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Message From Executive Editor

It is with immense pleasure and anticipation that we unveil the successive issue of the "**Shodh Samarth-Research Journal of Commerce, Management & Economics**." As the Executive Editor and Dean of Commerce & Management, I am thrilled to welcome you to this scholarly endeavour.

Our primary objective in launching this journal is to create a platform that fosters rigorous research, critical thinking, and innovative ideas in the realms of commerce, management, and economics. The fields of commerce and management are evolving rapidly, and the economic landscape is continually shaped by dynamic forces. In pursuing knowledge, it is crucial to have a dedicated space that not only captures these changes but also contributes to advancing our understanding.

The Shodh Samarth Research Journal aims to be that space—a conduit for intellectual exchange and the dissemination of cutting-edge research. Through the collective efforts of our esteemed contributors and the unwavering support of our editorial team, we aspire to make a meaningful impact on the discourse surrounding commerce, management, and economics.

As we embark on this exciting journey, we extend our heartfelt gratitude to the scholars, researchers, and mentors who have contributed to the establishment of this journal. Your expertise and commitment to advancing knowledge have laid the foundation for a scholarly platform that we hope will become a beacon of excellence.

To our readers, we invite you to explore the diverse and thought-provoking articles within these pages. We hope the research presented here will inspire, challenge, and contribute to your own intellectual pursuits.

Wishing everyone involved in this venture success and fulfilment in their scholarly endeavours. May the *Shodh Samarth-Research Journal of Commerce, Management & Economics* become a catalyst for meaningful dialogue and transformative ideas.

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Message From Editor-in-Chief

Shodh Samarth – Research Journal of Commerce, Management & Economics, is an online journal published by Pt. L.M.S. Campus, Rishikesh, Sri Dev Suman Uttarakhand Vishwavidyalaya, Badshahithaul. It is a bi-lingual journal and will be published twice a year viz, two issues per year. The journal invites manuscripts, papers and articles from areas of Economics, Business Studies, Commerce, Labour studies, environmental issues, Human Resource Management, and many other aspects of importance for the scholars and academicians. The journal will enhance multi-disciplinary researches. The aim of the journal is to bring a common platform for researches from Academicians and research scholars from across India. The research manuscripts, papers and articles will be reviewed and edited as per the UGC norms and the authenticity and originality will be checked. The journal has got ISSN: 3048-6505 (Online) and is indexed in Google Scholar. Soon it will have indexing in Academia.edu, Semantic Scholar, The Directory of Open Access Journal (DOAJ), etc. DOI has also been assigned to the published articles to improve the citation of the published manuscripts, papers and articles.

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IMPACT AND PROPRIETY OF GREEN FINANCE: INDIAN PERSPECTIVE

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Abstract

Requirements of human race and our planet are becoming eventually contradictory. But, serious efforts have also been started for the sake of future sustainability. Infrastructure and projects have been making feasible in terms of environmental issues. Norms for eco-friendly products and buildings are continuously mounting for paving the way towards sustainable economies. As a result of this, the concept of green finance has emerged as an innovative and unique phenomenon. This article underlines the introductory and theoretical background of green finance, policy and regulatory framework and its propriety at both national and international levels. Major initiatives and positive and negative scenarios on green finance have also been discussed by the author. Revisiting of existing literature, reports and data present some sort of improvement in the related field and gradually rising public awareness. Additionally, some suggestions have also been recommended in this attempt along with discussing the future prospects. Improvised pattern of management information system (MIS) and superior synchronization among authorities and stakeholders may lead towards long term sustainable economic escalation of the nation. Operationally sound and economically viable policies and strategies can pave the way for prospective and sustainable cost-effective benefits. In a nutshell, green finance is emerging as an international priority for every economy.

Keywords: Green finance, sustainable development, economic growth, green initiatives and green policies

Introduction

In the name of development, for the last so many years, civilization have been upgrading their technologies without paying due attention towards our natural

resources. Now-a-days, requirements of human race and our planet have become contradictory in nature.

Pollution and over-exploitation of the earth's resources, continuous load of rising population, blind race to increase the numbers of Gross Domestic Product (GDP) and economic growth, destruction of greenery on the cost of industrialization, and so on constitute the modern scenario in almost every country on the globe. But positively, awakened sections of civil society do raise their voices for the conservation of mother earth. Undoubtedly, investment, funds and finance is very much required and play the vital role in the development of economies. Accordingly, the notion of "green finance" has emerged as an innovative and unique phenomenon, over the time.

This article attempts to explain the meaning and highlight the significance of green finance across the globe, to investigate and evaluate the growth and propriety of green finance, especially with Indian perspective, to note down and highlight the major initiatives taken in the related field and to discuss the shortcomings, future prospects and suggestions along with conclusive note.

Conceptual Framework of Green Finance

Definitions and meaning of green finance

On the international platform, there is no accurate and precise definition that is commonly accepted among the experts. The concerned literature contains the few definitions mentioned below:

i. Gao (2009): "Green finance, the term describes a broad range of funding for environment oriented technologies, projects, industries or businesses."

ii. International Finance Corporation, "Green finance is a broad term that can refer to financial investments flowing into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy. Green finance includes climate finance but is not limited to it. It also refers to a wider range of other environmental objectives, for example, industrial pollution control, water sanitation, or biodiversity protection. Mitigation and adaptation finance is specifically related to climate change related activities. Herein, mitigation financial flows refer to investments in projects and programmes that contribute to reducing or avoiding greenhouse gas emissions whereas adaptation financial

flows refer to investments that contribute to reducing the vulnerability of goods and persons to the effects of climate change" (IFC, 2013).

iii. Pricewaterhouse Coopers Consultants, “for the banking sector, green finance is defined as financial products and services, under the consideration of environmental factors throughout the lending decisions making, ex-post monitoring and risk management processes, provided to promote environmentally responsible investments and stimulate low-carbon technologies, projects, industries and businesses" (PWC, 2013).

iv. Lindenberg (2014) mentioned, “Green finance comprises

- the financing of public and private green investments (including preparatory and capital costs) in the areas of environmental goods and services, such as water management or protection of biodiversity and landscapes, and prevention, minimization and compensation of damages to the environment and to the climate, such as energy efficiency or dams,
- the financing of public policies , including operational costs, that encourage the implementation of environmental policies and environmental damage mitigation or adaptation projects and initiatives, for example, feed in tariffs for renewable energies,
- components of the financial system that deal specifically with green investments, such as the Green Climate Fund or financial instruments for green investments, for example green bonds and structured green funds, including their specific legal, economic and institutional framework conditions.”

Dimensions of green finance

Hee (2010) explained, "Dimensions of green finance consist of

- financing green enterprises and technologies
- development of green financial products and green investors
- consideration of environmental risks in lending decisions
- efficient operation of emission trading market."

These dimensions have a great impact on financial industry, environmental improvement and economic growth.

Components of green finance

Besides this, experts opined, "the components of green finance have four categories

i. Retail finance – energy efficiency loans, green loans, green credit cards, green micro finance, etc.
ii. Asset management – green bonds, eco fund, natural disaster bonds, environmental impact bonds, social impact bonds, etc.
iii. Corporate / Investment finance – renewable energy finance, green securitization, climate resilient infrastructure finance, green venture capital fund, green equity, carbon financing, sustainable agriculture finance, biodiversity conservation finance, carbon credits, etc.
iv. Insurance – green insurance, carbon insurance, auto insurance, green projects insurance, etc." (Hohne et al., 2011).

Green Finance Initiatives in the World

- Circular Carbon Economy (CCE): In 2008, for the first time agenda was set in G20 summit. The issue came to light with attention to deal with harmful emissions. Besides this, various non-financial and financial programmes have been launched for environment protection and conservation.
- United Nation's Environment Programme (UNEP): Under the aegis of UN. For implementation of green finance among member countries 'Statement of Commitment by Financial Institutions on Sustainable Development' was started in 2011. Furthermore, Sustainable Stock Exchange was also set up (Ghosh et al., 2021), "it recommends the signatory countries' stock exchanges to come up with stock prices indices that track the stock performance of a set of companies operating in these countries, which are the leaders in recognizing the Environmental, Social and Governance (ESG) principles into their financing aspects. These indices are aimed at guiding investors who are interested in investing in green activities." In accordance, in India, National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) are part of this programme and they have been publishing and issuing ESG data indices and reports separately.
- The central bank of Bangladesh, Bangladesh Bank, mandated the reporting of various activities under Corporate Social Responsibilities (CSR) head for their commercial banks in the year 2008. In addition, "systematic environmental risk

analysis, as part of the credit appraisal, also has been made compulsory by the banks in 2011 extending it to the extension of the norms applicability on Non-Banking Financial Institutions (NBFIs) in 2013" (Umar et al., 2020). In the year 2017 the assessment of social risks was included too to be reported as a part of uniform risk reporting format drafted for the banks.

- France, in 2015, passed a law, namely 'The Energy Transition for Green Growth Law', "making the asset owners and managers responsible to report on how physical and transition risks impact, resulting from their activities and assets, the environmental status. It was aimed with launching of this policy that it would be helpful in linking disclosures to the broader efforts in order to decarbonise the energy sector" (Ghosh et al., 2020).
- United States Agency and Asian Development Bank provide bond guarantees and partial credit facilities to their partner banks and countries for green finance.
- According to Mathews (2013), "in 2006, China initiated the credit restrictions to the companies on the basis of environmental compliances. In 2010, the policy of differential reserve requirement was implemented in Lebanon for the commercial banks, wherein the banks having the larger share of green projects in the loan portfolio were required to hold lesser amount of reserves."
- Kuropka and Korzeniowski (2013) noted, "Brazil, in 2011, mandated the fulfilment of environmental considerations with the banks' Internal Process of Capital Adequacy Assessment through considering their lending exposure to the projects impacting the environmental and social hazards and risks. Furthermore, Brazil developed a system in 2017, wherein the banks are required to outline their risk assessment methods along with their exposure to environmental and social damages into their annual reports. Moreover, the establishment of various green financial institutions has been witnessed in Brazil on continuous basis."
- Similarly, Green Investment Bank was established in 2012 in the United Kingdom (UK) that is fully owned by the UK government.

Policies and Projects on Green Finance in India

Since 2007, the era of putting thrust on green finance was started. Reserve Bank of India (RBI), in December, 2007, passed a notification on "Corporate Social Responsibility, Sustainable Development and Non-financial Reporting – Role of

Banks" (RBI, 2019). It was noted, "in this attempt the importance of climate change and global warming in the context of sustainable development was underlined for the first time. Consequently, the National Action Plan on Climate Change (NAPCC) was formulated in 2008 with a vision to highlight the broad policy framework for justifying the impact of climate change. The Climate Change Finance Unit (CCFU) was created in 2011 within the Ministry of Finance to coordinate with the various institutions working particularly for the green finance in India" (RBI, 2019). Most importantly in 2012 as a major strategic move, the disclosure of sustainability requirements became mandatory. Furthermore, "Security and Exchange Board of India (SEBI) bounded the top 100 listed companies based on market capitalisation at BSE and NSE, to publish business responsibility reports annually since 2012 and it keeps it revising it from time to time. SEBI also issued guidelines, in May 2017, for green bond issuance describing the disclosure requirements. Moreover, the Ministry of Corporate Affairs imposed compulsory reporting of the improvements regarding Corporate Social Responsibilities (CSR) under the Companies Act, 2013" (Ghosh et al., 2021).

Along with the initiatives mentioned above, there are several financial and fiscal incentives currently operative in India. "These incentives have been made in accordance with India's commitments under the Paris Agreement 2015 to lessen the greenhouse gas emission intensity by 33 to 35 per cent and to attain 40 per cent of installed electric power capacity from non-fossil resources by 2030. At present, the Government of India offers subsidy of 30 per cent of the installation cost solar panels installed on rooftop of the residential and institutional buildings" (Ghosh et al., 2020). Additionally, the central government launched the two consecutive phases in 2015 and 2019 of the scheme 'Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME)' particularly for enhancing the smooth credit flows, decreasing the vehicles' purchasing price and creating and establishing the infrastructure for promoting the manufacturing and sale of green automobiles in our country. Besides this, for the purpose of developing excitement and motivation among the public favouring the e-vehicles, several banks have introduced the green car loans with attractions of lower interest rate and longer repayment option. At times, "RBI is undertaking the activities to sensitise the general public, investors and banks regarding the opportunities, need and challenges regarding green finance" (RBI, 2019).

A government-backed agency, Indian Renewable Energy Development Agency (IREDA), has been set up for encouraging clean energy investments. Further, "in May

2016, it was declared as India's first Green bank. Similarly, India Infrastructure Finance Corporation Limited (IIFCL) also initiated a dedicated scheme for financing the feasible green infrastructure projects in India" (Ghosh et al., 2020).

On the front of green lending, "in the year 2015 RBI has extended its coverage to small renewable energy sector under the Priority Sector Lending (PSL) scheme in the form of green finance initiative" (RBI, 2019).

Likewise, green bonds also entered into the picture. "Green bonds are the bonds that are issued by any corporate unit, sovereign entity, inter-governmental groups and their proceeds are invested and utilised for funding environmentally sustainable projects" (Hohne et al., 2011). The data available from Bloomberg depict that since the inception of green bonds in India (2015) the journey is successfully continuing and rising as compared to many developed and emerging economies. In general, the tenure of green bonds ranges from five to less than ten years. Additionally, Indian Railway Finance Corporation Ltd. (2017), Rural Electrification Corporation Limited (2017) and Indian Renewable Energy Development Agency Ltd. (2017, 2019) have issued these bonds containing the maturity time 10 years and above. Another feature of green bonds in India is that approximately 76 per cent of these bonds are denominated in US dollar.

Critical Analysis of Initiatives on Green Finance

As a positive scenario we can witness the rising level of general public awareness in our country. The initiatives, policies, schemes and institutions established and started either in the public or private sector have promoted the discussions and activities among the various social and organisational groups.

However, the negative scenario contains ambiguities and plurality of green lending or green loan definitions, high borrowing costs, wrong and manipulated claims regarding environmental compliances, complicated legal procedures and huge amount of paper work and formalities, lack of proper management information system (MIS) that creates information gaps. Additionally, "in India there are various reporting mechanisms, like perform-achieve trade (PAT) and renewable purchase obligations (RPO), for monitoring green house gas emissions, but it lacks a national measurement, verification and reporting platform particularly to track the growth and progress of climate finance in the country" (Ghosh et al., 2021). Further, scaling up green finance, addressing green washing concerns, improving data quality and transparency in reporting, enhancing

regulatory frameworks, managing climate risks and liabilities, establishing balance between economic and environmental goals, ensuring inclusivity and social equity are some of the major concerns to be looked into deeper. Not only this, our country is benefitted by having large size of domestic market due to a big number of population, but the penetration of green products and instruments has been remain smaller so far.

Future Prospects, Suggestions and Conclusion

Studies have noted and observed (RBI, 2019) that there are vast number of opportunities that remain to be tapped in Indian context like establishing more coordination between environmental policies and green investment and initiatives should be taken to remove hurdles and frictions in the existing policy framework at both state and national levels. Adding to this, green finance consists of vast range of potential opportunities, such as, in the field of renewable energy, sustainable transportation, climate resilient and environment friendly infrastructure, green buildings and urban development, eco-tourism, sustainable forestry and organic agricultural practices, etc. As a result of this, some emerging trends are becoming visible, like, sukuk, green bonds, green fintech, renewable energy finance, circular economy funds, etc.

"Policy measures for developing and strengthening of corporate bond market, making consistency in corporate reporting, removing ambiguities and increasing clarity and standardization of green investment terminology, and lessening information asymmetry between recipients and investors may be some of the steps for addressing the shortcomings of market and framework of green finance in India" (Ghosh et al., 2020). Furthermore, some other approaches can also be adopted in this regard, such as expanding and promoting 'green buildings' that are specially designed to reduce the consumption of energy and water, improve solid waste management system and provide better and healthier living spaces. Distribution and production of renewable and non-conventional energy should be made profitable, particularly for smaller business units. In addition to this, the government at all levels should draft feasible and suitable fiscal incentives policies for appreciating the green projects in our country.

Conclusively, green finance is rapidly emerging as a priority section for private and public sectors as well. In this attempt, the introductory and theoretical background of green finance have been discussed along with policy and regulatory framework at the

national and international levels, propriety of green finance in Indian context has been critically examined and evaluated and some suggestions in this regard have been presented by the author. Review of existing literature and analysis of existing scenario reveal some sort of improvement in green financing options and public awareness in recent years. Improved management information system (MIS) and better coordination among the government and stakeholders may lead towards long term sustainable economic growth of the country. Operationally sound and financially feasible policies and strategies can pave the way for prospective and sustainable economic benefits for India.

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INDIA'S ELECTRONICS & TELECOM SECTOR AND W.T.O: SOME ASPECTS OF CURRENT GLOBAL TRADE SCENARIO

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Abstract

This paper examines the impact of the Information Technology Agreement (ITA) on India's IT sector. The ITA is a Plurilateral agreement, eliminates tariffs on certain IT products. While India initially benefited from ITA-I, it opted out of ITA-II negotiations, fearing that further tariff reductions could harm its domestic electronics manufacturing sector. This decision was motivated by the "Make-in-India" initiative, which aims to boost domestic production. This paper analyse whether India's decision to prioritize domestic manufacturing over international trade liberalization is the best approach to revitalize its electronics sector. The study suggests that participating in the ITA could increase bilateral trade and potentially mitigate trade diversion effects associated with WTO membership.

Keywords: Information Technology Agreement, Bilateral Trade, Make-in-India, ICT sector, Market Access, Plurilateral Agreement.

