and depression. The authors further found that worsening mental problems are often associated with an increase in the likelihood of alcohol and illicit drug consumption.

Literature has also found water to significantly impact education. Zhang and Xu (2016) in their study in China found that access to quality water increased the likelihood of having higher schooling attainment. They found that people with access to quality water increase their school attainment by around 1.08 years. Further, the study reveals that the effect of water on female educational attainment is much more than on male educational attainment. As previously stated, access to quality water is essential for good health, which significantly improves energy levels as well as mental focus, resulting in an improvement in educational competency, as noted by Alderman et al., (2001) in their study in Pakistan. The link between water and education via the channel of improved health was also explored by Correa et al., (2016). Further in the study, the authors noted that via contributing to health status, access to water enhances household productive capacity and hence income, which will also have an impact on the educational status of the household. In their study in Brazil, the authors discovered that the shorter the distance to a water source, the lower the incidence of diseases and the higher the chances of completing higher education. Like this, Newman et al., (2002) in their study in Bolivia found that improving water infrastructure results in a decrease in drop-outs rates. Using IHDS data Choudhuri and Desai (2021) in their study in India discovered that due to the burden of water collection as well as other drudgery, women of the household have less time to care for their children, which has a significant impact on their educational outcomes. The authors discovered that increasing the distance to fetch water is negatively associated with educational expenses and Math test scores. Even though the impact was found to be significant for both boys and girls, the study discovered that girls are at a greater disadvantage.

Is clear from the previous paragraph that women and girls disproportionately bear the burden of inadequate access to water. This brings us to the next sustainable development goal i.e., gender equity. Geere et al., (2018) observed in their study in South Africa, Ghana, and Vietnam that because women are frequently the water provider of the household, the burden of fetching water usually falls on them, which exacerbates gender inequality by impacting women's education and employment outcomes. Furthermore, the authors discovered that people who reported a history

of water carriage were much more likely to report pain in locations commonly associated with cervical compression syndromes. Similarly, Buor (2004) noted that the traditional obligation of women to be 'water provider' in many regions of the world which result in women walking long distance for fetching water during scarcity have a direct impact on their health. Pouramin et al. (2020) conducted a systematic analysis of the relationship between water and gender in their study. The authors examined 59 studies from around 30 countries. The study concludes that women have less access to clean water and serve as the primary water purveyors, implying that they are frequently exposed to water stress and waterborne toxins, increasing their health risk. The authors believe that improving water access will have a significant impact on women's empowerment and the various targets included in SDG 5.

3. Discussion and Policy Implications

Harvesting the interconnections and synergies of the SDGs is critical to the success of Agenda 2030. This article provides an overview of one of these synergies. Despite not being exhaustive, the review clearly demonstrated that water is at the heart of sustainable development. Water resources permeate every interstice of life. It is critical for good health (SDG 3), food security, abolishing of hunger (SDG2), achievement of quality education (SDG4) as well as, reducing inequalities (SDG 10), particularly gender inequality (SDG 5). Having an immense impact on agriculture as well as industrial productivity, access to sufficient water was found to profoundly impact the income level of the people (SDG 1). This increase in income results in increases in resilience and adaptive capacity and decreases the vulnerability of people to shocks (SDG 13).

With the economic liberalization, India's growth and development parameters have improved significantly. However, the country's water situation is not promising. The nation's water resources are under increasing strain, which will have a negative impact on its future growth prospects. Based on the findings of this study, it is concluded that adequate attention must be paid to the deteriorating water situation and that proper implementation of policies that explicitly address the water problem is required if India is to attain sustainable development goals.

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Regional Inequality in India: An Interstate Analysis

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DOI : https://doi.org/10.65901/KIJEIS.2025.v1i1.26-36

Abstract

The present study is a modest attempt to find out whether regional inequality is widening or narrowing over the years across the states of India. The results are based on the Per-Capita Net State Domestic Product (PCNSDP) at Factor Cost (2011-12 base pries) published by the Central Statistical Office, New Delhi. It is found that regional inequality not only exists across the states in India but also perpetuating over time. This trend needs to be reversed by policy intervention for balanced regional development so as to reduce socio-economic disharmony and ensure successful working of democracy.

***Keywords*:** Regional Inequality, Per Caita Net State Domestic Product, Growth

1. Introduction

Regional inequality and the problems associated with it have become a widely debated topic in the literature of development economics in recent times. Regional inequality has not only distorted allocation of resources but also denied distributive justice leading to disproportionate growth of regions as well as people living within these regions. Countries all over the world and states within it, though in different proportions, have the same kind of experience of having both economically developed as well as less developed regions. The problem is confounded particularly in the developing countries where there are clearly visible inequalities in the rate of economic development among its jurisdictions. Since poverty anywhere is a potential threat to prosperity everywhere, it is in the centre stage of the policy agenda of the countries to minimize regional inequality so as to reduce social disharmony and ensure balanced growth for achieving maximum welfare.

Regional inequality may arise due to Natural and Man-made factors. Natural regional inequality is attributed to unequal distribution of natural resources such as land, water, power, mine, coal, transport, forest and so on. The states which are surrounded by hills, rivers and forests have transport problems that lead to high cost of developmental projects. So the states stay backward than other states which have smooth transportation. The states which are rich in mineral and other natural resources attracts Governments to take decision of locating industries and projects which create employment and other advantages for the residents there . On the other hand the states which are poor in mineral and other natural resources remain backward. Adverse climate, flood, cyclone also play a role for low rate of economic development of different regions and inequality between the regions. Man also has hand for regional inequality of the country. Man creates differences between the region on the basis of social, economic, religious, political and cultural beliefs. Man-made regional inequality means the man or Government put more efforts on the development of some regions by giving adequate subsides, loans, grants and investments while other regions remain neglected. The present study is an exercise to identify and group the Indian states on the basis of the level of their development. The history of economic development provides ample evidence in support of the development and disparity dichotomy. Two forces have been recognized – the forces of convergence and the forces of divergence. The former causes economic activities to disperse among regions, while the latter leads to accumulate economic activities in certain regions and hence to greater disparities between the regions (Myrdal, 1958; Hirschman, 1961; Williamson, 1969). There are, however, a lot of differences of opinions with respect to the relative strength of these two sets of forces.

2. Literature Review

2.1. Theories of development and regional inequality

Self-perpetuation Hypothesis advocated by Hughes in 1961 and empirically verified by Booth in 1964 found that regional inequalities diverge in the process of economic development. With contrast to it Accordion Effect Hypothesis developed by Hanna in1959 and found empirically valid by Hanna in 1959 and Perloff in 1960 suggest that regional inequalities converge as economic development takes off. However, the most widely accepted hypothesis is the Concentration Cycle Hypothesis developed by Myrdal in 1958 supported by Hirschman in 1961, Williamson in 1965 and Alonso in 1968. The hypothesis states that regional disparities diverge initially during earlier stages of development only to converge during later stages.

The empirical validity of the hypothesis is tested by Williamson (1965), Korpeckyz (1972) and Alonso (1980). Williamson confirmed with the help of a cross section study of twenty-four countries that inter-regional disparities tend to diminish in the later stages of development. Korpeckyz and Alonso went a little forward to suggest that the characteristics of economic development describe a bell shaped curve and therefore corroborate the findings of Williamson.

The political economic perspectives on regional development were actually pioneered by of Myrdal (1957) and Hirschman (1958). Myrdal explained the trend of regional inequality in terms of his famous theory of 'Circular and Cumulative Causation'. Myrdal believed that development, for diverse socio-economic and politico-demographic reasons, does not appear in all the regions simultaneously. Rather, it has a tendency to get itself concentrated in certain regions. The growing regions, once the development has started, will attract labour, capital and commodities from the lagging regions by offering higher wages and interest, which will support further growth of these regions. Myrdal has called this as 'backwash effect'. The other facet of Myrdal's model is that ultimately there will be 'spread effect' which will be diffusing the economic momentum from the growing areas to lagging regions in the neighboring areas, thereby stimulating a new cumulative causation process. But the spread effect works, once a country has reached a high average level of economic development. Therefore, in a developing country like India, backwash effect is stronger and outweighs the spread effect. Thus, there is an inherent tendency in the free play of market forces not only to create but also to increase the inequality among the regions. Myrdal's prescription is strong Government intervention in the distribution of economic activity to induce stronger spread effect in order to correct regional disparities.

Similarly, Hirschman explained the process of regional growth through 'Polarisation' and 'Trickle down' effects. He argued that once growth is kick-started, it tends to concentrate around the starting point. Development of growth points produces favourable forces as 'trickling down effects' and unfavorable forces as 'Polarisation effects'. In the early stages of economic development, the polarization effects are stronger than the trickle down effects. As a result, inequality increases. But in the long run, as growth proceeds, the inequality tends to decline and a process of convergence starts. Thus the regional inequality curve is likely to be an inverted 'U' with respect to the level of economic development (Kuznet-1958; Williamson-1965).

The Williamson model of divergence followed by convergence, however, was in direct contradiction to the implications of the Solow growth model where, due to diminishing returns in the leading regions, convergence is

the expected outcome. In other words, a region with low initial per capita income can be expected to grow at a faster rate compared to a region with higher initial average income (Barro and Sala-I-Martin -1995). The idea was initially proposed in an international context, where low-income nations were expected to grow faster than high-income nations . The reverse finding against the Solovian convergence hypothesis with regard to India is found in the empirical study by Ghose, Marjit and Neogi (1998) .

Rosenstein Rodan (1963) in his analysis of rural urban inequalities observed that the path towards greater equality is brought about through growing regional inequality. He was of the view that urban centres and industrialized regions grow much faster compared to the rural and agriculture dominated areas. But the absorption and diffusion effects of growth of the former regions do not crystallize for a long time in the places of development.

Friedman's Centre-Periphery Model (1960) provides a view of the space economy, consisting of rapidly growing central or core region and a slowly growing or stagnant periphery. In his model, core is typically a large metropolitan centre and the periphery is everything outside the core. Core is the warehouse of new ideas, technology, and capital to generate economic and cultural dynamism, The core regions have concentration of economies with high potentials for growth whereas the peripheral regions are characterized by stagnant or declining rural economies. In between core and periphery regions lie growth regions with a considerable growth rate. He was of the view that in the initial stages of economic development. regional disparities increase because growth is concentrated at few centres that act as suction pumps and pull the dynamic elements from other more static regions. He was therefore in support of state intervention to reduce regional inequality and improve distribution of welfare.

Richardson (1973) also attempted to explain the persistence of regional disparities through the working of economic forces. According to him, there are three potential convergence forces.

- The possibility of equilibrating factor flows as predicted by the Neo-Classical model
- The reallocation of resources within regions from low wage sectors to high productive high wage sectors
- High-income natured regions may slowdown future increases in per capita income

However, he says that, there is nothing inevitable about these convergent forces. According to him, the homogeneous characteristics of economic structure, variation in activity structure and uneven distribution of property owners over the regions are the factors, which lead to persistence of regional per capita income differences.

It seems, from the foregoing discussion, that there are three distinct long-term outcomes. One school of thought argues, following only economic principles, that convergence is the most likely outcome. Leftist economists, on the other hand, argue that economic principles are far less important than political conditions under which the economic actions are taken. Given the dependency of third world on first world and periphery on centre, divergence is the only logical outcome. In the middle lies a mix of beliefs and ideologies where, to begin with, divergence is to be expected, followed perhaps by some convergence depending on policy response and state action. Thus, the consensus opinion is that regional disparity is latent at least in the early stages of growth. But there is no time limit for the reversal of this trend. Now the question is whether we should allow this inequality to continue till the natural reversal takes place. This may be possible in the long run, when we are all dead. However, inequality and its perpetuation stand as obstacles to economic development. Hence, there is an urgent need for reversing this trend through well-conceived policies and programmes adopted by the state for speeding up development. The present study is a modest attempt to find out whether regional inequality is widening or narrowing over the years across the states of India.

3. Methodology and data

The present study is based on secondary data, on Per-Capita Net State Domestic Product (PCNSDP) at Factor Cost, collected from the publications of Central Statistical Office, New Delhi. The per-capita income is expressed in 2011-12 base prices for analysing the inequality among the states for the period from 2012-13 to 2017-18. Simple statistical tools like tables, ratios, annual growth rate and rank correlation have been used to analyse the data and elicit the results.

4. Discussion and results

The developed and under-developed states can be identified on the basis of their performance. In this study Per-Capita Net State Domestic Product has been taken as the variable to estimate the regional inequality among the states. Two time periods i.e. 2012-13 and 2017-18 have been taken to check with passing period of times whether the high performing states and low performing state have fared equally well or the former category states have fared better compared to the latter ones.

Table-1 shows 28 states of India, their PCNSDP in 2012-13 and 2017-18 and their average annual growth rate.

It is observed that Goa has the highest PCNSDP followed by Sikkim whereas Bihar has the lowest PCNSDP preceded by Uttar Pradesh. The states having above the average PCNSDP include Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu, Telangana and Uttarakhand. The rest of the states have this figure below the average PCNSDP both at the beginning and end of the study period.

Table 1: Per-capita Net State Domestic product at factor cost (Base Year-2011-12)

States	2012-13	2017-18	Average Annual Growth rate (in%)	States	2012-13	2017-18	Average Annual Growth rate (in%)
Andhra Pradesh	68,865	1,06,864	11.04	Manipur	38,954	48,113	4.70
Arunachal Pradesh	72,820	89,217	4.50	Meghalaya	59,703	61,789	0.70
Assam	41,609	57,099	7.45	Mizoram	60,261	1,05,617	15.05
Bihar	22,201	28,101	5.32	Nagaland	55,482	66,305	3.90
Chhattisgarh	56,777	68,543	4.15	Odisha	50,714	69,864	7.55
Goa	2,20,019	3,37,734	10.70	Punjab	88,915	1,10,834	4.93
Gujarat	96,683	1,44,090	9.81	Rajasthan	58,441	74,453	5.48
Haryana	1,11,780	1,57,649	8.21	Sikkim	1,60,553	2,19,792	7.38
Himachal Pradesh	92,672	1,28,840	7.81	Tamil Nadu	96,890	1,29,328	6.70
Jharkhand	44,176	54,246	4.56	Telangana	92,732	1,32,380	8.55
Karnataka	94,382	1,42,943	10.29	Tripura	50,366	74,637	9.64
Kerala	1,03,551	1,36,364	6.33	Uttar Pradesh	32,908	41,082	4.97
Madhya Pradesh	41,287	55,677	6.97	Uttarakhand	1,06,318	1,47,204	7.69
Maharashtra	1,03,904	1,41,152	7.17	West Bengal	53,157	65,497	4.64
Average					**77,719**	**1,06,979**	**7.53**
Standard Deviation (SD)					**41494.06**	**63573.50**	**10.64**
Co-efficient of variation					**53.39**	**59.42**	**2.26**

Source: Central statistical Office, New Delhi

It is heartening to note that there is a positive growth of PCNSDPG in all the states and the average growth of all the states taken together is estimated to be 7.53 per cent. While some states have grown faster than this average growth rate others are below this rate. The average annual growth rates of the states ranges from 0.7

per cent to 15.05 per cent. Sikkim has the highest growth rate (15.05 per cent) followed by Goa (10.7 per cent). The lowest growth rate is witnessed in the case of Meghalaya (0.7 per cent) preceded by Nagaland (3.9 per cent). While Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Punjab, Tamil Nadu, Tripura and Uttarakhand have this growth rate above the average growth rate, other states have lagged behind. It may be pointed out that two states such as Kerala and Maharashtra those have PCNSDP above the all India average are trailing behind the national average growth rate whereas the reverse is found in the case of Tripura.

The Coefficient of Variation (CV) is calculated to be 53.39 per cent and 59.42 per cent in the year 2012-13 and 2017-18 respectively. The value of CV indicates that the inequality among the states is not only significant but also it is widening over the years.

An attempt is made here to categorise states on the basis of their PCNSDP and their growth performance.

High Income States : State PCNSDP > Average PCNSDP + SD

Upper Middle Income States : Average PCNSDP < State PCNSDPS < Average PCNSDP + SD

Lower Middle Income States : Average PCNSDP - SD < State PCNSDPS < Average PCNSDP

Low Income States : State PCNSDP < Average PCNSDP - SD

The results are presented in Table-2 below

Table 2: Categories of the Indian States

Category	States	
	2012-13	2017-18
High Income Group	Goa, Sikkim	Goa, Sikkim
Upper Middle Income Group	Haryana, Maharastra, Uttarakhand, Kerela, Tamil Nadu, Gujarat, Karnataka, Telengana, Himachal Pradesh, Punjab	Haryana, Uttarakhand, Gujarat, Karnataka, Maharashtra, Kerela, Telengana, Tamil Nadu, Himachal Pradesh, Punjab
Lower Middle Income Group	Arunachal Pradesh, Andra Pradesh, Mizoram, Meghalaya, Rajasthan, Chhatisgarh, Nagaland, West Bengal, Odisha, Tripura, Jharkhand, Assam, Madhya Pradesh, Manipur, Uttar Pradesh	Andra Pradesh, Mizoram, Arunachal Pradesh, Tripura, Rajasthan, Odisha, Chhattisgarh, Nagaland, West Bengal, Meghalaya, Assam, Madhya Pradesh, Jharkhand, Manipur
Low Income Group	Bihar, Uttarpradesh	Bihar, Uttarpradesh

Two States, Goa and Sikkim come under High Income Group and Two States like, Bihar and Uttarpradesh come under Low income group both in year 2012-13 and 2017-18. Ten States, Haryana, Uttarakhand, Gujurat, Karnataka, Maharashtra, Kerela, Telengana, Tamilnadu, Himachal Pradesh, Punjab are in the Middle Income Group(upper) . Rest sixteen states, Arunachal Pradesh, Andra Pradesh, Mizoram, Meghalaya, Rajasthan, Chhatisgarh, Nagaland, West Bengal, Odisha, Tripura, Jharkhand, Assam, Madhya Pradesh, Manipur, Uttar Pradesh comes under Middle Income group (lower). So there is no change in the States in the four Categories during the study period. But the average rate of growth is found to be high among the higher income and Middle Income (Upper) group of states compared to the other states. This has accentuated the regional disparity across the states in India. In order to confirm the above result the ranks of the states on the basis of their PCNSDP and rank correlation coefficient for 2012-13 and 2017-18 is presented in Table-3

Table 3: Rank of the States on the Basis of PCNSDP

States	2012-13	Rank	2017-18	Rank
Andhra Pradesh	68,865	14	1,06,864	13
Arunachal Pradesh	72,820	13	89,217	15
Assam	41,609	24	57,099	23
Bihar	22,201	28	28,101	28
Chhattisgarh	56,777	18	68,543	19
Goa	2,20,019	1	3,37,734	1
Gujarat	96,683	8	1,44,090	5
Haryana	1,11,780	3	1,57,649	3
Himachal Pradesh	92,672	11	1,28,840	11
Jharkhand	44,176	23	54,246	25
Karnataka	94,382	9	1,42,943	6
Kerala	1,03,551	6	1,36,364	8
Madhya Pradesh	41,287	25	55,677	24
Maharashtra	1,03,904	5	1,41,152	7
Manipur	38,954	26	48,113	26
Meghalaya	59,703	16	61,789	22
Mizoram	60,261	15	1,05,617	14
Nagaland	55482	19	66,305	20
Odisha	50,714	21	69,864	18
Punjab	88,915	12	1,10,834	12
Rajasthan	58,441	17	74,453	17
Sikkim	1,60,553	2	2,19,792	2
Tamil Nadu	96,890	7	1,29,328	10

Telangana	92,732	10	1,32,380	9
Tripura	50,366	22	74,637	16
Uttar Pradesh	32,908	27	41,082	27
Uttarakhand	1,06,318	4	1,47,204	4
West Bengal	53,157	20	65,497	21
Rank co-efficient of co-relation			**0.96**	

Though there is no change in the States in the four Categories of the groups but some intra-group changes are noticed in the middle income groups as evident from the change of their ranks. The co-efficient of Rank Correlation of the states is worked out to be 0.96 between 2012-13 and 2017-18 which confirms the fact that the upper income states have grown faster compared to lower income states thereby accentuating regional inequality over the years.