Introduction

The Information Technology Agreement (ITA) is a trade agreement involving multiple countries worldwide, including India, as signatories. The primary aim of the ITA is to minimize trade barriers and enhance trade benefits, facilitating substantial growth and transformation in the communication and information technology sectors

within domestic markets. From a global perspective, expanding IT trade and addressing certain trade restrictions could lead to significant advancements in technological innovation and manufacturing. However, an important question arises: have the intended objectives and benefits of the ITA been fully realized in developing nations like India? This study proposes a framework for the Indian government to address challenges and enhance mutual benefits under the Information Technology Agreement (ITA). The recommendations include attracting Foreign Direct Investment (FDI), fostering growth in the emerging IT sector, and boosting the manufacturing capacity of India's IT industry. When India entered the ITA, it lacked dominance due to insufficient domestic manufacturing capabilities. However, this proved to be a hidden opportunity. While India did not attract substantial inward FDI, the liberalized IT imports served as a catalyst for the growth of domestic electronics and ICT manufacturing.

India joined the ITA in 1996, recognizing its lack of a robust domestic foundation in electronics production and related manufacturing processes. During the 1990s, India faced a shortage of technological capabilities and struggled to boost domestic production of IT goods and services. Consequently, India opted to lower trade barriers significantly and increase imports of electronic products to stimulate the growth of its domestic IT sector. As a signatory of the ITA, India reduced import taxes and duties on IT goods to almost zero. Consequently, the trade deficit did not hinder growth; instead, it drove innovation within the Indian IT sector over time. According to WTO Secretariat data, between 1999 and 2005, India registered only 26 patents under the ITA compared to China’s 206. This disparity indicates minimal innovation within India’s IT industry. In contrast, China leveraged its strong technological position to produce affordable technology, which not only strengthened its global competitiveness but also impacted India's domestic productivity in IT goods and products.

The Information Technology Agreement (ITA) was established with the aim of reducing trade barriers and speeding up the process of acquiring goods and services from trading nations. As a plurilateral agreement, the ITA allows signatories to adopt its rules voluntarily, and the reduction of trade obstacles is specific to the industry. From a global perspective, lowering trade barriers in IT products and services could foster innovation, as developing countries like India could benefit significantly through increased manufacturing and innovation. However, this potential benefit did not

materialize in India because the country's IT manufacturing sector was not sufficiently developed to see tangible results. Economically, it is important to understand that manufacturing and innovation are closely linked. New ideas, inventions, and innovative concepts can only be realized when there is a strong foundation of manufacturing goods and services—such as printers, 3D models, and utilities—because manufacturing provides a platform to turn ideas and inventions into finished, marketable products. This suggests that when a country's domestic manufacturing is underdeveloped, even the best research and development facilities are of limited use, as there are insufficient manufacturing units to convert research ideas into tangible products. In light of the current needs of the domestic IT sector and the broader economic strategy to strengthen local industries, the decision has been made to refrain from participating in the ongoing ITA expansion negotiations for the time being. This decision also takes into account the concerns and opinions of the Indian IT industry, which has expressed reservations about further commitments under the expanded agreement.

This paper aims to evaluate the costs and benefits of signing ITA-1 and ITA-2 agreements. It emphasizes that while ITA-1 focuses primarily on physical ICT products, ITA-2 encompasses a broader range of items, including many that are not traditionally classified as ICT products. These include consumer goods, electronic transmissions, digital content, and products that can be digitized. Furthermore, ITA-2 extends to products that may not yet have official HS codes but are increasingly integral to digital technologies. It is also important to note that participants of ITA-1 and ITA-2 eliminate tariffs on a Most Favored Nation (MFN) basis, meaning developing countries can access the market fully even without directly participating in these agreements. This underscores the complex trade-offs and considerations for countries evaluating the pros and cons of engaging in the ITA framework.

Objectives and Research Methodology

The primary objective is to raise awareness among developing country exporters about the on going market liberalization in the IT sector. The other objectives are-

- The study aims to empirically analyze the global IT trade and amplify the concerns of IT businesses, particularly from developing countries like India.
- To conduct a study of India's growth in the context of international trade.

- To assess whether reducing tariff barriers will benefit the Indian IT industry, particularly in terms of removing non-tariff barriers.
- To examine what government support is needed to fully leverage the benefits of joining global telecommunication pacts and the ITA.
- To propose some suggestions for collaborative approaches between government, businesses, and the international community to facilitate future IT market access programs.

The Indian Information Technology Sector-

India joined the Information Technology Agreement (ITA) in 1996, five years after its inception. As a late entrant, India faced several disadvantages, including:

1. **Low Manufacturing Rates Compared to China**: Despite hosting numerous multinational companies, India struggled with limited technological advancement and high manufacturing costs. As a result, many of these companies opted to sell their finished products within India rather than investing in domestic manufacturing operations.
2. **Cost Disadvantages**: The Indian electronics and ICT industries experienced significant financial setbacks due to higher production costs. These cost disadvantages hampered investments in critical areas such as plant and machinery, technological integration, and the enhancement of production and manufacturing capabilities.
3. **Rising Demand**: The ITA's reduction of trade barriers has led to a surge in imports of IT products, while domestic production has lagged significantly. This liberalization of information and telecommunication services created a growing demand for IT goods and services, but the local manufacturing sector has struggled to meet this demand. As a result, excessive reliance on imports has contributed to India's fiscal trade deficit.
4. . **Intensified Competition**: Multinational companies' strategy of manufacturing in countries like China and selling their products in India has heightened competition for domestic firms. This has forced Indian companies to compete with multinationals offering lower-priced goods. Consequently, manufacturing has largely shifted to China, while India has primarily become a consumer market for these imported goods.

In terms of innovation, India faces several fundamental issues and challenges. Despite having a highly skilled and well-trained pool of IT professionals, their talent and expertise are not fully utilized. The research and development efforts of these professionals often fail to translate into finished products due to a lack of sufficient technological capabilities. This gap significantly hampers India's ability to convert innovative ideas into tangible outcomes, limiting the growth of its IT and manufacturing sectors.

WTO Scope of Coverage

Agreement on Agriculture (AoA)

The AoA points to form a reasonable, market-oriented rural exchange framework, centering on household bolster, trade appropriations, and advertise get to. It improves GATT rules, bolsters country economies with negligible exchange twists, and awards exclusions to slightest created nations from decrease commitments. The understanding too addresses non-trade issues like nourishment security and natural concerns, giving extraordinary treatment for creating countries. It covers a wide run of items, counting staple commodities (e.g., wheat, drain, live creatures), prepared products (e.g., bread, butter, meat, chocolates), and a few non-food things, in spite of the fact that fisheries are prohibited.

Non-Agricultural Market Access (NAMA)

NAMA negotiations, part of the 2001 Doha Round, address industrial products and aim to reduce or eliminate tariffs and non-tariff barriers. Key sectors include marine products, chemicals, textiles, electronics, and automobiles. NAMA negotiations focus on tariff reductions, with some "unbound" tariffs (without binding commitments). For instance, India left more than 31% of its NAMA (Non-Agricultural Market Access) tariff lines unbound. Discussions also focused on lowering high tariffs and tariff peaks, with the Swiss Formula suggesting deeper cuts for developed countries compared to developing ones.

General Agreement on Trade in Services (GATS)-

The General Agreement on Trade in Services (GATS), established during the Uruguay Round, parallels GATT but focuses on services rather than goodsIts objective is to create global trade rules for services, ensuring equal treatment for all countries, promoting economic growth through policy commitments, and encouraging gradual liberalization to facilitate international trade and development. GATS encompasses all service sectors, with two exceptions: services provided under governmental authority (Article 1(3)) and measures related to air transport services, as specified in the Annex on Air Transport Services, which covers issues such as air traffic rights and associated services.

Trade-Related Aspects of Intellectual Property Rights (TRIPS)–

The TRIPS Agreement: It promotes trade in knowledge and creativity by addressing intellectual property (IP) disputes. It offers flexibility for WTO members to achieve their domestic policy goals while establishing minimum standards for IP protection. TRIPS covers seven types of IP rights: copyright, trademarks, geographical indications, industrial designs, patents, integrated circuits, and undisclosed information (trade secrets).

Plurilateral Trade Agreements: Plurilateral Trade Agreements include particular bunches of nations and incorporate the Understanding on Exchange in Gracious Airplane, the Understanding on Government Acquirement, the Universal Dairy Understanding, and the Universal Bovine Meat Assention.

Anti- Dumping, Subsidies, Safeguards: The WTO Anti-Dumping Assention (ADA) sets out controls to address "dumping," a hone where outside products are sold at misleadingly moo costs in a showcase, undermining reasonable competition. It sets guidelines for countermeasures, such as additional import duties, to protect domestic industries from harm.

The WTO Agreement on Subsidies and Countervailing Measures governs the use of subsidies, distinguishing between those that distort trade (prohibited) and those that are actionable, allowing countervailing actions if they harm domestic producers. It also includes provisions for investigations, exemptions, and special provisions for developing countries. WTO members can impose "safeguard" measures to temporarily

restrict imports if a sudden surge harms domestic industries. These measures must be transparent, follow established rules, and be aimed at remedying the injury. Affected exporting countries are entitled to compensation, and retaliation is restricted.

The Information Technology Agreement (ITA) is a plurilateral agreement accord aimed at the gradual elimination of tariffs on a range of advanced technological products, including computers, semiconductors, scientific instruments, telecommunications devices, and most components and accessories associated with these items. The parts that follow provide more specific provisions.

. **Dispute Settlement Mechanism (DSM)**

When one member government feels that another's activities are unfair or against WTO agreements, disputes in international trade often result. With one of the world's most active and successful international dispute resolution systems, the WTO plays a crucial role in resolving these conflicts. Ms. Shailja Singh, Consultant at CRIT, has underlined that the WTO's Dispute Settlement Mechanism (DSM) is considered its "Crown Jewel." The DSM looks for a "positive solution" to conflicts, preferably through solutions that are accepted by both parties (Article 3.7 DSU). Parties may turn to panel or appeal procedures or take alternative conflict resolution techniques into consideration if this strategy doesn't work. These disagreements are handled by the General Council, which is the Dispute Settlement Body.

Global Electronics Sector Trends

Among the businesses with the speediest rates of development in worldwide commerce are gadgets fabricating, ICT, and broadcast communications. By FY 2028, around the world buyer hardware income is anticipated to reach USD 1,177 billion, extending its advertise share from 7% to 8%, agreeing to Dr. Pritam Banerjee, Head and Teacher (CWS) The market for the Internet of Things (IoT), which brought in USD 970 billion in 2023, is predicted to grow from 2% to 3% by 2028, reaching USD 2,205 billion. Dr. Banerjee also pointed out that while India is the third-largest consumer electronics market, it holds only a 2% share in global trade. India remains a primarily importing economy in the electronics sector with limited exports, and none of its firms lead in exports within the electronics or IoT fields. The dominant exporters in this sector

are companies from the US, China, and several European countries like France, Germany, and Japan. Dr. Banerjee attributed India's reliance on imports to the unliberated economies of scale in the domestic market and various challenges faced by the Indian electronics manufacturing industry, particularly in Electronics Systems Design and Manufacturing (ESDM).

Cost Differential: India faces a cost gap of up to 20% compared to China and Vietnam, which hampers its manufacturing competitiveness, particularly in sectors like mobile phone production.

Tax Structure and Duties: India's tall charges and moment substitution laws may dishearten outside producers from setting up operations there. To advance both purport substitution and the integration of worldwide esteem chains for development, a more adjusted technique is required.

Absence of Component Ecosystem: India is intensely subordinate on imports, which raises costs, due to the country's frail inborn component biological system. This dependence limits India's capacity to make essential components locally, especially in zones where low-cost labor may be utilized.

Ease of Doing Business: is hindered by inadequate development of industrial land, leading to increased delays and costs. Furthermore, the protracted compliance processes and a limited number of free trade agreements in comparison to China and Vietnam complicate business operations significantly.

Government Incentive Scheme: scheme may be inaccessible for small and medium enterprises due to stringent eligibility requirements and incentives tied to sales performance. A more adaptable PLI framework is essential to provide support for a broader spectrum of manufacturers.

Delving into the Details of Information Technology Agreement:

At the Singapore Ministerial Conference on December 13, 1996, a sector-specific plurilateral agreement known as the Information Technology Agreement (ITA), formerly known as ITA-1, was reached. Tariffs on a range of information technology products (ITA items) were to be removed. After being signed by 29 nations

at first, ITA-1 grew to include 82 parties, including India. At the 2015 Nairobi Ministerial Conference, a revised version known as ITA-II (or ITA-E) was finalized and signed by 25 countries, including important nations like China, the US, and the EU. India is notably not a signatory to ITA-II, which now has 54 participants. The ITA remains one of the most important tariff liberalization agreements established under the WTO since its inception in 1995. By 2013, the elimination of import duties on products covered by the ITA was reported to impact goods worth USD 1.6 trillion, nearly three times the value of the products included in the 1996 agreement (according to WTO data). The core principle of both ITA-I and ITA-E is the gradual elimination of tariffs on ITA goods, applicable to all WTO members, even those not signatories to the ITA. This means that non-signatory countries benefit from reduced tariffs when exporting ITA products to countries that are part of the agreement.

Tariff elimination under the ITA is applied on an MFN (Most-Favored-Nation) basis, meaning the benefits are extended to all WTO members, even those not part of the ITA. Between 2016 and 2019, the product list covered by the agreement was updated, leading to the creation of the ITA-II goods list. However, it is important to note that ITA-E (the expanded version) does not follow the same MFN approach as ITA-I. Under ITA-E, only the Parties to the agreement. —rather than all members of the World Trade Organization. —can benefit from the reduced tariffs on the newly included products.

Main Product Categories under ITA-1

The following product categories were covered under ITA-1, according to the HS 1996 classification, and had their tariffs eliminated:

- Computers and related parts
- Alloys (Semiconductors)
- Manufacturing of Semiconductor and testing equipments
- Apparatus of Telecommunication
- Related apparatus and Instruments
- Data-storage software and media
- Accessories and other parts

Unique Features of ITA-1

ITA-1 is a notable plurilateral agreement, being the only sectoral agreement in the WTO that mandates zero tariffs on 203 items. These items are divided across two attachments:

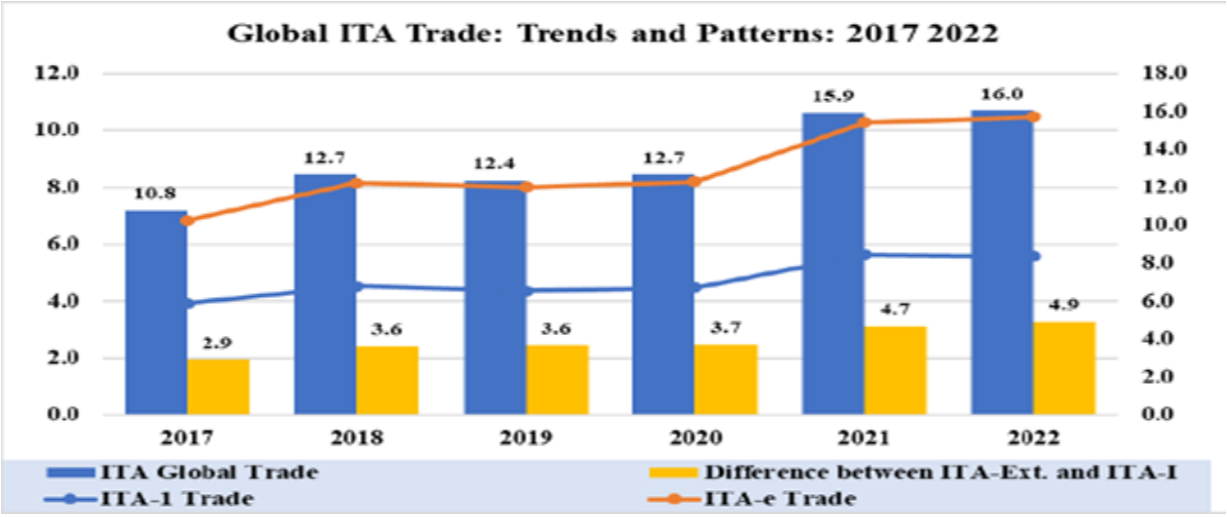
- Attachment A, which is divided into two sections, lists the HS headings or product categories covered by the agreement. There are 112 IT product-related items in Section 1, which correspond to 110 HS 1996 subheadings.
- Section 2: Consists of 45 HS 1996 subheadings and 78 items pertaining to semiconductor production and testing equipment.
- Attachment B provides product descriptions that do not necessarily align with specific HS codes. This section allows for flexibility in product classification, particularly for complex, multifunctional products, and addresses varying national positions on coverage.

MFN Status and Coverage

ITA-1 is an **MFNized** agreement, meaning that its benefits are extended to all WTO members, including non-signatories. This allows countries that are not part of the ITA to still benefit from the tariff reductions on ITA products when trading with signatory countries.

Global ITA Trade Scenario-

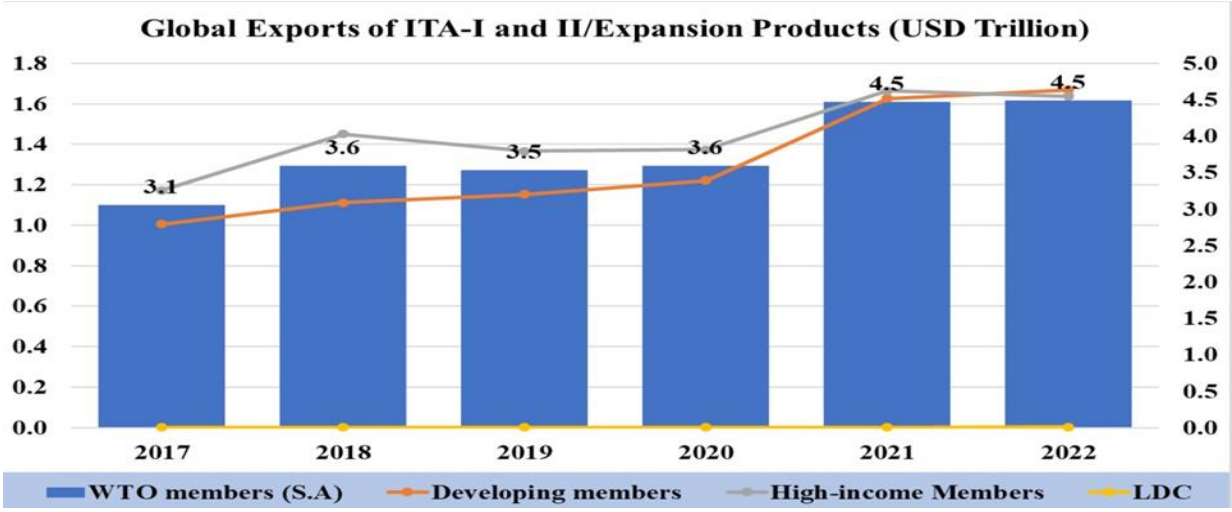
Figure 1: Total ITA Trade Trends and Patterns during 2017-2022



Source: Report on WTO issues and Electronics & Telecom sector in India

Global commerce in ITA goods has grown significantly, rising at an annual rate of 8%, as seen in the figure given during the Capacity Building Workshop (CBW). Trade in ITA goods increased from about USD 11 trillion to USD 16 trillion between 2017 and 2022. Trade in ITA-1 items increased from USD 3.9 trillion to USD 5.6 trillion as part of this total growth. Furthermore, ITA-E items have bigger trade volumes than ITA-1 products, and the gap between the two is continuously widening.