5. Conclusion

It may be construed from the foregoing discussion and results that the regional inequality not only exists across the states in India but also perpetuating over time. This trend needs to be reversed for balanced regional development so as to reduce socio-economic disharmony and ensure successful working of democracy. The low income and lower middle income categories of states need special bailout packages for speeding of their development ethos. Of course flow of funds to these states from the centre is no guarantee to their development activities unless they are provided with a level playing field. They are to be assisted on a sustainable basis till they come up to take-off their own.

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Sustainable Groundnut Profitability in Acidic Soils of Meghalaya through Integrated Nutrient Management

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DOI : https://doi.org/10.65901/KIJEIS.2025.v1i1.37-46

Abstract

Groundnut (*Arachis hypogaea* L.) provides a feasible diversification option for rainfed agriculture in the NEHR, India, yet its productivity is restrained by acidic soils with poor nutrient availability and low fertilizer use efficiency. This study evaluated the impact of nutrient management strategies on yield performance and profitability of groundnut grown in strongly acidic soil conditions in Meghalaya. An experimental trial was conducted in RBD with nine treatments involving combinations of farmyard manure (FYM), *Eupatorium* biomass, biofertilizers (*Rhizobium* and phosphate-solubilizing bacteria), and chemical fertilizers at varying rates which were replicated thrice. Findings demonstrated substantial treatment effects on pod yield and economic returns. Treatment T_9 (FYM @ 2.5 t ha^{-1} + Eupatorium @ 5 t ha^{-1} + 50% RDF + Rhizobium + PSB) recorded significantly higher pod yield, net return and B:C ratio over the remaining treatments followed closely by treatments T_3 (100% RDF) and T_8 (*Eupatorium* + *Rhizobium* + PSB), with B:C ratios of 1.92 and 1.90, respectively. However, B:C ratio was found at par between T_9 (2.11) and T_3 (1.92) but recorded significantly more over the remaining treatments. In contrast, the control and single-input treatments produced statistically lower yields and net returns.

Keywords**:** Groundnut, Acid soils, Integrated nutrient management, Biofertilizers, Eupatorium, Economic analysis, Yield response

1. Introduction

In India, oilseeds ranks as second most important food crops after cereals, that play a vital role in contributing to national economy. Globally, India ranks fifth in oilseed production, covering 12-15% of area and 7-8% in production across the globe. Among the nine oilseeds grown in the country, seven of them have consumable oils (peanut, soybean, rapeseed- mustard, sesame, sunflower, niger and safflower) and remaining 2 are categorised as inedible oils (castor and flax seed). Groundnut, soybean, mustard and oil palm account for around 80% of the edible oils consumed in the country. Of the nine oilseeds cultivated, groundnut (*Arachis hypogaea* L.) stands out because of its dual purpose: oil-rich edible kernels (43.6% oil content) and protein-rich seedcake used for both organic manure and livestock feed (Das *et al*., 2017).

In India, groundnut covers 45% of the total oilseed area and 55% of the production with an mean productivity of 1868 kg ha^{-1} (DOD, 2017). In addition to its market value, peanut also augments soil fertility via biological nitrogen fixation, making it an crucial crop for resource-conserving farming systems.

In the North Eastern Hill (NEH) region, groundnut is a non-traditional but increasingly promising crop. Farmers in Meghalaya, particularly in Ri-Bhoi district, have reported groundnut yields of 3–3.5 t ha^{-1} under short-duration (100–120 days) field demonstrations. Despite its potential, groundnut productivity in the region remains far below the national average due to challenges like strongly acidic soils (pH < 5.5), poor nutrient retention, and low input adoption (Sharma and Singh (2002); Thakuria *et al*., 2016)).

Soils in this region are predominantly *Inceptisols* and *Entisols* with low cation exchange capacity (CEC), high leaching, and phosphorus deficiency. Fertilizer-centric conventional nutrient management practices often result in poor nutrient-use efficiency, low base saturation with low CEC under excess soil acidic conditions (Thakuria *et al*., 2016). Therefore, enhancing the economic profitability of groundnut cultivation demands a shift toward sustainable and integrated input use strategies.

Integrating INM practices by combining inorganic fertilizers with organic manures and biofertilizers appears as a favourable solution to above discussed problems. Integrated nutrient management not only improves yield and nutrient-use efficiency but also improve long-term soil sustainability (Shekhawat *et al.,* 2012). Organic inputs namely, farmyard manure (FYM), Rhizobium, phosphate-solubilizing bacteria (PSB), and locally available weed biomass like Eupatorium odoratum (rich in N, P, K) have shown synergistic benefits in groundnut production under acidic conditions (Mohanty, 2000).

While majority of the research focused on yield enhancement, fewer studies have assessed the Benefit: Cost (B:C) ratio of different INM and inorganic practices that act as an economic indicator which help smallholder farmers undertake informed decisions. This paper aims to evaluate the profitability of various INM combinations in groundnut cultivation under acidic soils of Meghalaya by analysing their impact on gross returns, net returns, and B:C ratio.

2. Literature Review

2.1. Economic and Environmental Benefits

The adoption of INM practices not only improves groundnut productivity but also offers economic and environmental benefits. For instance:

2.1.1. Economic Benefits

INM practices have been shown to increase net returns by 58,447/ha and improve the benefit-cost ratio (B:C) to 3.52 (Datta *et al*., 2001) (Datta *et al*., 2014).

Mahapatra and Dixit (2010) outlined maximum net gains and benefit cost ratio when peanut was augmented with integration of FYM, 75%- RDF, biofertilizer (*Rhizobium*), gypsum and elemental boron (B).

An experiment was conducted in Odisha and results revealed that application of half of the recommended dose of NPK combined with lime and farmyard manure enhnaced income of farmer by 75% over the farmer's traditional practice (Pattanayak *et al.*, 2011).

In a experimental trial carried out at OUAT- Bhubaneswar concluded that basal application of 100% of RDF + 50% of RDN at 30 Days After Sowing along with Farmyard Manure @ 7.5 t ha^{-1} recorded the maximum gains (23274 ha^{-1}) and B:C ratio (1.935) which was comparable with 75% of recommended dose of fertilisers as basal + 75% recommended dose of fertilizer N at 30 DAS with/ without FYM and 100% recommended dose as basal + 50% RDN at 30 DAS without FYM (Patro *et al*., 2012).

2.1.2. Environmental Benefits

Table 1: Comparison of Key Integrated Nutrient Management Practices

Practice	Key Effects	Citation
Lime Application	Improves soil pH, increases nutrient availability, and enhances pod yield	(Lungmuana *et al*., 2023) (Ramesh *et al*., 2014)
Organic Amendments (FYM/PM)	Increases organic carbon, microbial biomass, and available phosphorus	(Ramesh *et al*., 2014) (Hazarika *et al*., 2021)

Practice	Key Effects	Citation
Rhizobium Inoculation	Enhances nitrogen fixation and nutrient uptake	(Singh *et al*., 2013) (Datta *et al*., 2001)
Micronutrient Application	Addresses Zn, B, Mo deficiencies, improves yield and profitability	(Das *et al*., 2023) (Das *et al*., 2001)
Integrated Nutrient Management	Maximizes pod yield, improves seed quality, and enhances profitability	(Singh *et al*., 2013) (Dey *et al*., 2024)

The use of organic amendments and biofertilizers reduces the dependence on chemical fertilizers, mitigates soil degradation, and enhances microbial activity (Ramesh *et al*., 2014; Hazarika *et al*., 2021).

3. Objectives and Hypothesis Development

3.1. Objectives

1. To estimate the influence of nutrient management (INM) practices on pod yield and economic profitability of groundnut under acidic soil conditions of Meghalaya.
2. To assess the benefit: cost (B:C) ratio of different combinations of organic, inorganic, and biofertilizer inputs in groundnut cultivation.
3. To identify the most economically sustainable nutrient management practice suitable for smallholder farmers in the North Eastern Hill (NEH) region.

3.2. Hypotheses

- H_0 (Null Hypothesis): There is no significant difference in B:C ratio and economic returns among the different treatments.
- H_1 (Alternative Hypothesis): INM involving RDF, organic manures, and biofertilizers significantly improves B:C ratio and net returns compared to individual nutrient sources.

4. Materials and Methods

4.1. Experimental Site and Soil Conditions

A field experiment was carried out during *kharif* season at the experimental field of the College of PG Studies (CAU-I), Umiam, Ri-Bhoi district, Meghalaya (25°41′N latitude and 91°54′E longitude, elevation 950 m above MSL). The region falls under the humid subtropical climate of the Eastern Himalayan foothills, receiving over 2500 mm annual rainfall. The soil was strongly acidic (pH 5.2), sandy loam in texture, low in available phosphorus, and deficient in organic carbon and cation exchange capacity.

4.2. Experimental Design and Treatments

The experiment was designed in a Randomized Block Design (RBD) with three replications and nine treatments:

Table 2: Treatment Information

Treatment Code	Description
T_1	Absolute Control
T_2	Seed treatment with Rhizobium +PSB
T_3	100% RDF (20:60:40 kg N P2O5 K2O ha^{-1})
T_4	FYM @ 5 t ha^{-1}
T_5	50% RDF + Rhizobium + PSB
T_6	FYM@2.5 t ha^{-1}+ *Rhizobium*+ PSB
T_7	Eupatorium biomass @10 t ha^{-1}(fresh weight incorporation 10 days before sowing)
T_8	Eupatorium biomass @10 t ha^{-1} (fresh weight) + Rhizobium+ PSB
T_9	FYM @ 2.5 t ha^{-1} + Eupatorium biomass @5 t ha^{-1} + 50% RDF + *Rhizobium* + PSB

All organic manures were applied 15 days before sowing. Seeds were treated with Rhizobium and PSB as per standard protocol. Groundnut (variety: ICGS 76) was sown with a spacing of 30 cm × 10 cm.

4.3. Data Collection

Economic parameters such as cultivation cost, gross returns, net returns, and B:C ratio were calculated:

- Gross Returns (₹/ha) = Pod yield × Market Price
- Net Returns (₹/ha) = Gross Return − Cost of Cultivation
- B:C Ratio = Gross Return ÷ Cost of Cultivation

Pod yield was recorded at harvest and adjusted to 10% moisture. Cost estimates were based on prevailing input prices and labour wages in Meghalaya during the season.