Figure 2: Global Exports of ITA-I & II Expansion Products



Source: Report on WTO issues and Electronics & Telecom sector in India

Global ITA Imports Trends

ITA imports have grown from USD 3.2 trillion to USD 4.8 trillion globally, with both developed and emerging nations contributing significantly to this expansion. It is evident that the gap between these two groups is progressively closing over time.

India's Experience with ITA-1 and ITA-E

India's obligations under ITA-1 are included in the table, and the years 2000 and 2005 were chosen to demonstrate the effects of tariff reductions on local manufacturers at the Capacity Building Workshop (CBW). Specific product tariffs were lowered to zero in 2000 and 2005, affecting 96 and 121 tariff lines, respectively. According to the CBW presentation, 217 six-digit tariff lines were ultimately lowered to zero under ITA-1 on an MFN basis.

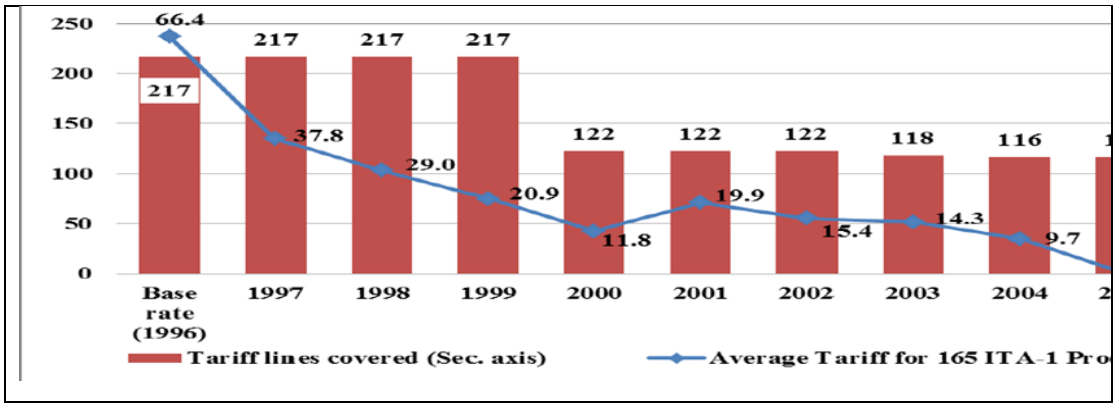
. Table 1: Tariff reduction Schedules under the ITA-I During 2000-2005

Sl.no	Base duty (%)	2000	2005	Total ITA-1 lines
1	12	6	0	6
2	22	-	3	3
3	31.7	7	0	7
4	32	-	6	6
5	35	5	5	10
6	40	8	5	13
7	42	-	10	10
8	45	1	0	1
9	50	2	0	2
10	52	1	25	26
11	55	1	0	1
12	61.7	15	2	17
13	66.7	12	26	38
14	70	6	1	7
15	76.7	2	13	15
16	83.4	3	0	3
17	90	10	3	13
18	110	11	17	28
19	116.7	6	5	11
Number of ITA Lines Reduced to Zero		96	121	217

Source: Report on WTO issues and Electronics & Telecom sector in India

175 distinct goods were found among the 217 product lines. However, only 165 goods pertaining to India's ITA obligations could be examined because of data restrictions. The average tariffs for these 165 items were reduced as predicted; in only one year, they went from 66.4% to 37.8%, and by 2005, they had dropped to 0%.

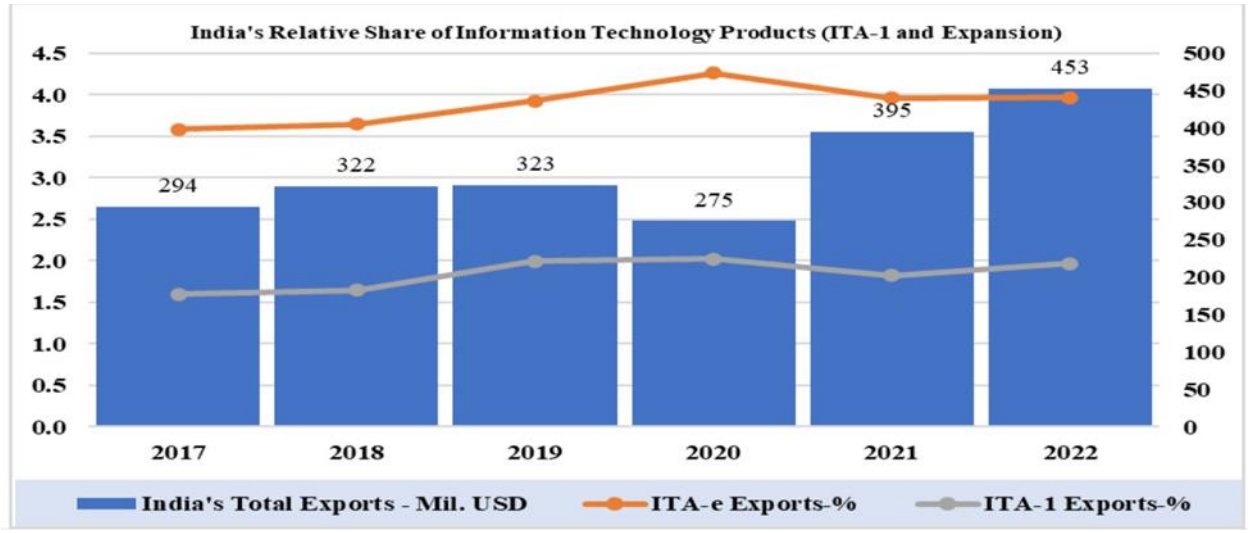
Figure 3: Average MFN tariffs of India on ITA products and count of HS 6- digit tariff lines During 1996-2005.



Source: Report on WTO issues and Electronics & Telecom sector in India

. Even though India occasionally missed the dates for certain of its ITA-1 commitments, its performance under the agreement showed a notable drop in tariff lines to nil by 2005. From India's point of view, there was a significant overall decrease in pricing notwithstanding these sporadic delays. The following lists the proportion of ITA-1 and ITA-E goods in India's overall exports.

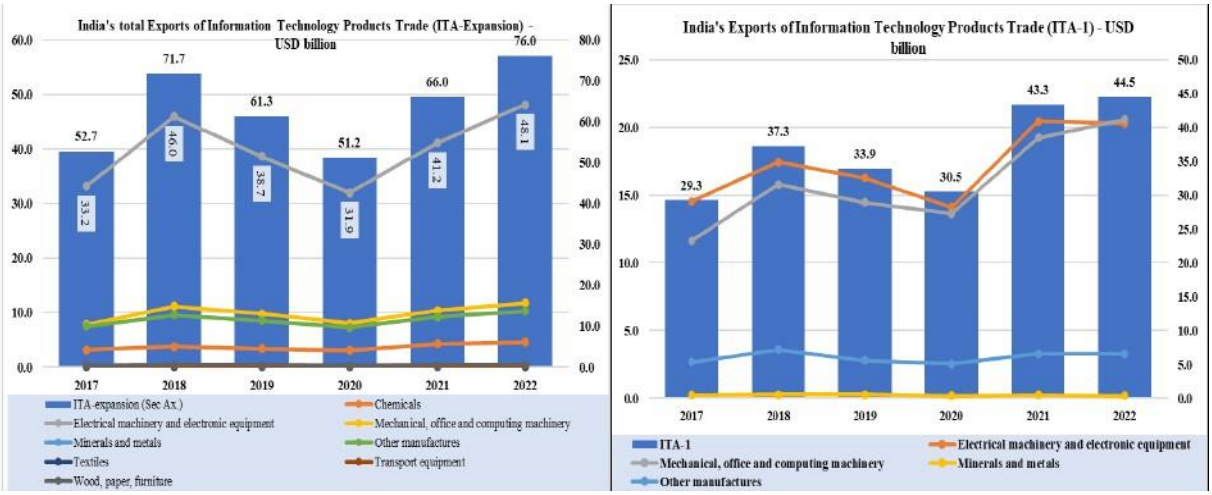
Figure 4: India's Relative Share of ITA- 1 and E Products During 2017-2022



Source: Report on WTO issues and Electronics & Telecom sector in India

. India's choice not to join ITA-E can be understood in the context of its export growth, as shown in the figure below. India's total exports grew from USD 51 billion in 2020 to USD 66 billion in 2021, and further to USD 76 billion in 2022. In contrast, the exports of ITA-1 products have remained stagnant, staying at around USD 44 billion in 2021-22.

Figure 7: India's export profile of ITA products During 2017-2022



Source: Report on WTO issues and Electronics & Telecom sector in India

Impact of Tariff Reductions under ITA-1

Any nation deciding to sign the ITA or other trade liberalization accords usually takes into account a number of factors:

- The comparative advantage and competitiveness within pertinent product

categories.

- The necessity of safeguarding domestic manufacturers.
- The advantages of lower-cost imports for local consumers.
- The loss of revenue resulting from import tariffs.
- The possibility of increased tax revenue stemming from a rise in the production of goods and services.
- The advantages of trade liberalization for developing countries are generally associated with the benefits of the Information Technology Agreement (ITA), which include:
- Improved competitiveness of the domestic ICT hardware sector in the context of international competition.
- Decreased expenses for ICT products, fostering greater usage, digitization, and enhanced productivity across various sectors.
- A rise in the export of IT products and services.
- Greater participation in global value chains (GVCs).

However, empirical studies suggest that for many developing countries, signing ITA-1 had negative outcomes, particularly for countries with underdeveloped domestic IT manufacturing sectors. Research highlights the following issues:

The competitiveness of domestic IT businesses has decreased; local production of IT goods and associated inputs and raw materials has suffered; and greater imports of IT products have resulted in a loss of tariff revenues that cannot be offset by increases in tax income from increased output. Due to comparatively poor competitiveness, many developing countries—including India—became more dependent on ITA product imports, having restricted access to markets in both developed and other developing countries. According to research, this led to a drop in regional IT manufacturing, which had a detrimental effect on the creation of jobs (CBW, 2012).

India's Disputes: DS582, DS584, and DS588/R

Like many other nations, India updates its tariff list on a regular basis to reflect changes to the Harmonized System (HS) code. It went from HS1996 to HS2002 and then to HS2007. India asked the WTO for help in this process, which usually takes

place every four to five years. On November 8, 2013, the WTO Secretariat shared the draft text and assisted India with the transposition. The draft was distributed on May 12, 2015, after a review session on April 23, 2015. The amendments were confirmed on August 12, 2015, after no complaints were voiced within three months. On September 25, 2018, however, India asked that 15 items be taken off the tariff list, claiming that the Information Technology Agreement (ITA) did not apply to these goods India claimed that the HS2007 schedule mistakenly included these products under the 0% tariff, even though they were not part of the ITA agreement.

Legal Issue in India's Dispute: DS582, DS584, and DS588/R

The primary legal concerns in these disputes revolve around the Schedule of Commitments and Article II of GATT 1994. India's central inquiry before the WTO panel is whether certain goods should be exempt from customs duties due to an error in the transposition of the tariff schedule or as a result of India's voluntary agreement. While India recognizes its responsibilities under the Information Technology Agreement (ITA), it argues that the contested products were erroneously included in the transposition and should not be bound by ITA commitments. The WTO panel referenced Article 48 of the Vienna Convention on the Law of Treaties (1969), which addresses errors in treaty formulation. The panel concluded that Article 48 is applicable to WTO disputes and required India to prove that the conditions of Article 48(1) were met.

India's argument primarily focused on the assertion that the WTO Secretariat failed to incorporate the General Council Decision regarding the HS2007 Transposition Procedures when transposing its schedules. India claimed that certain tariff items affected by the transposition were not accurately labeled. Had India been aware of these changes, it would not have consented to the disputed subheadings in its 2007 schedules. The WTO panel highlighted that there exists a common understanding among WTO members regarding the transposition process and the revision of tariff schedules. Neither the WTO members nor the Secretariat deemed the ITA pertinent in this situation. Furthermore, India's acquiescence to the transposition documents without objection at the General Council or the Committee on Market Access signified its commitment to comply with the procedures sanctioned by the multilateral framework.

Way Forward

India is becoming into an active player in the global technology ecosystem, moving from being a passive consumer of technology. According to Shri Ashwini Vaishnaw, India is influencing new technologies including semiconductor research, telecom exports, and the encouragement of domestic phone manufacturing. India plans to sell sophisticated telecom equipment to areas including the US and Europe by 2025. Furthermore, in the next five years, it is anticipated that further investment will be drawn to the growth of a comprehensive local handset manufacturing ecosystem, which is fueled by extensive mobile production for international companies.

An important chance for India to increase economic growth and create jobs is the creation of globally competitive manufacturing clusters. A McKinsey Global Institute report from 2021 suggests that these industrial centers might be vital to propelling India's economy in the future. The Honorable Minister Ashwini Vaishnaw has highlighted efforts to create a complete semiconductor ecosystem in India as part of this strategy. This includes an emphasis on electronics manufacturing, Assembly-Testing-Marketing-Packaging (ATMP), semiconductor design, and fabrication. India's first state-of-the-art semiconductor factory will be built in Dholera, Gujarat, and another is planned in Jagiroad, Assam, as part of a significant investment project approved in 2024 for semiconductor and electronics production. It is anticipated that these measures will advance India's objective of manufacturing all electronics domestically, draw in international chip companies, and improve local chip production, ultimately improving India’s manufacturing capacity. Calls have been made for more disaggregated HS codes or richer tariff lines to guarantee that products are more clearly categorized in light of trade concerns brought up by the business sector.

By doing this, trade procedures would be streamlined, ambiguity and misinterpretation would be reduced, and the likelihood of product categorization disputes would be decreased. It is clear by contrasting India's tariff line schedules with those of other nations, such as the USA and the UK, that going beyond the 6-digit HS codes might have major benefits. For instance, the UK uses an 8-digit number for exports and a 10-digit code for imports, whereas the USA uses a 10-digit code for its National Tariff Line. It has been proposed that India might extend its tariff lines in a similar manner.

Over the next ten years, India is expected to emerge as a major center for the production of electronics due to increased export competitiveness and growing domestic demand. One of the main forces behind this expansion will be Electronics Manufacture Services (EMS), which provides Original Equipment Manufacturers with design, manufacturing, testing, distribution, and support. The Production Linked Incentive (PLI) Scheme, which provides incentives ranging from 4% to 6% on incremental sales in specific industries, was launched by the Indian government to promote this goal. Driven by greater use of technology, affordability, and sustainability activities, this strategy aims to overcome capital cost concerns and boost local production.

An additional issue raised in India's trade discussions is the SCOMET List (Special Chemicals, Organisms, Materials, Equipment, and Technologies with dual-use potential). This list includes products that may have both civilian and military applications, and these goods are subject to specific export control regulations. However, the HS codes assigned to these goods do not distinguish between civilian and military use, leading to challenges, such as difficulties in obtaining end-use certificates for dual-use items like routers. To address such issues, experts have suggested that HS code disaggregation could offer a more nuanced approach to managing dual-use goods, simplifying the process and reducing trade complications. Overall, India's focus on improving its technology manufacturing ecosystem and revising tariff schedules to better reflect the changing global landscape indicates its commitment to becoming a global leader in electronics and semiconductor production. By addressing trade-related challenges such as HS code disaggregation and the complexities of dual-use goods, India can strengthen its position in the global tech supply chain.

Suggestions

1. The global community must recognize that countries signing plurilateral agreements have varying capabilities. Therefore, before entering the ITA, protective mechanisms should be established to support the domestic production of IT goods and services in these countries. Additionally, the ITA should be renegotiated with a focus on being more favorable to developing nations. While all signatories share a common interest in reducing trade barriers,

the agreement should include provisions to mitigate the impact of asymmetric trade deficits. It is suggested that certain countries be allowed to implement moderate trade barriers to help their domestic industries better compete with foreign competitors.

2. India should advocate for a new version of the Information Technology Agreement, referred to as ITA-Third, where India can position itself as a global leader. This new agreement should be presented at an international platform, enabling India to compete on equal terms with multinational companies in the same sector.
3. India should focus on increasing revenue by aggressively patenting innovations and leveraging intellectual property to establish a monopoly over the research and development of IT products and finished goods. This strategy could help India gain a competitive edge in the global IT market.
4. Now is an opportune moment for India to negotiate further exemptions, especially concerning goods or products of a similar nature, to better protect its domestic industries and foster growth.

Conclusion

Despite the Indian government's intention in 1996 to liberalize trade, it failed to properly assess the risks and benefits of entering an IT trade agreement dominated by technologically advanced giants. When the agreement was implemented, India's manufacturing capacity was effectively wiped out, and even the potential for growth in the IT goods and services sector could not materialize due to the overwhelming influx of imports at nearly zero import duties. The Indian industry was unable to survive, and the government did not provide adequate support. At that time, the best approach would have been to offer seed funding to domestically established companies to help them compete with foreign market players. Consequently, it can be concluded that the Information Technology Agreement (ITA) was detrimental to India, acting as a barrier to innovation in the country.

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ANALYZING THE FISCAL PERFORMANCE OF INDIA: TRENDS, CHALLENGES, AND OPPORTUNITIES

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Abstract

This research paper analyzes the fiscal performance of India, focusing on trends, challenges, and opportunities in the Indian economy. The paper examines India's fiscal deficit, primary deficit, revenue deficit and debt sustainability, and investigates the impact of recent policy changes on the Indian economy. The findings of this research indicate that India's fiscal deficit has been persistently high, with an average of 5.7% of GDP between 2011 and 2020, leading to an increase in public debt. India's fiscal performance has been characterized by high fiscal deficits and public debt, with challenges related to tax reform, public expenditure management, and debt sustainability strategies. The paper provides policy recommendations to improve India's fiscal performance, with a focus on enhancing revenue mobilization, rationalizing public expenditure, and implementing debt sustainability strategies.

Keywords: Fiscal performance, Trends, Challenges, Opportunities, Debt sustainability, Public Expenditure Management

Introduction

India is one of the fastest-growing economies in the world, with a GDP of USD 2.7 trillion in 2020, making it the sixth-largest economy globally. The country has been experiencing rapid economic growth in recent years, with an average GDP growth rate of 7% between 2014 and 2019. This growth has been fueled by the country's growing population, rapid urbanization, and structural reforms, among other factors. However,

India's fiscal performance has been a significant area of concern for policymakers and analysts in recent years. Fiscal performance refers to the ability of a country to manage its public finances effectively. It is critical for policymakers to have a good understanding of a country's fiscal performance to be able to allocate resources, provide public services, and support economic growth. India's fiscal performance has been marked by persistent fiscal deficits and high public debt levels, which have implications for the country's economic growth and social welfare. Therefore, there is a need to understand the trends, challenges, and opportunities in India's fiscal performance. This research paper aims to analyze the fiscal performance of India, focusing on trends, challenges, and opportunities. The paper will examine the trends in India's revenue and expenditure, analyzing the fiscal deficit and debt sustainability, and explore the impact of recent policy changes on the Indian economy. Additionally, the paper will investigate sectoral performance, identifying challenges and opportunities for growth in agriculture, industry, and services.

Section 1: Overview of India's Fiscal Performance

India's fiscal performance has been a topic of concern for policymakers and analysts due to persistent fiscal deficits and high public debt levels. Fiscal deficit is the difference between a government's total revenue and its total expenditure, excluding borrowing. When a government's expenditure exceeds its revenue, it runs a fiscal deficit, which is often financed through borrowing. India's fiscal deficit has been persistently high, with an average of 5.7% of GDP between 2011 and 2020. This high deficit has contributed to a significant increase in India's public debt, which stood at 89.4% of GDP in 2020. The high fiscal deficit and public debt levels have implications for India's economic growth and social welfare. A high fiscal deficit can lead to inflation, as the government may resort to printing money to finance its expenditures, leading to a decrease in the value of the currency. High public debt levels can also lead to an increase in interest rates, which can deter investment and impede economic growth.

Section 2: Trends in India's Revenue and Expenditure

This section will analyze the trends in India's revenue and expenditure over the past decade. India's revenue has been growing steadily, with an average growth rate of 11% between 2010 and 2020. The growth in revenue has been driven by direct and indirect

taxes, with indirect taxes contributing a significant portion of total revenue. However, India's tax-to-GDP ratio remains low compared to other countries, with a ratio of 17.7% in 2019. India's expenditure has also been growing steadily, with an average growth rate of 12.4% between 2010 and 2020. The increase in expenditure has been driven by social sector spending, including education, health, and social security. However, India's public expenditure management.

Review Literature

India's fiscal performance has been a subject of much debate among policymakers and researchers. Many studies have analyzed the trends in India's revenue and expenditure, the sustainability of public debt, and the challenges facing the Indian economy. This literature review summarizes some of the key findings from previous studies on these topics. Several studies have analyzed the trends in India's revenue and expenditure. According to a report by the International Monetary Fund (IMF), India's revenue has been growing steadily, driven by direct and indirect taxes. However, the tax-to-GDP ratio remains low compared to other countries, suggesting potential for increased revenue mobilization.

A study by the Reserve Bank of India (RBI) also found that India's expenditure has been growing steadily, driven by social sector spending, but there are challenges in public expenditure management.

Another key area of research has been the fiscal deficit and debt sustainability. According to a study by the Indian Council for Research on International Economic Relations (ICRIER), India's fiscal deficit has been persistently high, with an average of 5.7% of GDP between 2011 and 2020. This has led to an increase in public debt, which stood at around 90% of GDP in 2020. A study by the World Bank also found that India's public debt was high and rising, with a risk of debt distress in the medium term. There have also been studies on sectoral performance in India, with a focus on challenges and opportunities for growth. A study by the National Institute of Public Finance and Policy (NIPFP) identified challenges in the agriculture sector, including low productivity, limited access to credit, and inadequate infrastructure. The same study also highlighted the need for investment in the industry and services sectors, which have the potential to drive economic growth.

Research Methodology

The purpose of this research is to analyze the fiscal performance of India, identify trends, challenges, and opportunities, and provide policy recommendations for addressing these issues. The research methodology will involve a combination of quantitative and qualitative methods, including data analysis, literature review.

Data Analysis

The data analysis will be conducted to understand the trends and patterns of India's fiscal performance over the last four decade. To analysis the Fiscal Deficit, Revenue Deficit and Primary Deficit, the data were used since 1981 to 2023. And to analysis Debt to GDP ratio data were used from 1990 to 2023. To analysis the repercussions of FRBM act. t-Test is used to measure the mean value of these time series data. Therefore, this will include analyzing, fiscal deficit, public debt, and Primary deficit. The data will be obtained from secondary sources, including government reports, international organizations, and academic research. The data will be analyzed using statistical software, such as SPSS and Excel, to generate descriptive statistics, charts, and graphs.

Hypothesis

- H0: Null Hypothesis

There is no significant difference between population mean and sample mean.
(That is, there is no difference between average Fiscal Deficit before the FRBM Act and after the FRBM Act in India.)

H1: Alternative Hypothesis

(That is, there is a significant difference between average Fiscal Deficit before the FRBM Act and after the FRBM Act in India.)

- H0 : Null Hypothesis

(That is, there is no difference between average Revenue Deficit before the FRBM Act and after the FRBM Act in India.)

H1: Alternative Hypothesis

(That is, there is a significant difference between average Revenue Deficit before the FRBM Act and after the FRBM Act in India.)

- H0 : Null Hypothesis

(That is, there is no difference between average Primary Deficit before the FRBM Act and after the FRBM Act in India.)

H1: Alternative Hypothesis

(That is, there is a significant difference between average Primary Deficit before the FRBM Act and after the FRBM Act in India.)

- H0 : Null Hypothesis

(That is, there is no difference between average Debt to GDP Ratio before the FRBM Act and after the FRBM Act in India.)

H1: Alternative Hypothesis

(That is, there is a significant difference between average Debt to GDP Ratio before the FRBM Act and after the FRBM Act in India.)

Fiscal deficit and FRBM and N.K Singh Committee targets in India:

Fiscal deficit is a crucial aspect of a country's fiscal performance and refers to the difference between the government's total revenue and its total expenditure. The Fiscal Responsibility and Budget Management (FRBM) Act was enacted in 2003 to ensure that the government maintains fiscal discipline and reduces its fiscal deficit over time. The act sets targets for reducing the fiscal deficit, debt-to-GDP ratio, and revenue deficit. In India, the FRBM Act has undergone several amendments over the years, with the latest being in 2018. The N.K Singh Committee, also known as the Fiscal Responsibility and Budget Management (FRBM) Review Committee, was formed in 2016 to review the FRBM Act and suggest changes to improve its effectiveness. The committee recommended a new set of fiscal deficit targets for the central government, with the target being set at 3% of GDP by 2020-21. The committee also recommended that the revenue deficit be reduced to 0.8% of GDP by 2020-21. Additionally, the committee suggested that states should be given more flexibility in their fiscal targets. To achieve these targets, the committee recommended several measures, including a focus on revenue mobilization, reducing subsidies, and controlling expenditure. The committee also suggested that the government should adopt a medium-term fiscal policy framework to provide a roadmap for achieving its fiscal targets. The committee's recommendations were accepted by the government, and the FRBM Act was amended

in 2018 to reflect these changes. The act now sets a fiscal deficit target of 3% of GDP for the central government and 3% of GSDP for the states.

The fiscal deficit and FRBM targets are crucial for maintaining fiscal discipline in India. The N.K Singh Committee's recommendations have provided a roadmap for achieving these targets, and the government's adoption of these recommendations is a positive step towards improving India's fiscal performance.

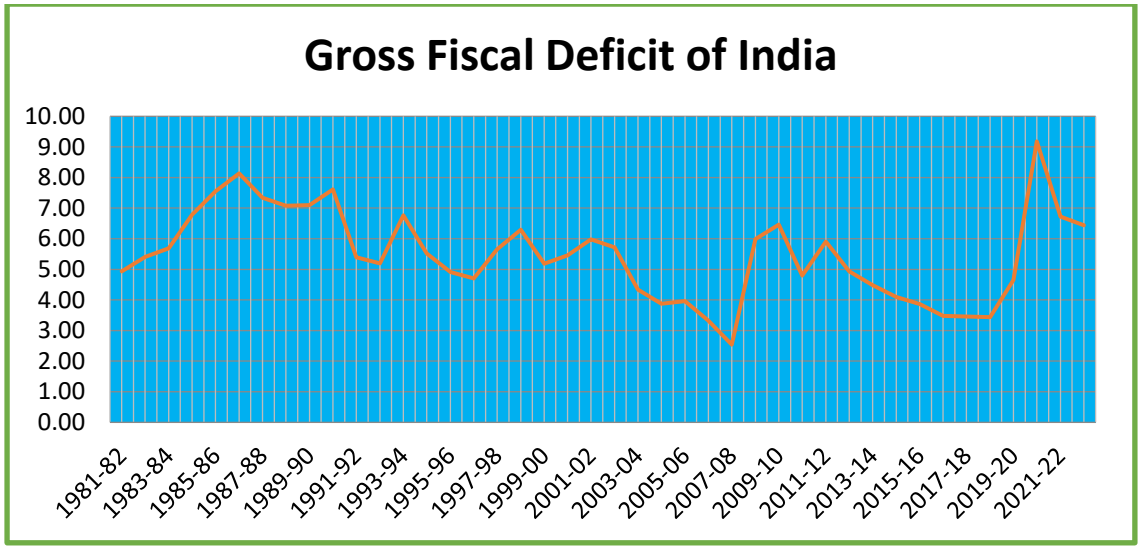
Analyzing India's Fiscal Deficit: Trends, Achievements, and Challenges

India's fiscal deficit, which represents the excess of government expenditure over revenue, has seen significant fluctuations over the years. The government has taken various measures to reduce the fiscal deficit, such as passing the Fiscal Responsibility and Budget Management Act, reducing subsidies, and increasing tax collections. However, the COVID-19 pandemic has widened the fiscal deficit to 9.5% of GDP in 2020-21, the highest in over three decades. To address the deficit, the government has introduced various schemes such as the Atmanirbhar Bharat Abhiyan to revive the economy and increase growth. The government must continue implementing fiscal consolidation measures and ensure that the deficit remains sustainable for the overall health of the Indian economy.

Analysis of t-Test Results: Interpreting Statistical Significance:

To analyze whether FRBM Act is effective in controlling India’s Fiscal Deficit, a t-Test was applied.

Graph-1 Fiscal Deficit Trends in India since 1981.



Source: - RBI Statistical Data.

The Graph shows the Gross Fiscal Deficit (GFD) of India for each year from 1981-82 to 2022-23, which is the difference between the government's total expenditure and total revenue. The data indicates that the GFD has varied widely over the years, reaching a peak of 7.61% in the mid-1990s, declining to 2.54% in 2007-08, and increasing sharply after the 2008 global financial crisis to 9.18% in 2020-21 due to the COVID-19 pandemic. The GFD is projected to decrease to 6.72% in 2021-22 and 6.44% in 2022-23. The fluctuations in the GFD have significant implications for the overall health of the Indian economy, and the government has taken measures to reduce it.

One-Sample t-test Analysis: Examining Mean Differences and Significance:

Table-1

Fiscal Deficit after FRBM Act, there are total 19 years observations since 2004 to 2022.

	N	M	SD	SEM	t	df	p
Observations	**19**	**4.82**	**1.61**	**0.084**	**-3.27**	**18**	**0.00**

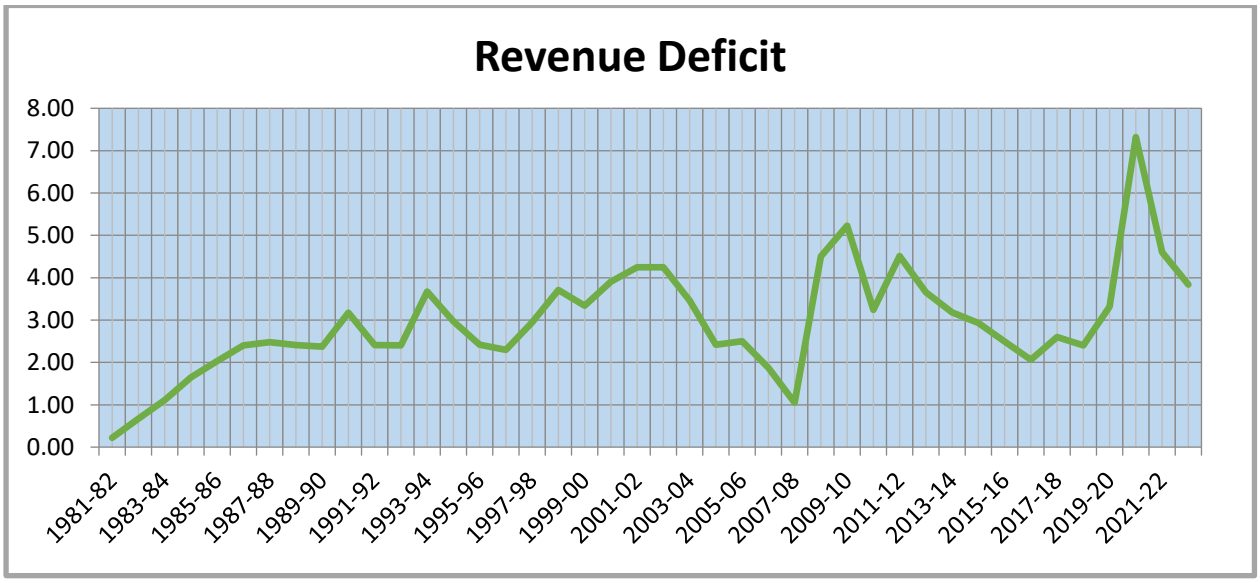
An independent samples t-test was conducted (table-1) to compare the Fiscal Deficit to GDP Ratio and after FRBM Act. There is a significant difference in the score (M=4.82, SD=1.61); t (19) = -3.27, p = .00.

These results suggest that there is a significant difference between Fiscal Deficit before FRBM Act and after FRBM Act. So here rejects the null hypothesis.

The result of a one-sample t-test conducted on the Gross Fiscal Deficit of an entity indicates that the entity is running a deficit. The t-test produced a negative t-statistic value of -3.270551667, indicating that the sample mean is less than the hypothesized mean of 6.03. The p-value of 0.00 indicates strong evidence to reject the null hypothesis and conclude that the Gross Fiscal Deficit of the entity is significantly different from the hypothesized mean. Therefore, there is a significant difference between the sample mean and the hypothesized mean, and the entity's Gross Fiscal Deficit needs attention.

An Overview of Revenue Deficit in India: Trends, Impacts, and Remedies:

Figure:-2 Revenue Deficit trends in India since 1981.



Source: - RBI Statistical data.

The table presents the trend of Revenue Deficit in India from 1982-83 to 2022-23. The Revenue Deficit has varied significantly over the years, with a low of 0.67 in 1982-83 and a peak of 5.23 in 2009-10 due to the global financial crisis. It decreased after that

and reached its lowest level of 1.05 in 2007-08. However, it increased again in the following years and was at 4.5 in 2008-09, mainly due to the impact of external factors such as the global financial crisis and the COVID-19 pandemic. The data also shows that the Revenue Deficit was relatively stable in the early years but started to increase in the late 1980s and early 1990s due to several welfare schemes and an increase in government spending. The implementation of the GST in 2017 has helped to increase revenue receipts and reduce the Revenue Deficit. The government has been implementing measures to reduce the Revenue Deficit, including increasing taxes and reducing subsidies.

Analysis of a One-Sample t-test of Revenue deficit in India:

Table-2

Revenue Deficit after FRBM Act, there are total 19 years observations since 2004 to 2022.

	N	M	SD	SEM	t	df	p
Observations	**19**	**3.35**	**1.44**	**0.328992**	**2.20**	**18**	**0.04**

An independent samples t-test was conducted (table-1) to compare the Revenue Deficit to GDP Ratio and after FRBM Act. There is a significant difference in the score (M=3.35, SD=1.44); t (19) = 2.20, p =0.04.