4.4. Statistical Analysis

Analysis of variance (ANOVA) using standard procedures in Randomised Block Design was applied to carry out analysis of data. Significance was tested at the 5% level ($p<0.05$), and mean comparisons were made using the LSD test. The graph was generated using R studio version 2024.12.1.

5. Results and Discussion

5.1. Pod Yield

The pod yield of groundnut was significantly influenced by different nutrient management treatments (Table 3). The highest pod yield (3.15 t ha^{-1}) was recorded under RDF + *Eupatorium* + Rhizobium + PSB (T_9), which was statistically superior to the control ($\mathbf{T_1}$) and all other treatments. This yield advantage can be attributed to the synergistic effects of organic, inorganic, and microbial nutrient sources, which improved nutrient availability and plant uptake.

Treatments T_5 (50% RDF + Rhizobium + PSB) and T_8 Eupatorium biomass @10 t ha^{-1} (fresh weight) + Rhizobium+ PSB) also produced appreciable yields (2.72 and 2.89 t ha^{-1}, respectively), indicating that the integration of FYM with fertilizers and biofertilizers enhances plant vigour and pod development. The sole application of *Eupatorium* (T_7) also performed better than FYM alone (T_4), highlighting its nutrient-rich potential as an alternative organic source.

5.2. Economic Returns

Economic analysis revealed significant differences among treatments with respect to cost of cultivation, gross return, net return, and B:C ratio (Table 4, Fig. 1). T_9 recorded the highest gross return (₹1,01,850 ha^{-1}) and net return (₹71,276 ha^{-1}) with a B:C ratio of 2.11, demonstrating maximum profitability. T_3 (RDF alone) showed a B:C ratio of 1.92, indicating high returns but slightly reduced net profitability due to the exclusive reliance on costly chemical fertilizers. Organic treatments alone (T_2 and T_4) recorded lower B:C ratios (1.33 and 1.47), while the control had the lowest economic output (B:C = 1.09). The results highlighted that while RDF ensures nutrient availability, its combination with organics and biofertilizers enhances resource use efficiency, reduces cost per unit yield, and improves economic sustainability.

5.3. Benefit: Cost Ratio Analysis

The B:C ratio serves as a key economic indicator of input-use efficiency. The superior performance of T_9 reflects not only enhanced productivity but also optimal cost efficiency. The inclusion of *Eupatorium*, a freely available local weed biomass, reduced dependency on expensive farmyard manure and provided a practical solution for regions with low manure availability.

The consistent trend in B:C ratios across integrated treatments affirmed that INM practices—especially those incorporating locally available and biologically active inputs—offer a sustainable pathway for improving profitability under resource-constrained acidic soils.

Table 3: Effect of Different Nutrient Management Practices on Pod Yield (t ha^{-1})

Treatment	Pod Yield (t ha^{-1})	Statistical Grouping
Absolute Control (T_1)	1.15	d
Seed treatment with Rhizobium +PSB (T_2)	1.58	c
100% RDF (20:60:40 kg N P2O5 K2O ha^{-1}) (T_3)	2.91	ab
FYM @ 5 t ha^{-1} (T_4)	1.65	c
50% RDF + Rhizobium + PSB (T_5)	2.72	b
FYM@2.5 t ha^{-1}+ *Rhizobium*+ PSB (T_6)	2.77	b
Eupatorium biomass @10 t ha^{-1} (T_7)	2.84	b
Eupatorium biomass @10 t ha^{-1} (fresh weight) + Rhizobium + Phosphate Solubilising Bacteria (T_8)	2.89	ab
Farm Yard Manure @ 2.5 t ha^{-1} + Eupatorium biomass @5 t ha^{-1} + 50% RDF + *Rhizobium* + PSB (T_9)	**3.15**	**a**

Table 4: Economic Analysis of Treatments

Treatments	Gross Returns (₹/ha)	Net Returns (₹/ha)	Benefit: Cost Ratio
T_1	35,600	8,520	1.09
T_2	48,750	17,300	1.33
T_3	89,410	63,487	1.92
T_4	51,900	21,000	1.47
T_5	84,320	54,930	1.86
T_6	86,010	57,820	1.88
T_7	87,920	59,140	1.89
T_8	89,470	61,110	1.90
T_9	**1,01,850**	**71,276**	**2.11**

Absolute Control (T_1), Seed treatment with Rhizobium +PSB (T_2), 100% RDF (20:60:40 kg N P2O5 K2O ha^{-1}) (T_3), FYM @ 5 t ha^{-1} (T_4), 50% RDF + Rhizobium + PSB (T_5), FYM@2.5 t ha^{-1}+ *Rhizobium*+ PSB (T_6), FYM@2.5 t ha^{-1}+ *Rhizobium*+ PSB (T_6), Eupatorium biomass @10 t ha^{-1} (T_7), Eupatorium biomass @10 t ha^{-1} (fresh weight) + Rhizobium+ PSB (T_8), FYM @ 2.5 t ha^{-1} + Eupatorium biomass @5 t ha^{-1} + 50% RDF + *Rhizobium* + PSB (T_9)

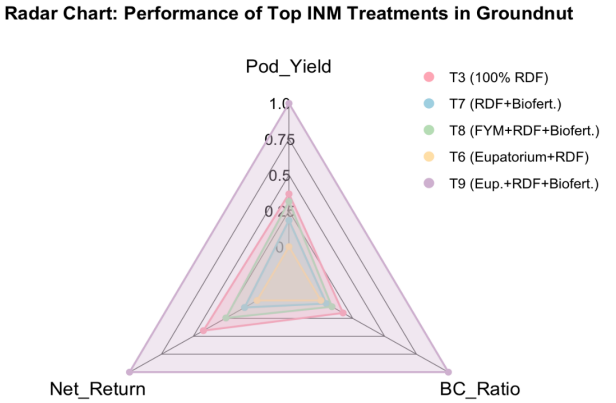

Fig. 1 Radar chart depicting the normalized performance of top five INM treatments in groundnut based on pod yield, net return, and benefit: cost (B:C) ratio. Treatment T_9 (FYM + Eupatorium + 50% RDF + biofertilizers) exhibited the highest overall performance across all indicators, followed by T_3 (100% RDF) and T_8 (FYM + RDF + biofertilizers), highlighting the synergistic benefits of integrating organic and biological inputs with reduced chemical fertilizers under acidic soil conditions.

6. Theoretical and Policy Implications

6.1. Theoretical Implications

This study supports the theory that integrating multiple nutrient sources enhances both crop productivity and economic sustainability, especially in low-input, high-acidity systems. It demonstrates how ecological nutrient management translates into tangible economic benefits.

6.2. Policy Implications

- Incentivizing Local Organic Inputs: Policy frameworks should support training and composting programs using locally available biomass like Eupatorium.
- INM Promotion through Extension: Government and ICAR schemes should integrate INM modules into Krishi Vigyan Kendras (KVKs) and FPO outreach.
- Support for Biofertilizer Adoption: Biofertilizer subsidies and quality assurance mechanisms are needed to promote reliable uptake by smallholders.

7. Conclusion

INM practices significantly improved the profitability of raising peanut in acidic soils. Among nine treatments, T_9 (RDF + *Eupatorium* + Rhizobium + PSB) emerged as the most economically viable and agronomically effective, with the highest B:C ratio and net return. The incorporation of locally available weed biomass as an organic input offers a sustainable pathway to reduce external input costs while improving soil health. These findings reinforce the value of diversified nutritional approach for smallholders in NEH region.

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Innovative Techniques used to Prevent Tax Evasion: A Critical Analysis

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DOI : https://doi.org/10.65901/KIJEIS.2025.v1i1.47-57

Abstract

A tax is a mandatory fee or financial charge levied by any Government upon the public or organization to collect revenue for public works or public benefit. It is a compulsory extraction made by the Government from the public. But the assessed want to save tax because he thinks it is his/her hard-earned money so he wants to save it. Generally, there are two ways to save tax. One is tax avoidance and another is tax evasion. Where the former is legal and as per the provisions of the tax law and the latter is illegal. Tax avoidance is the use of legal mechanisms available in the tax laws to avoid the payment of tax. There are many provisions in the tax law where a person can invest his/her money so that he/she does not have to pay the tax or he/she can avoid the payment of tax. Whereas tax evasion is illegal because in case of tax evasion the method adopted to not to pay tax is not according to law. So, where tax avoidance is legal way but tax evasion leads to fine, penalty and it is a criminal offence also. Tax avoidance is not taken as harmful and illegal because in case of tax avoidance the assessee have to invest his/her money in to some prescribed investment in which the society or country is benefited but in case of tax evasion the assessee have taxable income and he suppress the taxable income either by way of under reporting the sale or over reporting the deductions in which the county loses the amount of tax to be payable. Tax evasion and tax fraud not only defrauds the Government but it also acts an un-level playing field for compliant tax payers. Now days there are various technologies available by adopting which the tax evasion can be prevented or it can be minimized. These technologies help in data recording technology in electronic cash register electronic sales machines and automated reporting and it curbs the tax evasion techniques adopted by the assesses to a great extent. This topic tends to critically analyses the tax evasion and suggest the techniques to be used by Government agencies to prevent tax evasion by the general public.

Keywords: Tax avoidance, Tax evasion, Tax incidence

1. Introduction

Some taxpayers are adamant about not paying their taxes, even though the majority do. Tax evasion and fraud are still a problem, and they can cost many billions of dollars annually. This is illegal, not only because it defrauds the government of tax dollars, but also because it unfairly disadvantages law-abiding taxpayers. There are two specific methods of tax evasion that are being observed by several tax authorities throughout the world: underreporting of income through electronic sales suppression and over reporting of deductions through fake invoicing. The cash economy and the sharing (or internet) economy can help to further promote tax evasion and fraud. Nevertheless, tax authorities can currently use affordable technology solutions to prevent and detect various sorts of tax evasion and tax fraud.

2. Review of literature

Sharma and singh (2007) studied the perception of tax professionals with regard to Indian Income System. They found that presence of incompetent tax collectors were due responsible for high tax evasion in India. The problem arises at the time of tax collection, during which the person or an entity may unlawfully and intentionally avoid tax by not paying it. This act is referred to as tax evasion.

The causes and solutions for tax fraud in India and fraud in the Indian Tax System were investigated by Arora R.S. and Rank Vanita (2010). The main causes of tax evasion in India, according to their argument, are high tax rates, easily bribed tax collectors, social acceptability of tax payment default, a low likelihood that tax evasion will be discovered, and a lack of morals. Another factor contributing to tax evasion in emerging nations is an ineffective tax collecting mechanism.

Dr. Devarajappa (2017) investigated the magnitude of tax fraud in India as well as its effects on government revenue. He discovered that the biggest amount of tax evasion was reported in the years 2008 and 2009, while the least amount was recorded in the years 2002 and 2003. Utilizing legal means to lessen one's financial situation in order to pay less in taxes, particularly income taxes, is known as tax avoidance. Claiming realistic and legal deductions and tax credits usually achieves this. People frequently mix up tax avoidance and evasion.

Stuart P. Green (2009) investigated the psychological and moral implications of tax evasion, as well as the role that an individual's fundamental morality may have played. He discovered that although the public rationalized their reasons for not paying taxes, such as high tax rates and the government's ineffective use of tax dollars, it was still morally wrong to do so.

Vivendra Pal and Laliwadhwa (2012) investigated about tax evasion reasons and they came to the conclusion that the approach to lower the amount of money evaded is through the simplicity of tax legislation and closing of legal loopholes.

Nishant Ravindra Ghuge and Vivek Vasantrao Katdare(2016) contrasted the Indian and Australian tax systems. They concluded that the Indian tax system is woefully deficient and out-of-date, and they recommended a number of steps the Central Government should take to improve it.

Objectives

Objective 1: To discuss the reasons for tax evasion
Objective 2: To prescribe the Technologies that can prevent tax evasion
Objective 3: To outline the other actions those are needed to support to prevent tax evasion.

3. Research Methodology and Analysis

The paper uses the data from the secondary sources such as the research articles of various authors regarding tax evasion and various books available regarding this. Also, the data available in various magazines, e- books, and not the least the data from various sources from the internet also.

Two major sections make up this Topic:

- Automated sales reduction and counter-technology: the issue, important technological solutions, benefits, and costs that have been established, and supplementary steps required to put such solutions into practise;
- False invoicing: the issue, important technological solutions, outcomes, advantages, and supplementary steps required to put such solutions into practise;

Table 1: Examples of Tax evasion and Penalties in India

Some examples of tax evasion and penalties in India	
Tax evasion	Penalties
Non filing of income tax return	Penalty of Rs 5000
Concealing income to avoid tax	100 % to 300% of tax evaded
Not getting accounts audited as per sec 44ab	0.5% of total sales or Rs 150000 whichever is more
Non comliance with tds regulations	Penalty of Rs 10000
Wilful attemt to avoid tax	Minimum imprisonment of six months which can goes up to seven years with fine
Providing incorrect pan	Penalty of Rs 10000
Not providing pan	In this scenario, higher Tds will be deducted. e.g: deductor will deduct 20% Tds instead of 10%.

Source: Income Tax Act1961 as amended by Finance Act 2024

3.1. Electronic Sales Suppression

At its most basic, sales reduction can be as easy as ignoring some cash sales in order to report sales that are less than they actually were and, thus, declare tax liabilities that are less than they actually were. On the other hand, more advanced techniques are now widely used. Sales suppression is being carried out through electronic tools that can alter transactional evidence, whether it was paid for with cash or a card, without leaving any evidence of the alteration, in response to the growing prevalence of technology in businesses and electronic payment methods like debit cards. Utilizing the cash register in learning mode or stopping activities after they have started can also result in under reporting of these transactions. Tax officials cannot calculate the correct tax without accurate data.

In the past, you could easily decrease sales by putting money directly into your pocket or altering the financial records. Through the use of technology, sales suppression is becoming more sophisticated, making it much more difficult for administrations to catch it. Phantom ware and zappers are the two primary electronic sales suppression devices that are employed.

Phantom ware refers to the software that is installed as a component of the sales record. It enables a programme to run on the cash register that can change the reported data. The programme can only be accessed through a secret menu, allowing the company owner to secretly alter the sales data after the sale has taken place.

3.2. Techniques to prevent Sales Suppression

Phantom ware refers to the software that is installed as a component of the sales record. It enables a programme to run on the cash register that can change the reported data. The programme can only be accessed through a secret menu, allowing the company owner to secretly alter the sales data after the sale has taken place.

An online-accessed zapper is an outside programme or gadget that may be connected to the cash register. It may manipulate transaction data when attached to a cash register, serving a similar purpose as phantom ware.

Phantom ware and zappers both provide users the option to completely remove individual sales records and to replace the original sales figures with lower ones, which lowers aggregate sales. The cash register looks to users to work normally since they are disguised, making them difficult to spot by tax auditors.

There are new methods for reducing sales. This technique, often known as “sales suppression as a service,” enables a taxpayer accomplishes sales reduction using a foreign zapper that runs over the internet. The service offers remote hard drive

crashes as well as sales data erasure, modification, and replacement. Since it otherwise seems genuine or doesn't seem to be related to the taxpayer's conduct in any way, this can be exceedingly challenging for the tax authorities to identify. It is sometimes difficult for local authorities to pursue enforcement action since the service providers is located in a foreign country.

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3.3. Features of Techniques

Cash register certification and regulation ensures that only cash registers with the necessary functionality are approved for usage (and do not have any forbidden features that permit sales suppression). Isolating certain market sellers that sell cash registers through licensing is one way to do this. Another option is to enact laws that specify the standards that must be met by cash registers, then leave it to the market to supply the appropriate solutions.

3.4. Data content requirements

It is ensured that the information is helpful to the tax department for verification and for compliance action by prescribing the specifics of what data must be entered and displayed on the purchase receipt.

The amount of the sale, the amount of VAT or sales tax that is owed, the time, date, invoice number, the mode of functioning that the register was in (such as training mode), and the kind of receipt (such as a refund or a non-final bill at a restaurant) are all examples of what is referred to as fiscal data.

Keeping data To prevent tampering or hacking, data must be kept secure and apart from the till in a place that cannot be tampered with. The transaction's place of occurrence should be where the data is kept.

The information can be kept in a "black box" that is an external device that is attached to the cash register, completely housed inside the register itself or the receipt printer (such a microchip or sim card), or connected to and kept in cloud-based solutions.

3.5. Online data accessibility: The tax administration's remote access

The ability of the tax office to access information remotely at any moment discourages taxpayers from subsequently changing records. The tax authority may be able to use the data more effectively for compliance and audit case selection as it is already accessible without the need to send a special request or appear at an on-site audit inspection. This helps tax agencies where data may otherwise be housed abroad, making auditing more difficult.

3.6. Remote access by the tax administration to online data

Taxpayers are discouraged from later changing records when the revenue agency has remote control of the data at any time. Additionally, it enables tax authorities to choose audit cases and perform compliance tasks using the data, which may make these tasks more efficient since the data is already accessible without requiring a special request or an on-site audit check. Additionally, this helps tax authorities in cases when data may normally be kept abroad, making an audit more difficult.

3.7. Data transmission: Reporting to the tax authority

Taxpayers are discouraged from modifying records by the regular data transfer of the documents to the revenue agency since they know the tax administration will have direct data. Real-time or recurrent information exchanges are both acceptable with the tax office. Because online automated transmission requires Ethernet or GSM net access, periodic uploading through mobile internet devices with safe data buffering abilities may be appropriate in locations without stable connectivity, and may even be simpler for the tax authorities in some circumstances. Additionally, it enables the taxing agency to use the data for audit case choice and compliance operations, which may make these processes more efficient because the data is already accessible.

4. Methods adopted to implement solution

4.1. Sending information to the tax department

Regular data transfers of the papers to the revenue department deter taxpayers from making changes to records because they are aware that the department of taxation will have access to direct data. With the tax office, information exchanges that happen often or in real time are both appropriate. Online automatic transmission needs Ethernet or GSM network access, so occasional uploading via mobile internet

devices with secure data buffering capabilities may be suitable in places without consistent connectivity—and in certain cases, it may even make things easier for the tax authorities. Furthermore, it allows the taxation authority to use the data for compliance and audit case selection, which might make these procedures more effective as the data is already available.

4.2. Working with the tax department

It is advantageous to consult and work together with taxpayers and cash register manufacturers when deciding on the right criteria. Govt. should collaborate with the sector to create a set of "quality marks" that serve as indicators of trustworthy cash registers. To get feedback on technological options that might alleviate electronic sales suppression while minimizing the cost on industry, a survey of the public with companies and other stakeholders should be conducted .

4.3. Incentives

Incentives for companies to voluntarily use data-recording equipment, such as improved tax deductions, cost-sharing arrangements, or associations between the usage of compliant cash registers and a lower risk of audit. Examples: When the taxpayer notifies the tax administration that they have put in the necessary gadget, Govt. should offers a specific tax discount. Experience has shown us that even in cases when the government purchases systems that are meant to be utilized, the cost is soon recovered in the money generated.

4.4. Awareness among the customers

Consumers' knowledge of compliance, as in a receipt lottery. As a result, there is a greater public awareness of the hazards of tax evasion and fraud in taxes through the abuse of invoices, and they can serve as an enforcement tool, incentivizing taxpayers to comply. Customers may also receive an additional incentive in the form of a chance to win a prize by entering their receipt into a lottery or accruing points for each receipt they submit.

4.5. Monitoring

Keeping an eye on the adoption of the new technologies. In order to verify that their goods fit the requirements, providers of cash registers may be obligated to submit reports to the tax authorities. Taxpayers may also be required to notify after they have installed the appropriate data recording software device. The tax authorities might then keep a database or register to help with follow-up audits. Anybody in

possession of a cash register should be required to notify the tax department, and each cash register is assigned a specific identification number.

4.6. Enforcement

To discourage and punish both the use and the distribution of sales suppression technology, enforcement measures such as laws and fines for using or supplying electronic sales suppression devices are used.. This has to be backed up by efficient auditing techniques that can spot requirements violations and impose fines.