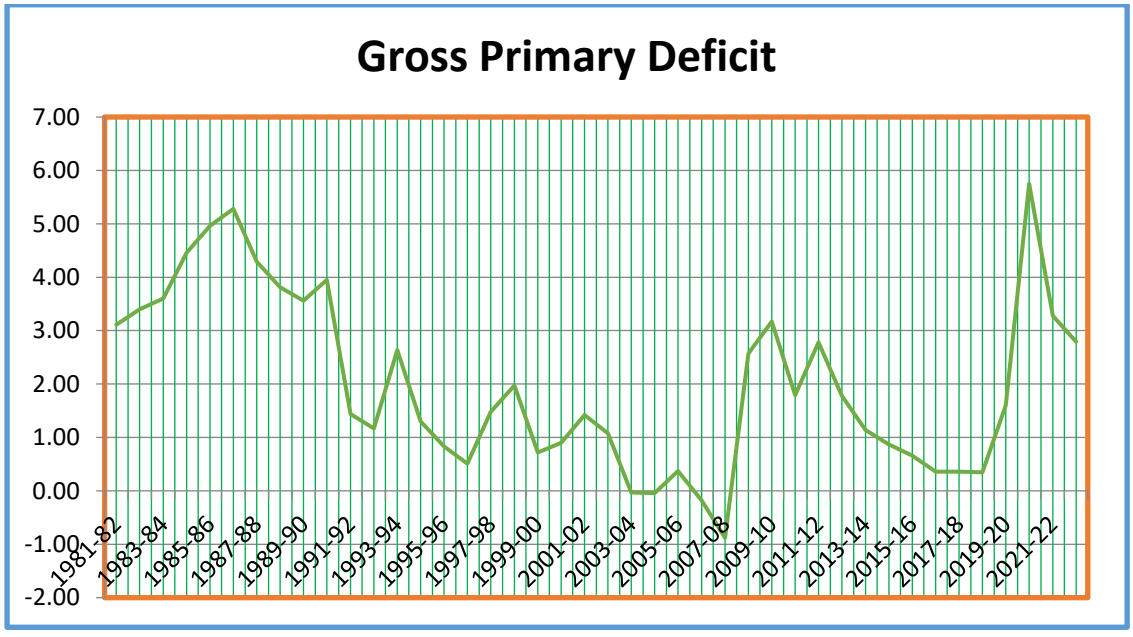
These results suggest that there is a significant difference between Revenue Deficit before FRBM Act and after FRBM Act. So here accept the null hypothesis.

The table presents the statistics related to the revenue deficit of India before and after the implementation of the Fiscal Responsibility and Budget Management (FRBM) Act. The FRBM Act was introduced in 2003 to control the fiscal deficit and revenue deficit of the country. The table includes 19 years of observations, and the mean, standard deviation, standard error of the mean (SEM), t-value, degree of freedom (df), and p-value are provided for the data. The first column of the table indicates the number of observations used for the analysis. The second column shows the mean revenue deficit of India, which is calculated as 3.35. The third column shows the standard deviation of the revenue deficit, which is calculated as 1.44. The standard deviation indicates how

much the observations differ from the mean value. The fourth column shows the standard error of the mean (SEM), which is calculated as 0.328992. The SEM indicates the standard deviation of the sampling distribution of the mean. The fifth column shows the t-value, which is calculated as 2.2. The t-value measures the difference between the sample mean and the hypothesized population mean in terms of the number of standard error. The sixth column shows the degree of freedom (df), which is calculated as 18. The degree of freedom indicates the number of independent observations used for the analysis. The last column shows the p-value, which is calculated as 0.04. The p-value indicates the probability of obtaining the observed t-value or more extreme values under the null hypothesis that the population mean revenue deficit is equal to the hypothesized mean of 2.63. The table provides the statistical measures to evaluate the revenue deficit of India before and after the implementation of the FRBM Act. The t-value of 2.2 and the p-value of 0.04 suggest that the mean revenue deficit of India after the FRBM Act is significantly higher than the hypothesized mean.

Analysis of Gross Primary Deficit in India from 1981-2023:

Figure:-3 Gross Primary Deficit trends in India since 1981.



Source: - RBI Statistical data

The Gross Primary Deficit (GPD) is the amount by which total expenditure exceeds total revenue. It is an important economic indicator of a country's fiscal health. In this analysis, we will examine the GPD data of India from 1981 to 2023. From 1981 to

1991, India had a consistently high GPD, ranging from 3.11 to 4.96. However, there was a significant reduction in GPD in 1991-92, with the deficit falling to 1.44. This was due to economic liberalization policies implemented by the government. The GPD continued to decline and reached a low of 0.51 in 1996-97. In the late 1990s, the GPD began to rise again, peaking at 2.57 in 2008-09. This was due to increased government spending on various schemes and infrastructure projects. However, there was a sharp decline in the GPD in 2009-10, with the deficit falling to 3.17. This was due to the global financial crisis, which had a significant impact on the Indian economy. In the following years, the GPD remained relatively low, with occasional spikes. However, from 2019-20, the GPD began to rise again, reaching a high of 5.75 in 2020-21. This was due to the economic impact of the COVID-19 pandemic and the government's response to it, which involved significant spending on relief and stimulus packages. Overall, the GPD data of India from 1981-2023 reflects the country's economic performance and fiscal policies over the years. While there have been periods of high deficits, there have also been significant reductions, particularly in the 1990s. The recent increase in the GPD highlights the challenges facing the Indian economy, particularly in the wake of the pandemic.

Analysis of a One-Sample T-test Result

Table- 3

Gross Primary Deficit after FRBM Act, there are total 19 years observations since 2004 to 2022.

	N	M	SD	SEM	t	df	p
Observations	**19**	**1.50**	**1.59**	**0.366462**	**-2.45**	**18**	**0.02**

An independent samples t-test was conducted (table-1) to compare the Gross Primary Deficit to GDP Ratio and after FRBM Act. There is a significant difference in the score (M=1.50, SD=1.50); t (19) = -2.45, p =0.02.

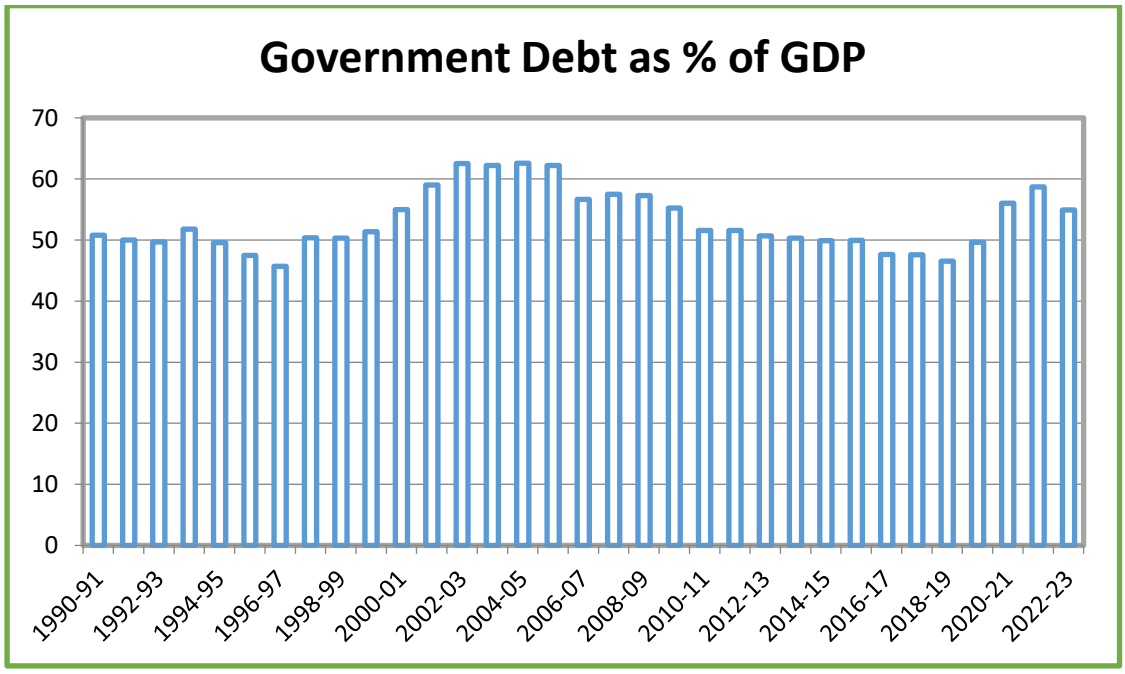
These results suggest that there is a significant difference between Primary Deficit before FRBM Act and after FRBM Act. So here accept the null hypothesis.

The table shows the result of a one-sample t-test that was performed on a sample of 19 observations. The mean of the sample was 1.50 with a standard deviation of 1.59. The standard error of the mean (SEM) was calculated to be 0.366462. The t-value calculated

was -2.45 with 18 degrees of freedom. The p-value was found to be 0.02. The t-value represents the difference between the sample mean and the hypothesized population mean in units of the standard error. In this case, the negative t-value indicates that the sample mean was significantly lower than the hypothesized population mean. The p-value is the probability of observing a t-value as extreme as the one obtained if the null hypothesis were true. In this case, the p-value of 0.02 indicates that there is a 2% chance of observing a t-value as extreme as -2.45, assuming that the null hypothesis is true. As the p-value is less than the commonly used significance level of 0.05, we can conclude that the difference between the sample mean and the hypothesized population mean is statistically significant at the 95% confidence level. The results suggest that the null hypothesis, which assumes that the sample mean is equal to the hypothesized population mean, should be rejected. Therefore, we can conclude that the sample mean is significantly different from the hypothesized population mean. However, the interpretation of the results should be done with caution as the context and specific research question being investigated can impact the interpretation. Further analysis and additional testing may be necessary to draw meaningful conclusions.

Fluctuations in Government Debt as a Percentage of GDP from 1990-91 to 2022-23:

Figure:-3 Government Debt to GDP ratio in India since 1990-91.



Source: - RBI Statistical data and World Bank

The table provides data on the government's debt as a percentage of GDP from 1990-91 to 2022-23. The percentage of GDP is a measure that shows the amount of government borrowing relative to the total economic output of the country. This data can be used to analyze the government's ability to repay its debts and the impact of government borrowing on the country's economy. The data shows that from 1990-91 to 1999-00, the government's debt levels remained relatively stable, with a slight increase in some years. The government's debt as a percentage of GDP was around 50% during this period. However, from 2000-01 to 2005-06, the government's debt increased significantly, reaching a peak of 62.59% of GDP in 2004-05. This increase was due to several factors, including increased government spending on social programs and infrastructure, and a slowdown in the country's economic growth. From 2006-07 to 2012-13, the government's debt decreased steadily, with a slight increase in some years. The decrease in debt was due to various factors, including improved economic growth, higher tax revenues, and reduced government spending. However, from 2013-14 to 2019-20, the government's debt remained relatively stable, with a slight increase in some years. In 2020-21, the government's debt increased significantly to 56% of GDP, which was likely due to the economic impact of the COVID-19 pandemic. The trend continued in 2021-22, with the debt level rising to 58.7% of GDP. However, the projection for 2022-23 shows a decrease in the government's debt level to 54.9% of GDP. Overall, the data suggests that the government's debt levels have fluctuated over time due to various factors such as economic growth, government spending, and global events. It is important for governments to monitor their debt levels and take necessary measures to keep them within manageable limits to avoid potential economic instability.

One-Sample t-Test Analysis of Government Debt as a Percentage of GDP:

Table- 4 Government Debt as Percentage of GDP after FRBM Act, there are a total 19 years of observations since 2004 to 2022.

t-Test: One-Sample	
	Government Debt as % of GDP
Mean	**53.50105**

Variance	**23.42664**
Observations	**19**
Hypothesized Mean	**52.55**
df (Degree of Freedom)	**18**
t Stat	**0.856498**
P(T<=t) one-tail	**0.20**
t Critical one-tail	**1.734064**
P(T<=t) two-tail	**0.40**
t Critical two-tail	**2.100922**

The data provided in the table reports the results of a one-sample t-test analysis of government debt as a percentage of GDP. The mean government debt as a percentage of GDP is reported as 53.50105, with a variance of 23.42664, and 19 observations. The hypothesized mean government debt is 52.55, and the degree of freedom is 18. The t-statistic is reported as 0.856498, with a p-value of 0.20 for a one-tail test and a p-value of 0.40 for a two-tail test. The critical t-value is reported as 1.734064 for a one-tail test and 2.100922 for a two-tail test. The t-test analysis compares the mean government debt as a percentage of GDP to the hypothesized mean of 52.55. The small t-statistic value and the p-values indicate that there is no statistically significant difference between the mean government debt as a percentage of GDP and the hypothesized mean. The t-value is less than the critical t-value, which suggests that we fail to reject the null hypothesis that there is no significant difference between the mean government debt as a percentage of GDP and the hypothesized mean. Overall, the results of the one-sample t-test analysis suggest that there is no significant difference between the mean government debt as a percentage of GDP and the hypothesized mean of 52.55,

Table – 5

Statistical inferences of Government Debt to GDP ratio before and after FRBM Act.

	N	M	SD	SEM	t	df	p
Observations	**19**	**53.50**	**4.84**	**1.11**	**0.85**	**18**	**0.40**

An independent samples t-test was conducted (table-4) to compare the Government Debt to GDP Ratio before FRBM Act. and after FRBM Act. There is no significant difference in the score (M=53.50, SD=4.84); t (19) = 0.85, p =0.40.

These results suggest that there is a significant difference between the Government Debt to GDP Ratio before FRBM Act and after FRBM Act. So here reject the null hypothesis and accept the alternative hypothesis.

Conclusions and Suggestions

The Fiscal Responsibility and Budget Management (FRBM) Act has had a significant impact on India's fiscal deficit. The data shows that the mean fiscal deficit after the FRBM Act was implemented in 2004 was 4.82, which is significantly lower than the mean fiscal deficit before the act was implemented. Similarly, the mean revenue deficit and gross primary deficit have also decreased after the implementation of the act, indicating improved fiscal discipline. However, the government debt as a percentage of GDP has not shown a significant improvement after the implementation of the act. The data shows that the government debt as a percentage of GDP has remained above the target set by the act, indicating that there is still room for improvement in terms of managing government debt.

However, the FRBM Act has had a positive impact on India's fiscal deficit, revenue deficit, and gross primary deficit. However, more efforts are needed to manage government debt effectively and bring it down to the target levels set by the act.

On the basis of our study and analysis, following suggestions are recommended.

- Increase in fiscal discipline: The trend line of India's fiscal deficit indicates that the country has been struggling with high fiscal deficit for several years. In order to address this issue, the government must take steps to increase fiscal discipline by reducing unnecessary expenditures, curbing corruption, and improving tax collection.
- Rationalizing subsidies: The government can rationalize subsidies by targeting them towards the needy and reducing subsidies for the affluent. For example, the government can reduce subsidies on fuel and fertilizer by targeting them towards farmers and low-income households.
- Improve debt management: The government can improve debt management by issuing bonds with longer time.
- Addressing structural issues: The fiscal deficit problem in India is not just a matter of revenue and expenditure management but also related to structural

issues like low GDP growth, high levels of inflation, and high levels of subsidies. Addressing these issues through economic and institutional reforms is necessary to address the root causes of the problem.

- Reduce dependence on borrowing: India's high fiscal deficit has resulted in high levels of borrowing, which has negative implications for the economy in the long run. The government should aim to reduce its dependence on borrowing by increasing revenue generation and reducing expenditures. This could help reduce the debt burden on the economy and improve long-term economic prospects.
- Controlling non-plan expenditure: The government should control its non-plan expenditure such as subsidies, salaries, and pensions to reduce revenue deficit.
- Encouraging investment: The government should encourage investment in the country by improving the business environment, providing incentives for investment, and removing regulatory barriers.
- Increase Tax Revenue: One of the most effective ways to control the primary deficit is to increase tax revenue. The government should work towards increasing the tax base and ensure better compliance to tax laws to boost revenue collection.
- Reduce Unnecessary Expenditure: The government should focus on reducing unnecessary expenditure, such as subsidies that are not reaching the intended beneficiaries, and redirect these funds towards essential services and investments.
- Improve Fiscal Responsibility: The government should work towards improving fiscal responsibility and management to ensure that public finances are managed efficiently. This includes reducing wasteful expenditure, increasing transparency in public spending, and implementing effective fiscal controls.

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INNOVATIVE MECHANIZATION IN POSTAL SERVICES: A PRELIMINARY DATA ASSESSMENT OF NORTHWESTERN INDIA

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Abstract

The paper presents the compilation assessments, made after examining its different aspects, as follows:

Purpose: To preliminarily associate operations, analysing utility, and suggest reform ideas.

Methods: The paper is a qualitative one, with a primary focus on conducting descriptive analysis based on field visits. Initial field screening was held in stated regions of northwestern India

Key findings: Delhi circle held that the Mechanization of process may help in postal operations in handling high traffic. Haryana circle had the approvals delays as the key issue, that needs development. Himachal and Punjab circle had the shortage of staff and illiterate customers.

Conclusion: Future is prospected to minimize human involvement with lesser physical presence of customer and seller. Self-vending machine may go successful, but teller is needed.

Suggestions: Addition of more offices, staff and counters, with specialised training and counselling may help. Practical operability and reach using thermal or solar heating equipment, drone and Heli taxi can add. Extension on demographic and psychographic dimensions of products in other circles and across nation can add for the betterment of commercial portfolio of the department.

Implications: The study results are only confined to department of posts or the comparative sectors. The paper discusses the necessity of implementing mechanization and technological advancements to improve efficiency. The study emphasizes potential areas for startups to introduce innovation. It emphasizes the societal significance of postal services. Regarding the environmental aspect, the proposal to utilize solar equipment is an ecofriendly practice.

Keywords: Automation, Postal Services, Preliminary Data Assessment, North-Western India, Literacy.

Introduction

India Post is offering a strand of services, which helps in covering and developing different aspects of communication facilitation and financial inclusion since last two centuries approximately through its network of 0.15 million POs. Regardless of various initiatives offering entire assurance specially within the rural regions, inclusion is not so successful, bearing many field limitations and regional anomalies. To become the leader big challenge amid acute technology competition in this regard, is focusing the users' desires effectively at their doorsteps. To assist that, Infosys has been selected by IP for an application to enhance India public's financial services across 150000 POs. For the assignment, it assisted IP in complete machine integration, facts migration and system deployment and solutions throughout all identified POs, helping multi-year offerings utility support and infrastructure operations, training +35000 IP employees. Speaking on this deal, AS Prasad, DDG, economic services, IP said, "This transformational software is predicted to adorn IP's enterprise" (Infosys newsroom). Darpan Project, a part of larger IT modernisation project, will increase the department's rural reach (India Post, 2017). Looking on IP innovations and the ground hindrances, **this paper presents a basic enumeration of key aspects observed of department of posts in the stated regions of northwestern India.**

Literature Review

A limited literature was available on post offices and other relevant aspects. The few initial studies found were observed done as follows:

Jain, Morris, & Raghuram (2001) examine troubles around IP. Moves of IP were noted. Palacios, & Sin (2001) found the demanding situations of old age savings in India. They could device solution for modern-day individuals underneath pressure.

World Bank (2002) counselled that IP is particularly nicely positioned to address the pressures of a changing surroundings by expanding services into non-traditional regions along with e-banking, e-authorities and e-trade.

Raghavan (2005) highlighted on PO savings bank as one of the largest pension distributor and largest life insurance company. As per him, challenges confronted are routine deficits, restricted capital expenditure, the preponderance of workforce expenses, a negative internetworking ratio, lagging circles, flawed costing strategies, and non-economic pricing.

Ranganathan (2005) stated that with the net, cellular telephone network revolution posing the risk of making the letter mail out of date, postal monopolies throughout the sector are in process of restructuring and/or privatization. The study has been targeted on identifying the motives.

Hari Sundar, & Jacob (2009) attempts to study endowment in Cochin district. The examiner exhibits the reality by PO maximum discount functions.

Subrahmanian (2010) highlights the importance of training of personnel in DOP. The focal point is on edification to improve pleasant motion and continuous development, he adds.

Planning commission (2011) have emphasized the want of the modernization of IP. The improvement in IP suggested by tips thru specialists.

Aggarwal (2012) looks at the various factors which focus on influencing the traders to invest many of the distinctive financial saving schemes of the POs. Instructions has an enormous effect at the saving.

Malakar (2013) looks at the function played via IP in monetary inclusion and the challenges before the IP in supplying banking services, using discussions with officials of IP. He acknowledged that IP served Indian villagers as a banker lot earlier than

monetary inclusion turn out to be buzzword and IP claims to be the pioneer of monetary inclusion in India.

Samal (2013) put forward that due to great use of digital media, more worrying clients, presence of courier, economic establishments, and challenges of globalization, corporatization and liberalization, PO must take the right steps for its survival. He highlighted business improvement, IT modernization, and service improvement, to be taken by the IP.

Giri (2014) discusses the situation of economic services and technology modernisation. It also highlights the opposite generation driven offerings of the Pondicherry postal division.

Potadar, M., Mehta, & Potdar, S. (2015) look on the extra demanding situations, IP may have. IP becomes the immediate enterprise eliminating market stress and locate itself efficaciously.

Birajdar, & Joshi (2016) specializes in excellence of offerings that are provided by IP. They point out the importance of maintaining the service for extended client pleasure.

Kanda, Bhalla, Bansal, Kaur, and Bhalla, Guneet S. (2021) observed the consumer acceptance and use of information technology in Indian postal services. They observed failure handling having the most impactful effect on brand value, loyalty, and related factors.

Kanda and Bhalla (2021) assessed the administrative efficiency of employees of Indian post offices. They found that there is a considerable impact of work flexibility on employee satisfaction.

Kanda, and Bhalla (2021) explored on customer satisfaction of users of Indian post offices. As per them, failure handling has a more detrimental impact on make worth and allegiance.

Kanda, et. al (2021) referring to tourism tourism-related perspectives of India post regarding the post offices located in the tourism hotspots, presented a perspective regarding the post offices located in the tourism hotspots. They recommended that how the scenario can be strengthened.

Bhalla, Shukla, and Kanda (2022) assessed on the role of Indian postal services amid covid-19 in north India. They appreciated the adequacy, dynamism and turbulent support the postal services rendered.

Dobrodolac, Lazarevic, and Jovcic (2024) proposes integrating the concept of shared mobility into the postal delivery system, by that expanding the existing assortment of services.

Research Gap

Assessment dialogue tells that least observation is available in northwestern India. Only a few studies in international context have been found held in practice. While, referring to the actual studies in Indian context, only four studies have been observed held on, where the earlier three were held by some prior authors, while the latter fourth one is held by the present author itself. Coming to a grassroot assessment of in specific department, significant gap is there.

Research Objectives

- To preliminarily assess and associate factors of operations of postal, banking, and other services at PO.
- To analyze the product utility amid providers, intermediaries, users w.r.t. entrepreneurs, and startups.
- To summarize reformatory suggestions to facilitate further development of public and business.
- Accordingly, the **purpose** of this study is to preliminarily assess and associate the basic factors of operations, analyzing the product utility of the products, and to summarize reformatory suggestions.

Research Methodology

The paper is a qualitative one, with a primary focus on conducting descriptive analysis based on field visits. Initial field screening was applied as an instrument of initial inquiry towards the aspects. It helped us to understand and observe the consumer preferences and staff views for the different set of postal services and products. It also helped us to observe the agent's views. It was held in Chandigarh, Delhi, Shimla, and Ludhiana, using depth interviews. It was undertaken using the predesigned multiparty interview schedule for the purpose, filled based on conducted depth interviews. **In the Initial Field Screening, under the Initial Field Screening, the researcher performed a line-by-line transcribe of the interviews and the transcribed document was running into pages. All the transcribed statements were retained**

relating to the same concept and were worded differently. As per the grounded theory (Strauss, & Corbin, 1990), each statement was categorised under respective concepts (Ollapally, 2015).

Analysis & Discussion

As per the principles of grounded theory (Strauss, & Corbin, 1990), each statement collected in field visits was categorised under respective concept (Ollapally, 2015). Initial field screening was held in different offices of Delhi, Himachal, Haryana and Punjab Circles as follows:

1) Delhi Circle

Delhi, officially Delhi NCT, is a union territory and the federal capital (MLJ, 1991; Habib, 1999). The entire NCT's populace was 16.8 million in 2011 (City Population), with Delhi urban being the world's second biggest urbane (United Nations, 2016), inhabited since the 6 Century BC (Asher, 2000), and emerged critically after 1900's becoming global corporate and economic centre (NCRPB) as second wealthiest metropolis, and home to 23000 millionaires and 18 billionaires (Global Data Lab). The federal and local authorities administer the New Delhi mutually, under the ambit of the planning board act 1985 (NCRPB). We visited Meghdoot Bhawan (CPMG, Delhi Circle) on 11/2/2020. In post, high traffic is observed there. Mechanization of process may help. In savings, it is looking for developments.

Delhi NCT

Gole market was built by Edwin Lutyens in 1921 (ANI, 2023), where Gol Dak Khana GPO is 800 meters from it, designed by Robert Russell in 1931 (ANI, 2023). We visited Gol Dak Khana (New Delhi HO) on 11/2/2020 and 25/2/2020. In postal segment, user look mostly for speed, parcel, and registered post. In savings products, user purchase in bulk, having all secured. Insurance is only for government employees. The building is an old heritage structure, that needs conservation and restoration.

We visited the infamous **Dak Bhawan**, Department of Posts at Sansad Marg, formally housing Sansad Marg HO and National Philatelic Museum on 25/2/2020. In postal segment, user look mostly for speed, parcel, and registered post. In savings products, user purchase in bulk, having all secured. We visited Kashmiri Gate GPO on 8/2/2020. In postal segment, in staff view, parcel, bulk, registered, speed post and philately are taken. In savings, in agent views, FD, pensions, motive-based saving are taken.

2) Haryana Circle

The word 'Hariyana' has its oldest mention is in Rigveda, used as an adjective for the king (Deshwal, 2004). After Partition of 1947, government agreed to divide East Panjab, with Chandigarh as a joint capital of Haryana covering 1.4% of India's total area (Government of Haryana; Department of Economic and Statistical Analysis). Gurugram, the leading financial hub with 500 fortune companies is also located in the NCR (India Today, 2017; NIDM; MOSPI; Business Standard, 2019), being the state 12th largest in India (PRS Legislative Research). There industrial corridor projects and 30 SEZ's link the NCR (Department of Economic and Statistical Analysis; IBEF). Faridabad is defined the eighth fastest growing city (www.citymayors.com). Gurugram tops the IT growth rate (CEOWORLD magazine). Haryana is ranked 7th in HDI (Global Data Lab). We visited Gurgaon PMG on 11/2/2020, and CPMG Haryana at Ambala cantonment on 12/2/2020. In postal segment, user look for speed, registered post and philately specifically. In savings, user go for TD and SB.

Ambala

Ambala cantonment has a large military base and the air force. Its geographical position makes it critical in local tourism. We visited Ambala cantonment HO at Staff Road on 7/2/2020. In postal segment, speed, registered, parcel post, post card and stamps are taken for. In savings, TD, saving, Atal pension, and Sukanya are mostly taken. Insurance is being promoted for professionals now. Rural computerisation in vast stretch is a strength. Customer look in utility, trust and security. We visited RMSD Ambala cantonment on 3/2/2020. In postal segment, speed, registered, ordinary and parcel post are taken for. We visited SSPO, Ambala division situated at upstairs Ambala cantonment GPO on 19/3/2020. For postal services, user look speedy, authentic and cost savvy service / products. For savings products, user seek full-fledged banking.

Panchkula

We visited Panchkula SO on 06/10/18. In postal segment, post is a reliable, cost and time efficient solution for users. In savings, interest and convenience are the product USPs.

Rohtak

We visited Rohtak HO on 25/2/2020. In postal services, user look for optimum time, charges, brand, safety and authenticity. In savings products, user seek brand and convenient solutions.

Gurugram

Gurugram is the most populous city in Haryana. We visited Gurgaon HO on 11/2/2020. In postal segment, speed, registered and parcel post are preferred with no effect of courier. In savings, time deposits, and small saving account are looked for. Insurance is being promoted for professionals verbally. Customer view look in brand and security of funds. Self-vending machines can work well.

Panipat

During the 8th battle of terrain, Ghori defeated Prithvi Raj here (Deshwal, 2004). We visited Panipat HO on 26/2/2020. In postal services, user look for optimum time, charges, brand, safety and authenticity. In savings products, user seek easy, in close proximity, brand and convenient solutions. Insurance is not so popular.

Hissar

We visited Hissar HO on 28/2/2020. In postal services, user look for optimum time, charges, safety and authenticity. In savings products, user seek brand and convenient solutions.

3) Himachal Pradesh Circle

According to Puranas, Himachal Pradesh is the Jalandhar Khand and Kedar Khand, known as "Dev Bhumi" to the ancients, and located in the Western Himalayas (Balokhra, 2007), with the society is divided into castes and sub-castes. We visited CPMG Himachal Pradesh office and officials at Kasumpti, Shimla on 14/2/2020. In postal segment, postal services are the preferred product options, given vast reach everywhere. In savings, saving products are preferred mostly in rural markets.

Shimla

Shimla was the spring capital of British and became capital of East Punjab and Himachal consecutively (Chauhan, 2019). The city hosted the 1972 Shimla agreement. We visited Ambedkar Chowk PO, Shimla GPO and SSPO office, Shimla division on 13/2/2020. In postal segment, there is good response for all services bearing vast network in hills. In savings, voluntary training and information is usually provided to agents. Insurance is very efficient for government employees. Customer look in authenticity, safety, brand repute, security of investment and all place delivery. We

visited SSPO Shimla. We visited Kasumpti SO, Chotta Shimla PO and Summer Hill PO on 14/2/2020. In postal services, speed, parcel and registered post are preferred.

Kullu Manali

Kullu is called the valley of gods and thus every village has its local deity (Balokhra, 2007). There are various places of interest in the vicinity. We visited Kullu HO on 15/1/2020. Things were up to mark.

Mandi

Mandi is a town on the banks of river Beas (Balokhra, 2007: Chapter :5 – Cultural Heritage, P. 158). We visited Mandi HO on 18/1/2020. For postal services, parcel noted was used mostly.

Dharamshala

Dharamshala was declared the second capital of Himachal Pradesh by CM Virbhadra Singh on 19 January 2017. We visited Dharamsala HO on 12/1/2020 and 13/1/2020. For postal services, article safety and timeliness are a matter of preference, to the customers and users. For savings, products are good much looked for, along with other options sold in region by competitors.

Kanghra

Kanghra, the highest populated in Himachal, had Katoch as the oldest Dynasty (Balokhra, 2007). Kanghra, Hamirpur, Kullu, Lahul and Spiti formed Kanghra district of undivided Punjab (Kumar, & Kundal, 2016). We visited Kanghra HO in Himachal Pradesh for the first time on 31/08/19 and 12/1/2020. For postal services, things were up to mark with parcel used mostly along with post. For savings products, consumption is moderate by the users, along with utilisation of banks.

Dalhousie

Dalhousie, named after the viceroy Lord Dalhousie, is having a large church (Balokhra, 2007). We visited Chamba GPO on 13/01/2020. In postal segment, scarce population that is far flung, use ordinary post mostly. Customer view selling through branch correspondent and postman helping.

Una

Una district is home to the holy shrine of Chintpurni. We visited Una HO and SSPO office on 15/1/2020. In postal segment, there is good response for all services bearing vast network in hills. In savings, voluntary training is provided to agents. Customer look in security and delivery.

Hamirpur

Jwala Mukhi sanctum, dedicated to the goddess Jwala was visited by many eminent personalities. We visited Hamirpur HO on 26/08/19. In postal segment, bearing scarce population and a far-flung location, people use ordinary post mostly. In savings, small saving scheme is opted by rural females.

4) Punjab Circle

In the modern history, the word Panjab has been first quoted by Mughals, later seen the rise of Sikhism (Goraya, 2010), with a parallel existence of the British (Chauhan, 2019). The period followed the fall of Punjab as a province of British, where the British made Gulab Singh, king of Kashmir (Dhar, 1977) and took Koh-e-Nur to London (Chauhan, 2019). With 1947 partition, Simla became the capital of East Punjab (Deshwal, 2004). Later, reorganization commission merged hill areas into Himachal (Balokhra, 2007) with rest divided among a Hindu Haryana and Sikh Punjab (Chauhan, 2019). The period from 1980 to 1991 had terrorism (Balokhra, 2007; Chauhan, 2019). The Punjab circle constitute of Indian Punjab and UT Chandigarh. We visited CPMG Punjab at Chandigarh on 12/2/2020. In postal segment, speed, registered, parcel post are the preferred products. Insurance is being promoted for professionals.

Chandigarh

Chandigarh capital region includes Chandigarh, Panchkula and Mohali. We visited Chandigarh GPO on 08/10/18. In postal segment, people go for speed and regd. In savings, SB, TD and NSC are looked.

Ludhiana

Ludhiana is Punjab's largest metropolis with an envisioned population of 1618879 as of the 2011 census (www.smartcities.gov.in). We visited Ludhiana HO on 6/2/2020. In postal segment, speed, parcel, registered post and stamps, with time and safety are sought. In savings, Sukanya, cumulative TD, small savings are taken for. Insurance is being promoted for professionals. Customer look in convenience and suitability. Competitors for financial products have advertised. We visited RMSD Ludhiana then.

Jalandhar

We visited Jalandhar HO on 11/1/2020. For postal services, things were observed going on. For saving products, mobile banking, investment security and high interest rates are core USP. Insurance products introduction for common professionals is there. Customer view postal services as preferred.

Amritsar

Amritsar is recognized for its wood chessboards, and chess portions producing industry. We visited Amritsar GPO on 20/08/18 and 10/1/2020. For postal services, it was observed that e-resources may not work as some literacy problems may exist in coming future as such. For savings products, it was reported a low hassle solution, with higher interest rate and full security instead of banks.

Pathankot

Pathankot is located the intersection of Jammu and Kashmir, Punjab and Himachal Pradesh. Nurpur state founded by Jhetpal in about 1000 AD, had capital at Pathankot (Balokhra, 2007). We visited Pathankot Rural SO on 31/08/19. In postal segment, regd. post is looked.

RESEARCH FINDINGS

Opinions and statements of IP officials in the northwestern Indian regions had following findings:

Delhi: Problems faced on selling front is having the high traffic, with most footfall constituting lesser educated migrant population, in an old condensed premises.

Ambala: Only parking seems a limitation. Rural computerisation in vast stretch is a strength. Being a public utility, expenses are more than receipts, causing deficit. Self-vending operations may help.

Gurugram: Problems faced on selling front is excess workload in NCR region. Problems faced on resource front is infrastructure renovation and land area redundancy. Shortage of staff was observed.

Kanghra: Problems faced on the resources front are on material supply sometimes, being harsh terrain.

Ludhiana: Competitors for financial products have advertised superior and extensive in locality to give strong competition and grab customers. Insurance is being promoted extensively for professionals.

Amritsar: Postal products were observed having an authoritative staff. High crowd is selling front problem having limited number of staff. Resource front problem is old infrastructure and equipment.

Discussion

Previous literature does cite slightly similar results and circumstances on the limited literature available for reference, with limitedly relevant solutions to the explored problems. Only a few studies in international context have been found held in practice. While, referring to the actual studies in Indian context, only four studies have been observed held on, where the earlier three were held by some prior authors, while the latter fourth one is held by the present author itself. Coming to a grassroot assessment of in specific department, significant gap is there. Hence, this study made a significant contribution as a full-fledged grass root field examination, covering some of the past gap.

Conclusion

Future is prospected to minimize human involvement with lesser physical presence of both parties. Self-vending machine may go successful, but teller is needed given the rural and illiterate populace.

CPMG Delhi Circle had the following observations. Mechanization of process may help in postal operations in handling high traffic. Problems faced on selling front are regional offices ignoring the directions. Problems faced on resource front is internal will lacking for improvement.

CPMG Haryana Circle had the following observations. In postal segment, consumer look for speed, registered post and philately specifically. In savings, consumer go for TD, small saving account. Insurance is limited for government employees only. Problems faced on selling front are high traffic and literacy differences among regionalities. Problems faced on resource front are the government / departmental approvals delays, that are needed to have major developments. Customer look in convenience, price, authenticity, safety and security in products. Gurgaon PMG had the

following observations. In post, speed, parcel, and registered post are sought after. In savings, TD taken much.