4.7. False Invoicing

False invoicing aims to misrepresent deductions while sales suppression tactics aim to understate income. False invoices are created to pass off non-deductible personal costs as legal deductions. When a company produces or raises invoices that list the company as the debtor, such practice is known as false invoicing. As a result, it is able to fraudulently claim costs for taxes that it hasn't actually incurred. Although it is theoretically possible for a tax authority to confirm the legitimacy of each invoice by comparing it to the counterparty's records for the transaction, doing so takes time and resources.

5. Technology Solution to curb false invoicing

5.1. Establishing uniform standards

Establishing uniform standards for electronic invoice requirements Quality assurance and simplicity of audit are provided by defining the requirements, such as the content or format, or by certifying the suppliers of electronic invoicing systems. Additionally, it clarifies for businesses the broad adoption of computerized invoicing. When only one uniform format is required, the tax authorities may find it simpler to handle and analyze bulk data automatically.

5.2. Digital receipt signature

Digital receipt signature The transaction's specifics, including the date, time, and transaction amount, are included in the signature as a special identifier. With a compatible key to decipher the signature, the tax authorities may assess whether the receipt is full and genuine. A separate digital signature identification will be produced, leaving a record of the alteration, if the transaction's details is afterwards changed. Therefore, using a digital signature is crucial if you want to be able to authenticate invoices as well.

5.3. Connection of a sales recording device to an electronic invoice

This ensures that the data is appropriately kept and tamper-proof and that the invoices are accurate when they are produced. Information about invoices is provided to the tax authority. The tax authority may be sent the information produced by electronic invoicing. This can be done by requesting the delivery of all invoices or by outlining the necessary summary data. This might happen either periodically or in real time by connecting online to the tax authorities.

6. Other actions needed to implement solution

6.1. Legislation

Legislation mandating electronic invoicing, including penalties for non-compliance. Legislation enabling the tax authorities to obtain data from third parties to match the flow of payments to taxpayers may enable this.

6.2. Tools for online verification.

For instance, the taxpayer must request authorization from the tax office after the transaction has been accepted. The invoice is recognized as legitimate and has financial consequences against third parties if it contains the necessary information. The data is stored in the tax authority's database, which may then be used for verification of other tax reports and collection.

6.3. Record keeping and reporting

The burden of compliance for businesses can be reduced by coordinating the specifications for the structure and content of electronic invoices with other tax record-keeping and reporting requirements or by utilizing them to pre-fill returns. Another strategy that has been employed is to offer protection from tax fines in the case of an audit, providing the company has put the necessary invoicing technology in place.

6.4. Rewards for tax payers

Rewards for taxpayers, such as assistance from software. Examples: The Revenue Agency should provide software to businesses that will enable them to perform electronic billing for business to business transactions. This software will allow operators, particularly micro-small firms, to produce, transmit, and store electronic invoices. The government should offers small enterprises internet accounting software that enables them to record activities and produce ready-made tax reports.

7. Conclusion

Technology may be used to identify and stop tax fraud and tax evasion, and the results speak for themselves. Better crime detection, more revenue collection, and synergies that make tax compliance simpler for businesses and tax administrations are all possible benefits of these technologies. This brief research demonstrates that there are frequently already effective solutions in place, and that many nations are already able to exchange information about their implementation experiences. It is anticipated that this succinct analysis would motivate all nations to think about the dangers in respective taxpayer segments and to use the experiences of others to build on the lessons previously discovered. Although there is no one technology solution that can solve the issue of tax fraud and tax evasion, if used properly, significant progress may be made in high risk sectors. The other essential instruments accessible to tax authorities, including as legislative actions, efficient enforcement, consultation with taxpayers, and international cooperation, should always be used in addition to these options.

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Sentinel-based Crop Discrimination using Temporal Profile for Sustainable Agricultural Production

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DOI : https://doi.org/10.65901/KIJEIS.2025.v1i1.58-64

Abstract

Accurate crop discrimination is essential for agricultural monitoring, yield prediction, and sustainable resource management. This study leverages Sentinel-2 temporal profiles to analyze the phenological behavior of four economically significant crops—rice (*Oryza sativa*), maize (*Zea mays*), cotton (*Gossypium hirsutum*), and red gram (*Cajanus cajan*)—in the semi-arid Jogulamba Gadwal region of Telangana, India, during the 2020–2021 growing season. Using 12-day interval NDVI time-series data, we derived distinct growth patterns for each crop: rice exhibited rapid NDVI rise and fall (peak: 0.8–0.9 at 60–75 days), maize showed a gradual peak (0.8–0.85 at 60–80 days), cotton displayed prolonged high NDVI during boll development (0.7–0.8 for 80–110 days), and red gram had an earlier peak (0.7–0.75 at 50–70 days).

Keywords*:* Sentinel-2, NDVI, temporal profiling, crop phenology, remote sensing, precision agriculture

1. Introduction

Remote sensing has revolutionized agricultural monitoring by enabling the timely and accurate discrimination of crop types, which is essential for food security, yield prediction, and sustainable land management. Sentinel satellites produce high resolution (both temporal and spatial) images at a regular interval making them suitable for studying crop phenology over time. These temporal profiles capture the distinct growth patterns of different crops, allowing for precise classification in diverse and fragmented agricultural landscapes.

2. Literature Review

Some of the economically and nutritionally significant food crops like rice (*Oryza sativa*), maize (*Zea mays*), cotton (*Gossypium hirsutum*), and red gram (*Cajanus cajan*) have distinct phenological cycles that produce unique spectral signatures. Differential variation of spectral and temporal signatures obtained from multispectral Sentinel 2 data reflect differences in planting schedules, growth pattern, and canopy structures. Recent advances in machine learning and time-series analysis have enhanced the classification ability of crops with minimal ground truth data, making large-scale mapping of crop efficient (Zhang *et al*., 2023; Wang *et al*., 2024).

Several findings have concluded the effectiveness of temporal spectral patterns in crop classification. For instance, Ndikumana *et al*. (2023) emphasized the role of normalized difference vegetation index (NDVI) and enhanced vegetation index (EVI) time series in discriminating crops with overlapping growth cycles. Additionally, the integration of synthetic aperture radar (SAR) data from Sentinel-1 has further influenced classification accuracy by supplementing information on crop structure and moisture content (Li *et al*., 2024). Despite these advancements, accurate classification still remained challenging with crops having similar spectral characteristics, such as red gram and maize, particularly in regions with fragmented agricultural fields. This investigation aims to establish a robust methodology for discriminating rice, maize, cotton, and red gram using Sentinel-2 temporal profiles with emphasis on optimization of feature selection for improving classification accuracy.

3. Materials and Methodology

Study Area

The study was conducted in Jogulamba gadwal region of Telangana during 2020-2021, a major agricultural zone known for cultivating rice, maize, cotton, and red gram. The area experiences semi-arid climate with South west monsoon expanding from June to September and irrigation project over Tungabhadra River provides an opportunity for growing various crops with distinct growing seasons, making it suitable for temporal crop discrimination studies.

Data Collection

Satellite Data

Sentinel-2A Multispectral Imagery: Level-2A surface reflectance data (10–60 m resolution) was acquired from the Copernicus Open Access Hub for the crop-growing season. The total of 20 images from June 2020 to January 2021 were

collected. Bands Used: B2 (Blue), B3 (Green), B4 (Red), B8 (NIR), for vegetation indices computation. Images were collected at 12-day intervals to capture key phenological stages.

Ground Truth Data

Field surveys and agricultural records were used to collect reference data. GPS-based crop type labels were obtained for four major crops and sample plots (minimum 50 per crop class).

Preprocessing

The preprocessing of the sentinel data includes the removal of the cloud data and also compositing the according to NDVI feature extraction indices and date wise.

NDVI (Normalized Difference Vegetation Index): (B8−B4)/(B8+B4) (B8−B4)/(B8+B4)

Crop Calander

This act as the ready source for the development of the temporal profile of the crop.

Results and Discussion

Temporal Profiles of Crops: The study analyzed the temporal spectral behavior of rice, maize, cotton, and red gram using Sentinel-2 time-series data. The key observations from the temporal profiles are as follows:

NDVI Trend analysis

NDVI was obtained throughout the crop growth season was monitored for accurate development of each crop temporal profiles. Rice showed the low initial values during transplanting (0.2–0.3). During the rapid increase during vegetative growth (0.6–0.8 by 30–45 days). The peak growth NDVI (0.8–0.9) at the reproductive stage (~60–75 days). Sharp decline during senescence (0.4–0.5 at harvest). The maize being the short duration crop with growth period of 100-110 days which showed increasing trend after sowing (0.3–0.5 in the first 30 days), Peak NDVI (0.8–0.85) at tasseling (~60–80 days). Slower senescence than rice, with NDVI dropping to ~0.5 at maturity. The two long duration crops in the study region are cotton and red gram, with growing season varying from 150 to 180 days. Cotton has slow intial growth and extended peak NDVI (0.7–0.8) during boll development (~80–110 days). Prolonged senescence due to staggered boll opening. Red gram faster initial growth than cotton (0.4–0.6 in 30 days). Moderate peak NDVI (0.7–0.75) during flowering (~50–70 days). Steady decline post-flowering, with NDVI stabilizing at ~0.4 fig:1.