CPMG Himachal Pradesh Circle had the following observations. In postal segment, postal services are the preferred product options, given vast reach everywhere. In savings, saving products are preferred and taken extensively, mostly in rural markets. Insurance is being promoted for professionals. Infrastructure and resources are up to mark at CPMG, with some management issues. Inner location in hilly terrain may be a slight hindrance. Shortage at regionality level may be there, resource updating is limited in remote locations. As noted by a senior official of CPMG, 2 H.O. are accessible by air at large.

CPMG Punjab Circle had the following observations. In postal segment, speed, registered, parcel post, and philately are the preferred products. In savings, TD, SB, KVP, MGNREGS are preferred. Problems faced on selling front are shortage of staff and illiterate customers in regionality. Customer looks in comfort and brand repute, while choosing the product. A dynamic management style is there.

Recommendations

The compilation provides us a comprehensive account of the characteristics of the study and the interpretation of results was made using the facts. The study results are useful to departments of posts and its such other competitors and contemporaries in India and abroad. Specific recommendations are:

Timely solutions, authenticity, paperless procedures, and minimum effort functions to be focused much. The addition of more offices, staff, and counters, with specialized training and counseling, should be there.

Himachal and Punjab circle having approval delays, needs to have early developments responsibly. Practical operability and reach using solar heating equipment, drones, and Heli taxis need to be worked.

Implications

The paper discusses the necessity of implementing mechanization and technological advancements in postal services to improve financial efficiency and enhance service delivery. It emphasizes potential areas for startups to introduce innovation in postal services, including self-service vending machines and automated teller systems. Suggested solutions will also have many positive benefits for the environment, including lesser pollution, renewable energy utilization, and low fuel ingesting.

Limitations

The study results are only confined to the department of posts in India with special reference to northwestern India, or in comparison with the relevant competing industries and sectors in India and abroad, given the similarity of economy, social environment, and other factors.

Future Research

An extension on demographic and psychographic dimensions with particular reference to individual products in specific regions, circles and national level, using a structured randomized study would be a fruitful extension. Same can be held with the postal and rural finance department of other international economies to test about the similarities and variations.

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CONSUMER PERCEPTION ON ELECTRIC VEHICLES: A CASE STUDY OF DEHRADUN AND LUCKNOW

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Abstract

For this study, a consumer perception structural model was prepared to know the perception level of consumers. Four points were considered: environmental concerns, driving range, vehicle prices, and infrastructure facilities. The study collected primary data from Dehradun and Lucknow vehicle owners through a structured questionnaire. The collected data were analyzed with the help of SPSS software and M.S. Excel. A consumer perception regression model was prepared to investigate consumer perceptions of vehicles. It was observed from the Consumer Perception Regression Model that the vehicle's driving range (x3) and the infrastructure facility for the vehicle (x4) variables were found to be positively related to consumer perception towards electric vehicles. On the other hand, explaining the relationship between the independent variable of environmental concern(x1) and the price of electric vehicles (x2) was also necessary, which is negatively associated with the consumer perception level in the prevailing situation. It may be concluded from the results that the interest in using electric vehicles is increasing among vehicle users and shifting their desire to have electric vehicles. The population in survey areas is very much conscious about a clean environment and better health issues. There is a bright future in the market for

electric vehicles, and they are contributing a significant role in reducing carbon dioxide levels and air pollution. The electric vehicle is a better option than fuel-based vehicles to protect the environment and the health of human beings on earth.

It may be concluded that the consumer perception towards electric vehicles depends on various factors, such as whether those are favourable or not favourable for electric cars. Where consumers live and have favourable or non-favourable conditions for electric vehicles.

Keywords: Consumer perception, Electric Vehicle, Environmental Concern, Driving Range, Price of Vehicles, Infrastructure Facility

Introduction

Consumer Perception is consumers' opinions, feelings, and beliefs about the brand. It is essential in building customer loyalty, retention, brand reputation, and awareness. Under consumer perception, four points are taken into account. To measure the Perception level of the consumer towards electric and non-electric vehicles.

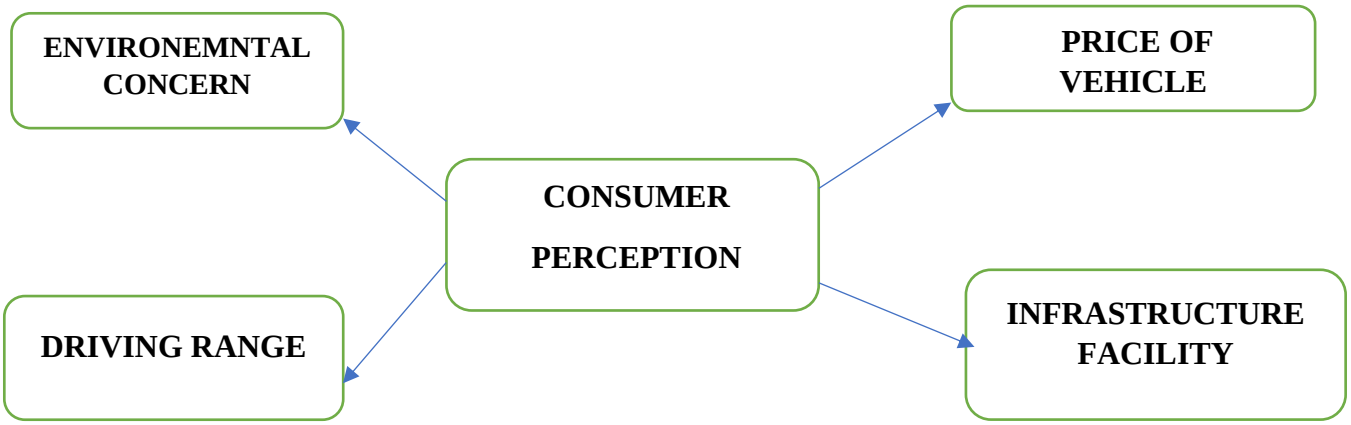
Environmental Concern: The environment can be a total of all the living and non-living elements, and their effect influences human life and their surroundings. The living or biotic elements are animals, plants, forests, fisheries, and birds; non-living or abiotic elements include water, land, sunlight, rock, and air. Environment refers to the surroundings in which life exists on Earth. Components like animals, human beings, sunlight, water, trees and air, temperature, and wind make up the environment. They are Earth's living and non-living components. Living organisms, including trees, humans, and animals, are closely related to consumer views/perceptions.

Price of Vehicles: The value of vehicles fixed by the company or agency for disposal to the purchaser.

Driving Range: The driving range of the vehicles is the crucial parameter that attracts consumer interest in purchasing the vehicles. This includes the mileage of the vehicles covered in 1 litre of fuel, whether vehicles are electric engines or other than this.

Infrastructure Facility: Infrastructure Facility directly affects the purchaser's perception of consumers towards the vehicles. This includes the type of road, charging points and quality of electric vehicle batteries.

STRUCTURAL MODEL OF CONSUMER PERCEPTION



Review of Literature

Naor M & et al. (2015), this paper is explored how a company developed an environmentally friendly innovation that attempted to address diffusion issues. The purpose is to describe the ways an electric vehicles (EV) infrastructure company, in partnership with a major car manufacturer. The author tried to address barriers to the diffusion of an environmentally friendly innovation during the development stage and improve the likelihood of success and lessons learned from its failure.

Lakshmi.S & Muthumani's (2016) study determines consumers' purchase decisions and behaviour towards quality products. Acceptance of a brand depends mainly on the consumers' opinions. The study investigated consumers' views, attitudes, and beliefs about brand quality. The convenience sampling method has been adopted to identify samples from the population. SPSS package was used to analyse the data using the chi-square test and multiple regression analysis. It is concluded that brands win the battle for awareness. Brand awareness is the battle of mind; thus, it cannot be won without in-depth knowledge of one's strengths, weaknesses and competitive outlook—the study insights into consumer perception governing purchase decisions.

Bennett . R., & Vijaygopal, R. (2017) investigate the effects of gamification on connections between consumers' self-image congruence about the purchasers of environmentally friendly products, Electric Vehicles (EVs). The attitudes towards EVs, their levels of environmental concern, and prior knowledge of EVs. Additionally, the research explored the willingness to purchase EVs.

Bhalla P, & et al. (2018), this paper studied the factors influencing the consumer acceptance of electric vehicles. The result shows that environmental concern and

consumer trust in technology are the antecedent factors for the perception of Electric vehicle purchase. Cost, infrastructure, and social acceptance are the factors that give adoption a blowback. Thus, to promote sales of electric vehicles, the government has to play a leading role by creating environmental policy and infrastructure and subsidising the cost of cars or lowering the bank's interest rate.

Acharya .S. (2019) shows that the automobile sector produces harmful gases, i.e. carbon dioxide and adds to the environment. Promoting green vehicles to reduce their effect on the environment is necessary. Concerning environmental issues, the world has unforeseen natural calamities like floods, famine, earthquakes, tsunamis, etc. This report essentially provides an in-depth study of customers' attitudes and perceptions towards Green Vehicles. It tries to answer fundamental questions affecting consumers' awareness level and preference for an environment-friendly car over a standard one.

Tupe O, Kishore.S &Johneira A. (2020) suggested that with the current depletion of fossils and its price hike, there is a need for other energy resources to run the vehicles. The automobile sector considers Electric Vehicles a situation for industry and the environment. However, the current market penetration of EVs is relatively low despite the government's implementation of EV policies.

Hussain M & et al. (2020) studied global warming as one of the most acute challenges in the world, prominently caused by greenhouse gases. Introducing hybrid Vehicles (HVs) is one of the industrial initiatives that tackle this challenge, allowing at least some proportionate reduction in global gas emissions. Such initiates like HVs have also affected the consumers' green-purchase intention (GPI). Hence, underpinned by the theory of planned behaviour (TPB), this study aims to analyse consumers' response in terms of GPI for HVs, in addition to exploring the moderating effect of price-sensitivity between the independent variables (Attitude subjective norms and perceived behavioural control) and consumers' GPI for HVs.

Thomas V, A. V.S Abhilash & V Pillai, S (2021) analysed the consumer perception and purchase intention of electric vehicles in India. The results clearly illustrate that the population knows the environmental benefits. Because environmental sustainability is one of the significant concerns to be addressed, electric vehicles would ultimately aid in achieving the same as the carbon emissions from electric cars, which are almost 90% lower than those of conventional vehicles.

Objectives

- To study the consumer perception toward electric vehicles.
- To compare the perception level of consumers of Lucknow and Dehradun.

Research Methodology

Sampling

Purposive and random sampling techniques were used to select areas, states, districts, and respondents and collect data. At first, the stages, i.e. Uttarakhand and Uttar Pradesh, were chosen for study based on the availability of electric and non-electric vehicles in the state and getting local support easily compared to other areas.

In the second stage, one district from each state, i.e. Lucknow from Uttar Pradesh and Dehradun from Uttarakhand, was finally selected for the present study. Keeping given helping hand availability in these districts during the data collection, the above districts were selected.

In the third stage, a list of the electric vehicle owners and other conventional vehicle holders was collected from the respective RTO office, and 500 respondents (250 from each district) were selected by following lottery systems/random sampling methods.

Finally, the primary data were collected from the selected households by conducting a personal interview with the vehicle's owner through the survey method.

Sample Size

The present study sampled 500 households or respondents (250 from each district) selected from two different districts belonging to separate states: Dehradun District in Uttarakhand and Lucknow District in Uttar Pradesh.

Likert Scale

A Likert Scale is a closed-ended survey question that measures a participant's opinion on a series of statements. Likert Scale can have five, seven, or nine points depending on the depth level required from respondents. The scale is named after Rensis Likert, who developed the method in 1932 to determine respondent attitudes towards a topic.

This study applied a five-point Likert scale weightage score ranging from 1 to 5, i.e. strongly disagree (1), disagree (2), Neutral (3), agree (4), and strongly agree (5). The respondent's opinions and views were recorded as weightage scores for analysing consumer perception in the automobile sector.

Multiple Regression

The perception of consumers may be positive or negative personal. The relation between the dependent variable (Y) (consumer perception) and explanatory variables, i.e. x1, x2, x3, and x4, were tested in the four mathematical /statistical models, namely linear, log-linear, and semi-log models. First, the four mathematical models were tested, and the results were compared in the form of the value of the coefficient regression determinant ($\mathbf{R^2}$) of different models. The correlation coefficient value of independent parameters and their relationship with the dependent variable were considered and compared with each mathematical model. The best-fit criteria were followed, and the model was selected based on the value of coefficient regression determinants (R2) and a significant number of correlation coefficients of independent variables used and relation with the dependent variable at a substantial level were the criteria for selecting the best-fit model for further analysis and interpretation of the result. In the present situation, the log-linear mathematical model was found suitable and used in the second stage of running the data.

Data Analysis and Interpretation

Table 1 Classification of Respondents' Fuel-Basis of different types of Vehicles

Fuel Based	**No of Respondents**		**Overall**
	Dehradun	**Lucknow**	
Electric	150 (60)	200 (80)	350 (70)
Diesel	19 (7.6)	1 (0.4)	20 (4)
Petrol	64 (25.6)	19 (7.6)	83 (16.6)
Petrol +CNG	10 (4)	21(8.4)	31 (6.2)
Both Petrol and Diesel	7 (2.8)	3 (1.2)	10 (2)
Both Petrol and Petrol	0 (0)	6 (2.4)	6 (1.2)
Total	250 (100)	250(100)	500 (100)

Source: Author's Primary survey data, Figures in parenthesis Indicate the percentage of total

The above table revealed the classification of respondents based on the types of different fuels used in the vehicles in both the survey areas, i.e. Dehradun and Lucknow. It was seen from the table that, overall, nearly 10 per cent of owners had doubled the number of conventional fuel-based vehicles compared to electric cars. It was further

observed from the table that 2.8 per cent of the respondents in Dehradun city and 3.6 per cent of respondents in Lucknow city had double conventional fuel vehicles in the survey areas. The table further revealed that nearly 20 per cent of respondents had only single-fuel base vehicles, i.e. petrol or diesel. The single conventional fuel vehicle users saw higher (33 per cent) in the case of the Dehradun as a counterpart of Lucknow (8 per cent). However, it is interesting to mention here that the number of electric vehicle users was higher (80 per cent) in the case of Lucknow as against Dehradun (60 per cent).

Table 2 Age-wise and gender-wise distribution of sample households

Age Group	**Male**		**Female**		**Total**		**Overall**
	Dehradun	**Lucknow**	**Dehradun**	**Lucknow**	**Dehradun**	**Lucknow**	
<20	8 (1.6)	6 (1.2)	4 (0.8)	2 (0.4)	12 (2.4)	8 (1.6)	20 (4.0)
20-29	30 (6.0)	40 (8.0)	4 (0.8)	8 (1.6)	34 (6.8)	48 (9.6)	82 (16.4)
30-39	104 (20.8)	112(22.4)	8 (1.6)	10 (2.0)	112 (22.4)	122 (24.4)	234(46.8)
40-49	70 (14.0)	60 (12.0)	2 (0.4)	2(0.4)	72 (14.4)	62 (12.4)	134(26.8)
>50	20 (4.0)	10 (2.0)	0 (00)	0 (00)	20 (4.0)	10 (2.0)	30 (6.0)
Total	**232(46.4)**	**228(45.6)**	**18(3.6)**	**22(4.4)**	**250 (50)**	**250 (50)**	**500 (100)**

Source Author's Primary survey data, Figures in parenthesis Indicate the percentage to total.

The table shows respondents' age- and gender-wise classification, and five age groups used the vehicles in survey areas. It is observed from the table that the majority of the sample households belong to the age group of 30-39 years (46.8 per cent), followed by the 40-49 age group (26.8 per cent) and the age group of 20-29(16.4 per cent). The other age group is the less utilised vehicle. This may be due to less availability of family members below the age of 20 and more than 50. These age group members used the vehicles only on casual, personal, and occasion, i.e., students going to school or the market when required. The people attending the office are aged more than 50.

It is further observed from the table that women who are using vehicles occasionally used vehicles for their personal use as well as commercial purposes belong to the age group of 30-39, followed by 20-29 and 40-49 in both survey areas but slightly higher in case of Lucknow than that of Dehradun who were contributing their services in the different activities of family and helping to the family members.

Table 3 Occupation-wise distribution of respondents

Occupation	Dehradun			Lucknow			Total		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Commercial Based Driving	170 (34)	0(00)	170 (34)	170 (34)	0(00)	170 (34)	340 (68)	0(00)	340 (68)
Personal purposes	62 (12.4)	18(3.6)	80 (16)	58 (11.6)	22(4.4)	80 (16)	120 (24)	40(8)	160 (32)
Total	232 (46.4)	18(3.6)	250 (150.6)	228 (45.6)	22(4.4)	250 (50.6)	460 (92)	40(8)	500 (100)

Source: Author's Primary survey data. Figures in parenthesis Indicate the percentage of the total.

Table No-3 shows the distribution of sample respondents based on their full-time engagement in driving operations who adopted their driving skills as a source of income using personal vehicles and hiring out their services to other vehicles. Another category of the respondents was driving vehicles, especially need-based ones, for which they were not paid for driving work. It is further seen from the table none of the females in the survey areas were hiring out their driving skills as a source of income for the family. Still, on the other hand, the reverse situation was observed where females were helping in various types of need-based activities like taking children from school, local markets, and other petty activities for which the vehicles were required. This indicated that hardly any females were allowed by their family members to drive jobs on a hire-out basis. In the overall situation, 68 per cent of sample households were engaged in a full-time driving job in survey areas.