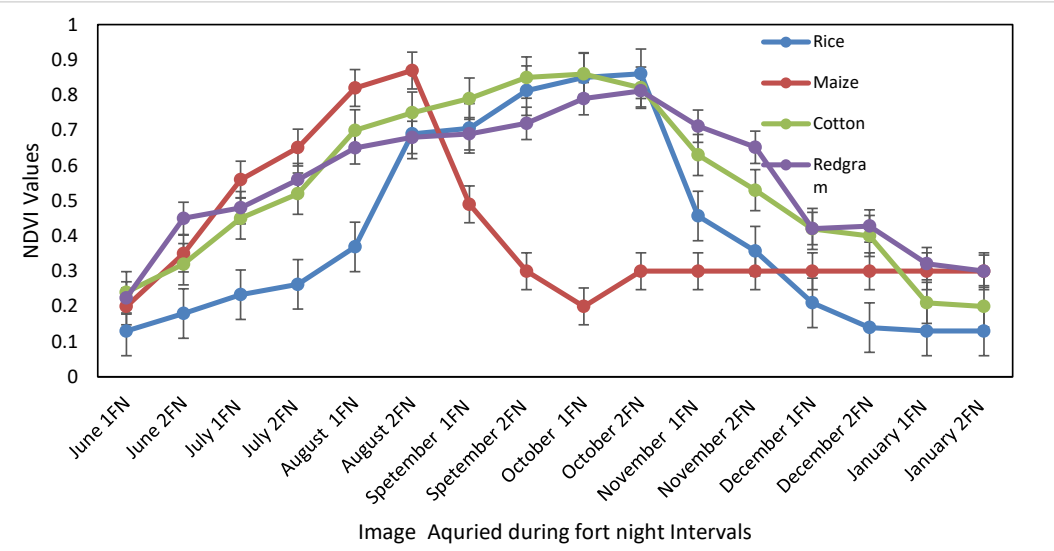

Fig 1: NDVI values for various crops that depict the temporal Profiles.

4. Discussion

The temporal profiles derived from Sentinel-2 data revealed distinct phenological signatures for rice, maize, cotton, and red gram, aligning with established crop growth patterns while providing new insights into their spectral behaviours. Rice exhibited a rapid NDVI increase during the vegetative stage, peaking at 0.8–0.9 around 60–75 days after sowing, followed by a sharp decline during senescence—a pattern consistent with findings by Xiao *et al.* (2022), who noted similar dynamics in irrigated paddy systems. Rice fields showed low SWIR reflectance further confirming its high canopy moisture content, as studied by Son *et al.* (2023) on hyperspectral crop monitoring.

Maize demonstrated a more gradual increase in NDVI with peak values (0.8–0.85) occurring at later stage (60–80 days) during tasselling, aligning with results from Lobell *et al.* (2023) in temperate cropping systems. The EVI index was found particularly useful for early-stage maize detection, minimizing soil/ ground effects—a methodological advantage discussed by Jin *et al.* (2023) while working on crop phenology retrieval. Cotton, in contrast, produced a prolonged plateau in NDVI (0.7–0.8) during boll development stage, reflecting its indeterminate growth habit, as previously documented by Zhou *et al.* (2024). The higher SWIR reflectance in cotton was attributed to lower canopy moisture content, proving a clear spectral distinction from rice, supporting the multi-index approach recommended by Sibanda *et al.* (2023).

Phenology of red gram was marked by an earlier NDVI peak (0.7–0.75 at 50–70 days) and a steady decline during post-flowering, differentiating it from extended growth pattern of cotton. This aligned with Murthy *et al***.** (2023), who reported similar trends in pulses using time seied data of Sentinel-2. The red-edge bands (B5–B7) further enhanced separation during flowering, echoing Delegido *et al***.** (2023)'s findings on the sensitivity of these bands to photosynthetic activity.

Notably, temporal resolution (5-day composites) of the study mitigated cloud-related data gaps, though persistent cloud cover in rice-growing regions during monsoon posed challenges, as noted by Zhang *et al***.** (2024) in Southeast Asian contexts. Future integration of Sentinel-1 SAR data, as demonstrated by Brisco *et al***.** (2023), could improve continuity. Additionally, the influence of mixed cropping systems on pixel purity warrants finer-resolution data, such as PlanetScope, per Yan *et al*. (2023).

These results underscored the viability of temporal signature profiles for discrimination of different crops, advancing methods for non-classification-based monitoring. By leveraging multi-temporal spectral indices, the approach supplements machine learning-driven classification frameworks as proposed by Wang *et al*. (2024), while offering a parsimonious alternative for regions lacking training data. Future work should explore the fusion of thermal and red-edge bands to capture abiotic stress responses, building on AghaKouchak *et al*. (2023)'s drought impact studies.

Limitations and Future Work: Cloud Interference that led to missing data in monsoon seasons affected temporal continuity. Mixed Cropping may lead to fields with intercropping complicated pure pixel extraction. The future recommendation includes integration of optical and microwave imagery and use of high spatial resolution data for small holding farmers.

5. Conclusion

The temporal profiles of rice, maize, cotton, and red gram derived from Sentinel-2 data exhibited unique phenological patterns, enabling discrimination without classification. Key differentiators included:

Declaration of Conflicting Interest

"The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article."

Funding Statement

"This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors."

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Social Entrepreneurship: An Innovative Way for the Transformation and Upliftment of the Society

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DOI : https://doi.org/10.65901/KIJEIS.2025.v1i1.65-74

Abstract

India and the rest of the world are abuzz with talk of social entrepreneurship. People have considered the idea of generosity to be rather appealing. It has the best balance of social responsibility with enterprise, which makes it very alluring and special in its own right. Entrepreneurship is typically associated with commercial pursuits, cutthroat profit-making, and disregard for social advantages or societal well-being. The idea of social entrepreneurship is expanding across the nation as well as across the world, and it has aided in embodying the essence of the capitalist system in the current period of major industrial growth and economic expansion, including India, in a manner that is more significant than ever before. Economic enterprise is more closely associated with economic demands than social enterprise, which focuses more on social requirements. The breadth and importance of social entrepreneurship have increased recently; this paper discusses these subjects. The study article also discusses how social entrepreneurship may impact India's and other developed countries' social structures and social fabric, particularly at the base of the hierarchy.

Keywords: Social entrepreneurship, Innovation, Social needs, social entrepreneurs, economic entrepreneurs

1. Introduction

Entrepreneurship which is the important factor of economic development, is responsible for all of the economic progress we currently enjoy. There are numerous more sorts of entrepreneurship, and they are classified according to various characteristics and standards, one of which is social. This kind of entrepreneurship is particularly distinctive and consists of various mixtures of elements. The main goal of social entrepreneurship differs from the traditional goals of entrepreneurship in that social and economic advantages are included. Social entrepreneurship is frequently used interchangeably with social service or job. Although there are certain similarities, the existence of profits is the main distinction. In social welfare, NGOs or social services workers only concentrate on work that is done for the underprivileged or impoverished; it is done for service rather than profit. Providing innovative and affordable goods and services to the bottom of the market pyramid is what makes social entrepreneurship such a positive phenomena. You might also put it this way: social entrepreneurship is just another form of business with specific characteristics, such as profit-making, selling, and innovation. But the distinction is that it prioritizes social advancement over individual gain and does not entirely depend on or highlight profit-making.

2. Review of Literature

According to Pless (2012), Zahra et al. (2009), and Renko (2013), social entrepreneurs are motivated by a feeling of commitment and moral obligation to assist others.

Ruebottom, (2013), in his study on social entrepreneurs has found by employing a rhetorical style that casts the organization as the protagonist and those who oppose the change as villains, social entrepreneurs achieve credibility for achieving social change .

Bygrave and Minniti (2000), in their study has of the opinion that though all the enterprises serves the society but social enterprise differ from them because it has been created for social value rather than individual financial advantage.

Schramm (2010), in his study described that in case of the commercial enterprises it is very difficult to assess their contribution towards society because they have been created for personal economic benefits of the entrepreneurs. Therefore the role of social enterprises are important because it's aim is to create social change .

Urbano, Toledano, and Soriano (2010), social businesses combine the pursuit of public social benefits with the tools and strategies of for-profit companies. Additionally, they provide benefits both for the society and the enterprise also.

Newbert and Hill (2014),Overall, SE might be viewed as a unique activity with the goal of increasing producer surplus by minimising negative externalities and/or generating positive externalities through the integration of key social and entrepreneurial dimensions .

Mair and Marti (2006), a social enterprise, according to is an organisation which engages itself to the commercial activities but their main aim is to serve the society with the help of the profit they derive from commercial activities.

Objectives

To discuss how the social entrepreneurs help the society by bringing innovation

To analyse how the social entrepreneurs upgrade community facilities

To discuss how they resolve social issues

3. Research Methodology

The paper uses the data from the secondary sources such as the research articles of various authors regarding tax evasion and various books available regarding this. Also the data available in various magazines, e- books, and not the least the data from various sources from the internet also.

4. Meaning and definition of Social Entrepreneurship

One of the major branches of entrepreneurship is social entrepreneurship. More than just charitable giving, it has a profound and significant impact on social transformation and uplift in underdeveloped countries. So that social inequities can be addressed and a perfect society can be realized, the government has begun to heavily encourage social entrepreneurship. Initiatives of a particular type that combine social work with economics are referred to as social entrepreneurs. The fundamental elements of social entrepreneurship are clearly stated in this definition of the term. The followings are the elements of the social entrepreneurship.

1. It is carried out by a unique set of individuals known as social entrepreneurs.
2. It refers to an instance in which a social issue is located and resolved utilizing entrepreneurial principles.
3. Rather than focusing on maximizing individual income, the fundamental goal is to bring about societal transformation.
4. Social enterprise is successful in terms of the intangible social consequences, not the large financial returns.

5. A social enterprise is a business created by social entrepreneurs with a primary focus on social innovations to address current societal issues.

"The practice of identifying and nimbly pursuing chances to provide social value for society is known as social entrepreneurship. Innovative, driven to address social challenges, resourceful, and goal-oriented, social entrepreneurs excel in these areas. They build strategies that optimize their social effect by addressing social inequities and social challenges with a mindset modelled after the greatest thinking in both the corporate and non-profit worlds. These businesspeople work for many different types of organizations, including hybrid, for-profit, non-profit, and large and small businesses. These businesses are referred to as the "social sector."

5. Contributions of Social Entrepreneurs

The social enterprise is useful in countries that are still in developing stage . India, a developing country, faces its own social problems and issues with social development. All of India's socioeconomic inequities can be eliminated through social entrepreneurship. Some start-ups and new businesses have recently been created with the goal of addressing social concerns in a sustainable manner while still making a profit.

The arguments that support the necessity for social enterprise in India and nations like India around the world are as follows. The contributions made by social enterprises in India are listed below.

1. Social enterprise focuses on the weak/deprived sectors of society; in India, there are approximately 27 billion individuals who live in these situations. Therefore, social entrepreneurship is necessary and vital for raising this group of people.
2. Social entrepreneurship prioritizes social good above financial gain. This makes it easier to find top-notch goods and services at reasonable costs.
3. Social entrepreneurship focuses on addressing societal issues like illiteracy, abuse of girl child, finances, health, and access to clean water. By utilizing local resources and employing entrepreneurial concepts, social enterprises help in addressing these social issues.
4. Social entrepreneurship innovates, but this innovation differs somewhat from that of other forms of entrepreneurship. Due of their attention to social issues, this innovation is known as a social innovation..Through innovation the social problems can be answered and this is the key characteristics of social entrepreneurship.

5. Social enterprises are helpful for people of low income groups whose financial and other problems can be tackled with the innovations and effort made by social enterprises.

Social Entrepreneurs in India

1. To foster community development, Zero Miles is constructing multi-utility drinking water centers in Maharashtra.
2. Adhan creates a variety of places out of abandoned shipping containers, including classrooms.
3. Social enterprises can help traditional Indian crafts and art tremendously by giving them access to online and urban marketplaces. Such an initiative brings the kauna crafts of Manipur to the globe through Ziveli.
4. Divya Rawat uses mushroom farming as a strategy to reduce migration and give people in Uttarakhand a means of subsistence. In the state, numerous "ghost villages" are being repopulated thanks in part to this.
5. The Water Maker project, which creates water from nothing, is nothing short of extraordinary in a nation where women frequently have to go great distances to obtain and collect drinking water for their family. It is, to use the words of one appreciative recipient, "khuda ka paani."

Table 1: Social Entrepreneurs and their contributions

Social Entrepreneurs	Contributions
1. Jeroo Bilimoria Founder of Childline	Renowned for her social entrepreneurship, she has garnered support for the nation's social cause from numerous international non-governmental organizations. An initiative of the social enterprise Childline Program was established to assist individuals in India during times of emergency.
2. Ria Sharma Founder of Make Love Not Scars NGO	One of India's most prosperous social entrepreneurs and social crusader is Ria Sharma. The UK-born New Delhi native established the first rehabilitation and therapy clinic for acid attack survivors in the globe after earning her degree from Leeds College of Ark.
3. Urvashi Sahni Founder and CEO of SHEF (Study Hall Education Foundation)	Biography: Urvashi Sahni is an activist and social entrepreneur. SHEF-Study Hall Education Foundation was founded by her, and she serves as its CEO. It is an Ashoka Fellow, Sahni. Underprivileged students who want to study business or engineering are given scholarships by the Study Hall Education Foundation (SHEF), a social enterprise.

4. Karthik Naralasetty Founder and CEO of Redcode Informatics	At Redcode Informatics, Karthik Naralasetty serves as both the CEO and founder. His social entrepreneurship has made a great impact on Indians' lives. Tech startup Redcode Informatics transforms the lives of underprivileged people nationwide by utilizing new technologies.
5. Hanumappa Sudarshan Founder of Vivekananda Girijana Kalyana Kendra	As a credible human rights crusader, Hanumappa Sudarshan is one of India's greatest examples of a social entrepreneur. He was rewarded for his unwavering efforts to reduce poverty among India's impoverished people with.
6. Anshu Gupta Founder of Goonj	Goonj is a social service organization that makes it easier for used goods, such clothing, to be given to low-income households and homeless kids in rural areas. Being raised in a middle-class home, he was aware of the struggles faced by the poor and their ragged clothing. His main goal is to guarantee equitable item redistribution between urban and rural area.
7. Aarushi Batra Founder of Robin Hood Army	She established the volunteer-run Robin Hood Army, which provides unselfish aid to India's underprivileged, destitute, and defenseless. Together with her three like-minded companions, Batra established the Robin Hood Army.
8. Ajaita Shah Founder and CEO of Frontier Markets	As the CEO and founder of Frontier Markets, Ajaita Shah is a well-known female social entrepreneur in India. She is Frontier Innovation's President for the entire country. Her non-profit organizations bring in revenue to support low-income families and orphans around the country.
9. Trilochan Shastry Founder of Association for Democratic Reforms (ADR)	ADR was started by Indian social entrepreneur Trilochan Shastry. Because of his passion for politics, he has authored numerous publications that support democracy and democratic reform all throughout the country. ADR is a nonprofit organization that was founded with the goal of strengthening democracy throughout India by improving openness, accountability, and good governance.
10. Santosh Parulekar Founder of Pipal Tree	The creator of Pipal Tree is Santosh. The company wants to give people in India access to respectable professions and formal training. In rural areas, Pipal Tree continues to empower more than a thousand people. In the coming years, the one-center organization intends to expand its network of training facilities throughout India in order to provide formal instruction to a larger number of individuals

Sources: https://www.founderjar.com/social-entrepreneurs-in-india

6. Features of Social Entrepreneurship

Finding more creative and entrepreneurial solutions to address social concerns and problems is one of the fundamental characteristics of social entrepreneurship. The first step in social entrepreneurship is to identify a problem or deficit in society. From there, the process advances to a methodical analysis of the problem, taking all potential factors into account.

The characteristics of social entrepreneurship that are frequently present include the following:

1. Social entrepreneurship has the ability to accept risk, just like any other field of entrepreneurship. It faces dangers and uncertainties when establishing a social enterprise.
2. Social entrepreneurship also possesses vision and foresight; it recognizes issues and identifies solutions in ways that no one could have predicted.
3. Social entrepreneurship offers leadership and guidance to those involved in social enterprise in order to achieve a common objective.
4. Creativity is the most important and arguably the most distinctive aspect of entrepreneurship, and it also appears in social entrepreneurship. Social entrepreneurship seeks out innovative answers to societal issues.

7. Responsibilities of Social Entrepreneurs towards Society

As was already established, India and other societies like it offer the finest conditions for social enterprise to flourish. With relation to Indian society, the following list of duties and obligations for social entrepreneurs is provided.-

1. Social entrepreneurs have the power to uplift society through their distinctive products or services.
2. Social entrepreneurs in India encounter a number of issues relating to the mindset of people who are unwilling to alter their way of life.
3. Social entrepreneurship relies on social discoveries; the challenge is to develop these innovations in a way that uses the least amount of resources possible to completely solve the social issue.
4. In order to reach the social sectors of the population that lack access to basic amenities, social entrepreneurs must travel to the farthest reaches of the nation. Social entrepreneurs have a duty to connect with these people and provide for their needs.
5. With their own strategies, social entrepreneurs are meant to create jobs as well.

Challenges faced by Social Entrepreneurs in India

Like every other sector of social entrepreneurship, social entrepreneurship has its problems. All of the difficulties are manageable because they can either be controlled or not. The following list includes some of the major difficulties social entrepreneurs in India face:

1. Conflict with social work - Social enterprise is frequently confused with social work in India, making it difficult for it to stand out as a distinct entity there. The first challenge for social business owners is here.
2. The next issue that social entrepreneurship faces is a lack of creativity in coming up with innovative concepts that will both benefit society and generate revenue.
3. Financing arrangements: A problem for Indian entrepreneurs continues to be a shortage of funding.
4. The lack of qualified or committed workers is a very special difficulty that only social enterprise must deal with. Since obtaining social rather than individual rewards is the main goal of social entrepreneurship. It is quite difficult to hire personnel for the company under these circumstances. The key problem of social business is to properly identify and communicate values.
5. Setting and conveying values objectively.

Measures to face Challenges

Without a doubt, social entrepreneurship has numerous difficulties, and these difficulties are escalating with time and societal dynamics. The government must establish some specific councils and organizations for the methodical growth of social entrepreneurship. These are some initiatives or strategies that can be used to address the current issues of social enterprise in India.

1. Several of the institutions are engaged in the promotion of economic entrepreneurship; however, others still need to be made available for social entrepreneurship.
2. Adding a paper or subject on social entrepreneurship to the course syllabus. One of the best ways to raise awareness of social entrepreneurs is to incorporate it in higher education courses.
3. Awareness rising for the general public - Initiatives should be conducted to educate the public about social entrepreneurship so that they do not confuse it with social work. Media, social media, and other platforms can be used for the same purpose.

4. Providing infrastructures and basic amenities - The government and other interested parties must concentrate on providing social entrepreneurship with the necessities.
5. Programs for the growth of social entrepreneurship must be created periodically to support social entrepreneurship, much like programs for the development of entrepreneurship.

8. Findings and Conclusion

India's social landscape can be changed via social entrepreneurship; numerous initiatives and projects that fall under this category have changed the course of local residents' lives. Particularly in India, where social problems are rife, social entrepreneurship has higher chances. A special fusion of entrepreneurial skills and altruism is social entrepreneurship. In social entrepreneurship, goods and services are created to have the greatest possible social impact while also generating sizable profits for the business. The study's findings are as follows:

1. Social entrepreneurship is the greatest way to combine entrepreneurial talents with social service to identify societal problems.
2. Social innovation is a capability of social entrepreneurship. These technologies provide a precise and original solution to the societal concerns and problems that are now plaguing India.

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KISS International Journal of Entrepreneurship, Innovation and Sustainability (KIJEIS)

A peer reviewed and refereed journal

Published by
Centre for Indigenous Innovation and Entrepreneurship (CIIE),
Kalinga Institute of Social Sciences (KISS)
Deemed to be University, Bhubaneswar, Odisha, India

editor.kijeis@kiss.ac.in

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Kalinga Institute of Social Sciences (KISS) Deemed to be University,
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Title	KISS International journal of Entrepreneurship, Innovation and Sustainability (KIJEIS)
Frequency	Bi – Annual
ISSN	ISSN 3107-6459 (Online) and ISSN 3107-6440 (Print)
Publisher	Head, Centre for Indigenous Innovation and Entrepreneurship (CIIE)
Chief Editor	Dr. Snigdharani Panda
Copyright	Kalinga Institute of Social Sciences (KISS) Deemed to be University
Starting Year	2025
Subject	Social Sciences
Language	English
Publication Format	Online / Print
Phone No.	+91 9776246270
Email Id	snigdharani.panda@kiss.ac.in, editor.kijeis@kiss.ac.in
Mobile No.	+91 9776246270
Website	https://university.kiss.ac.in/groups/kiss-international-journal-of-entrepreneurship-innovation-and-sustainability-kijeis/
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