Table 4 Classification of Respondents based on Monthly Income

Income	Male		Female		Total		Overall
	Dehradun	**Lucknow**	**Dehradun**	**Lucknow**	**Dehradun**	**Lucknow**	
Less than 25000	160 (32)	150 (30.0)	1 (0.2)	2 (0.4)	161 (32.2)	152 (30.4)	313 (62.6)
25000-50000	14 (2.8)	8 (1.6)	2 (0.4)	4 (0.8)	16 (3.2)	12 (2.4)	28 (5.6)
50000-75000	25 (5.0)	3(0.6)	5 (1.0)	4 (0.8)	30 (6.0)	34 (6.8)	64 (12.8)
75000-100000	18 (3.6)	20 (4.0)	6 (1.2)	7 (1.4)	24 (4.8)	27 (5.4)	51 (10.2)

More than 100000	15 (3.0)	20 (4.0)	4 (0.8)	5 (1.0)	19 (3.8)	25 (5.0)	44 (8.8)
Total	**232 (46.4)**	**228 (45.6)**	**18 (3.6)**	**22(4.4)**	**250 (50)**	**250 (50)**	**500 (100)**

Source: Author's Primary survey data, Figures in parenthesis Indicate the percentage of total

The respondents who have vehicles at home for their personal/private use and commercial purposes were classified according to their family income during the survey year. The table shows that five income groups of respondents have vehicles in their possession. It is seen from the table that overall, nearly 70 per cent of sample households have a monthly income less than Rs.50,000 per month, whereas, at the district level, Dehradun has a higher number of respondents as compared to Lucknow who have a monthly family income less than Rs.50,000 per month. This indicated that the Dehradun respondents' income level was better than the Lucknow respondents. It is further noticed from the table that nearly 13 per cent of households have a monthly income of between Rs. 50,000 and Rs 75000. However,10 per cent of respondents have a monthly income of between Rs.75000 to 100000 in the overall situation.

The table shows that 9 per cent of respondents come from families with higher incomes whose monthly income is more than 1 lakh. It is clear from the table that families with a monthly income of more than 75000 may have a permanent income source as employees in private reputed companies or government offices that belong to central or state governments. In this situation, it is necessary to mention here that the majority of government employees who have vehicles higher nearly (5.5percent) in the Lucknow survey area than that of Dehradun (4.8 per cent) households who have their family income between Rs 75000 to more than Rs 1 lakh. It was necessary to mention here that the females employed in any reputed organization earning and contributing to the family income were found to be higher (1.4 percent) in Lucknow than in Dehradun (1.2 percent). This indicated that females in these families had liberty and were allowed to work in the offices and contribute their potential to family development. It was notified here from the table that families with a monthly income between the Rs.50000-Rs.75000 range help in the family development activities so that their family may stand firmly against forthcoming challenges.

Table-5 Reliability Test using Cronbach Alpha Method

Reliability Statistics			
Factors	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	**Number of Items**
Consumer Perception	.834	.837	18

Source: Author's Primary survey data

The consumer perception toward electric vehicles' reliability was estimated using the Cronbach alpha Likert scale with 5 points, with the help of 18 items, using 500 samples, and the size was 0.834. This value is more significant than 0.7, which is considered suitable for the internal consistency of the respondent's views. It is also notable here that the estimated values above 0.51 were supposed to be up to the mark. The consumer perception in which 18 items were considered for estimation and value was more than 0.51. The respondents expressed their view in favour of vehicles, which indicated strong support from most vehicle users.

Consumer Perception Index of Electric Vehicle Users

Maximum =Mean +SD and Minimum=Mean-SD

The formula used for the Percept Index of vehicles user $= \frac{\text{Total weightage score of respondents}}{\text{No.of major factor}}$

Table 6 Consumer Perception Index of Electric Vehicle Users

Sr. No	**Factor**	**Category**	**Dehradun**		**Lucknow**	
			Index Value	**No. of Respondents N=150**	**Index value**	**No. of respondents N=200**
1	Environmental Concern	Lower	Less than 317.26	19(12.67)	Less than 378.51	45(22.5)
		Medium	Between 317.26 to 505.65	100(66.67)	Between 378.51 to 521.57	120(60)
		Higher	More than 505.65	31(20.67)	More than 521.57	35(17.5)
2	Price of Vehicles	Lower	Less than 313.92	15(10)	Less than 393.42	30(15)
		Medium	Between 313.92 to 503.52	100(66.67)	Between 393.42 to 549.66	139(69.5)
		Higher	More than 503.52	35(23.33)	More than 549.66	31(15.5)

3	Driving Range	Lower	Less than 307.76	50(33.33)	Less than 369.96	28(14)
		Medium	Between 307.76to 445.26	74(49.33)	Between 369.96 to 496.62	113(56.5)
		Higher	More than 445.26	26(17.33)	More than 496.62	59(29.5)
4	Infrastructure Facility	Lower	Less than 303.45	42(28)	Less than 383.93	38(19)
		Medium	Between 303.45 to 493.89	58(38.67)	Between 383.93 to 522.91	112(56)
		Higher	More than 493.89	40(26.67)	More than 522.91	50(25)
5	Consumer Perception	Lower	Less than 1224.96	33(22)	Less than 1540.79	37(18.5)
		Medium	Between 1224.96 to 1937.68	85(56.67)	Between 1540.79 to 2085.79	113(56.5)
		Higher	More than 1937.68	32(21.33)	More than 2085.79	50(25)

Source: Author's Primary survey data, Figures in parenthesis Indicated the percentage to total

The consumer perception index of electric vehicles was estimated with the help of five parameters, i.e., environmental concern, money value or budget of the cars, driving range, infrastructure facilities, and purchase intention for electric vehicles. Under environment factors four questions were asked from the respondents. Electric vehicles protect the environment from pollution and save for future generations. Respondents were given a weightage value to individual questions based on their mind's priority. The weightage value given range from 1 to 5 Likert scale weightage. With the help of the weightage value, the family weightage score was prepared, and the mean and standard deviation from the weightage score were estimated. The lower and upper limits of the index were classified and presented in Table 6. Most sample respondents were under the medium index group, indicating that the environment is essential for good health and a better life. 13% of respondents from Dehradun and 23% from Lucknow were unsatisfied with the environmental factors in the lower index category.

Another critical factor was the market value or price of electric vehicles/money value. This having four questions reflects the perception level of consumers, i.e. the price of electric cars, replacement cost of the electric battery, vehicles may not be expensive, and maintenance cost was affordable. The table shows that 67 per cent of households in Dehradun and 70 per cent of respondents in Lucknow were satisfied with the existing questions asked at the time of the interview and came in the range of medium index

value. This indicated that most respondents were satisfied with the features available in the vehicles, which became profitable for electric vehicle holders.

The driving range of the electric vehicles indicates how much distance can be covered by the fully charged battery without taking a rest. Currently, electric cars generally cover nearly 35-40 miles, i.e. 65-70 km, in one time fully charged battery. There were many factors affecting the driving range of electric vehicles. The significant points related to a driving range, engine capacity power, battery types, engine controlling system, temperature reflect the battery, wind velocity, and speed. The slow speed increases the battery's life span, land surface and direction of the driving; upper side or higher alleviation requires more electric power comparatively going down side. Most of the respondents were satisfied with the features available in the driving range of electric vehicles. The higher number of respondents (50 per cent) were in the medium index driving range in Dehradun, and 57 per cent of respondents in Lucknow were in the medium index. It was further observed from the table that 33 per cent of respondents belong to a lower index value of the driving range in Dehradun. It was clear from the data that undulated surface area controlled the speed of vehicles. This is true in the case of Dehradun. The undulated surface area is the factor that reduces the speed of electric cars.

Under the factor's infrastructure facilities, the five questions were taken into account for the opinion of respondents, i.e., battery charging time, recharging facilities, dependency on electricity for charging the battery and poor infrastructure facilities in terms of road condition. It was found that most sample households were satisfied with the available facilities in the survey cities. The value of the infrastructure index indicated that nearly 28 per cent of respondents in Dehradun and 19 per cent of respondents in Lucknow city were not satisfied with the existing infrastructure facilities. This may indicate that the infrastructure facilities for charging the electric batteries, road conditions and quality of electric batteries need to be improved.

Table 7 Distribution of respondents according to support to different parameters of questions (in percentage) related to consumer perception (Electric Vehicles)

Factors	**Percentage of Respondents**		
	Dehradun	**Lucknow**	**Overall**
Environmental Concern			
EC1: Electric vehicles are friendly for the environment as they have low emissions.	95.33	85.00	89.71
EC2: Electric Vehicles can protect the environment from pollution.	92.67	86.50	89.71
EC3: Electric Vehicles save the environment from global warming.	90.00	86.50	88.00
EC4: Electric vehicles save the environment for future generations.	90.00	82.50	85.71
Total	**92.00**	**85.50**	**88.14**
Price of vehicles			
PV1: Price of an EV is expensive as compared to conventional vehicles	92.00	86.50	88.86
PV2: Replacement cost EVs battery is high	91.33	87.00	88.86
PV3: Electric Vehicles are inexpensive to use.	89.33	86.00	87.43
PV4: Maintenance cost is average	83.33	87.50	85.71
Total	**89.00**	**86.75**	**87.71**
Driving Range			
DR1: Electric Vehicles are more convenient for short trip than long trip	86.00	83.50	84.57
DR2: Driving of electric vehicles reduce dependency on fuel.	87.33	85.00	86.00
DR3: Electric vehicles is not safe for long range drive.	83.33	85.50	84.57
DR4: Electric vehicles have automated driving system	83.33	80.00	81.43
Total	**85.00**	**83.50**	**84.14**
Infrastructure Facility			
IF1: Electric Vehicles take a long recharging time.	93.33	85.50	88.86
IF2: Recharging is inconvenient	99.33	85.50	91.43
IF3: Infrastructure is well situated for EV.	96.67	80.00	87.14
IF4: Depend on electricity	86.67	86.00	86.28
Total	**94.00**	**84.25**	**88.43**
Purchase intention of Electric vehicles			
PI1: Next time I buy an Electric Vehicle	95.33	89.00	91.71
PI2: I have the intention to drive electric vehicles soon	88.67	87.50	88.00
Total	**92.00**	**88.25**	**89.86**

Source: Authors' Calculation

The table revealed that consumer perception is related to different parameters that contribute to an effective role in the perception level of customers. The four questions interviewed the respondents, who have a crucial role in increasing or decreasing the perception level of the consumers. The conventional vehicles release emission gases and pollute the air and became global problem have negative effect on human life. The emission gas production (carbon dioxide) may be checked using electric vehicles sample households of the survey. Electric vehicles protect the environment from pollution, as reported by 88 per cent of sample households in the overall situation where it lies between 85 per cent to 92 reported by the per cent of respondents of Dehradun and Lucknow, respectively.

The price of electric vehicles was a factor that affected consumers' purchase decisions. From the table, 87 per cent of sample households gave their view and were satisfied with the existing price of electric vehicles, while the remaining respondents were not. The battery problem and maintenance cost were unfavourable, reported by nearly 11 per cent, and 14 per cent of respondents were in the survey areas. Electric vehicle prices were affordable, as reported by the majority (89 per cent) of sample households in both survey areas. However, only 8% of Dehradun and 13% of Lucknow sample households reported that their economic condition was not affordable enough to buy electric vehicles at the existing price.

The vehicles' driving range is one factor that affects consumer perception level. Electric cars were not suitable for long trips and for more people to travel at a time in vehicles. This condition was applicable only in the case of two-wheeler and three-wheeler electric vehicles due to the lower capacity of the battery. These vehicles may not run more than 12 hours after getting one -time recharge.

Infrastructure facilities have a close relationship with consumer perception. Suitable and better infrastructure facilities have a higher level of perception of the consumers, while the reverse was true in the case of poor infrastructure facilities. From the overall situation, 88 percent of respondents were satisfied with the existing infrastructure facility available in both areas. In survey areas, 94 per cent of Dehradun and 84 per cent of people expressed satisfaction with existing infrastructure facilities.

Table 8 Distribution of respondents according to support in 5 points Likert scale Consumer perception (in percentage) Dehradun

Factors	**Types of Vehicles**	**Percentage of respondents**				
		Strongly Disagree (1)(%)	**Disagree (2)(%)**	**Neutral (3)(%)**	**Agree (4)(%)**	**Strongly Agree (5)(%)**
Environmental Concern	EV	1.17	5.33	1.50	78.17	13.83
	NEV	4.75	8.75	14.50	63.00	9.00
Price of Vehicle	EV	1.67	7.17	2.17	74.67	14.33
	NEV	3.00	6.75	9.75	70.75	9.75
Driving range	EV	2.50	9.30	3.17	69.66	15.33
	NEV	2.75	10.00	16.00	63.00	8.25
Infrastructure Facility	EV	1.67	3.67	1.17	84.50	9.50
	NEV	3.00	7.75	14.75	63.00	11.50
Purchase Intention	EV	1.00	5.67	1.33	80.33	11.67
	NEV	2.50	8.50	11.00	68.5	9.50

Source: Authors' Calculation

Consumer perception towards electric and non-electric vehicles relates to different factors viz; environmental concern, price of cars, driving range and infrastructure facility and consumer purchase intention of vehicles. The majority of the respondents disagreed with three conditions, varying from 4 per cent (infrastructure facility) to 9 per cent (driving range) in the case of electric vehicles, indicating that features of electric vehicles need to be updated, which is suitable for new generations. The condition in which respondents did not express their views had a neutral opinion, and few respondents were found to strongly disagree about the different factors of both.

Table -9 Distribution of respondents according to support in 5 points Likert scale Consumer perception (in percentage) Lucknow

Factors	**Types of vehicles User**	**Percentage of respondents**				
		Strongly Disagree(1) (%)	**Disagree (2) (%)**	**Neutral (3) (%)**	**Agree (4)(%)**	**Strongly Agree(5) (%)**
Environmental Concern	EV	2.50	9.37	2.87	60.38	24.88
	NEV	3.00	13.00	10.00	66.50	7.50
Price of Vehicle	EV	2.00	8.75	2.75	62.13	24.37
	NEV	4.00	13.00	11.50	65.00	6.50
Driving Range	EV	2.63	10.50	3.37	62.00	21.50
	NEV	2.50	8.50	10.50	71.50	7.00
Infrastructure Facility	EV	2.75	9.97	3.13	62.75	21.50
	NEV	2.50	9.50	9.50	71.50	7.00
Purchase Intention	EV	1.75	7.50	2.50	65.00	23.25
	NEV	3.00	13.00	10.00	67.00	7.00

Source: Authors' Calculation

Consumers' opinion towards electric vehicles and non-electric vehicles about different consumer perception factors, i.e. environmental concern, price of vehicles, driving range and infrastructure facility and purchase intention, together have a relation with the consumer's perception. It was observed from the table that nearly 15 per cent of sample households were not satisfied with electric vehicles because of unfavourable, i.e. environmental conditions. Most respondents disagreed about all the four factors and varied between nearly 9 percent to 13 percent in case of electric vehicles. It was observed from the table that the price of vehicles reported a lower number (9 per cent) of respondents and the driving range 11 per cent of respondents disagreed with the existing driving range, i.e. 30-40 km per hour at a continuous time. 10 per cent and 9 per cent of respondents disagreed with infrastructure facility and environmental concerns, respectively.

Consumer Perception Regression Model.

Y=f (X_1+X_2+X_3+X_4…….Xn+€)

Whereas, Y=Dependent Variable, f=function, X_1,X_2,X_3 ,….. Xn =Independent variables

β1, β2…… βn=Correlation Coefficient, €=Error

Y= Consumer Perception weightage score (CPWS)

$\mathbf{X_1}$ = Environmental Factor weightage score of Customer view (ECSC)

$\mathbf{X_2}$ = Purchase Price weightage score of Customer view (PPSC)

$\mathbf{X_3}$= Product Quality weightage score of Customer view (PQSC)

$\mathbf{X_4}$= Infrastructure Facility weightage score of Customer view (IFSC)

€ = Error

Multivariate Regression Model Equation

CPWS = **β1** ECWS +**β2** PPSC +**β3** PQSC +**β4** IFSC +**€**

Table-10 Consumer Perception Regression Model Dehradun

Particular	**Details**	**Correlation Coefficients**				**R^2**
Intercept	0.74247	$\mathbf{x_1}$	$\mathbf{x_2}$	$\mathbf{x_3}$	$\mathbf{x_4}$	0.91037
Variable	4	-0.07304 (0.002016)	-0.05383 (0.0069)	0.02011 (0.00217)	0.01499 (0.00272)	
D.F	145					
Calculated t Value		-36.2318	-7.7172	9.23298	5.5136	

Source: Authors' Calculation, Figures in Parenthesis indicated the standard error value.

Consumers' Perception indicates the personal opinion of the human being about commodities, goods, and services. The result shows that the value of $\mathbf{R^2}$ was 0.9103, pointing to all four parameters having a close association with the dependent variable. It shows that 91.03 per cent variation in the explained variable was due to the independent variable, and the remaining 8.97 per cent variation may be due to the residual effect on the multiple coefficient regression determinant ($\mathbf{R^2}$). It was further seen from the table that the vehicle's driving range (x3) and the infrastructure facility for the vehicle (x4) variable were found to have a positive relation with consumer perception towards electric vehicles. The value of the correlation coefficient was 0.020 for the driving range **($\mathbf{x_3}$)** and 0.014 for the infrastructure facility ($\mathbf{x_4}$), indicating that if a 1 per cent value change of the driving range variable and infrastructure facility variable increased in the form of weightage score, the impact was positive on the dependent variable (consumer perception) by 2.01% and 1.49% variation occurred in

the dependent variable with increasing two variables, respectively. It is also seen from the table that the independent parameters were found statistically significant at a 1 per cent level of significance on 145 degrees of freedom. On the other hand, it was also necessary to explain the relationship between the independent variable of environmental concern(x1) and the price of electric vehicles (x2) having a negative association with consumer perception level in the present time or condition prevailing or faced by consumers. Both variables were statistically significant at a 1 percent level of significance at 145 degrees of freedom. The negative relation of these parameters may be unfavourable and non-acceptable conditions of consumers and negative feelings in consumer minds towards electric vehicles.

Table-11 Consumer Perception regression model of electric vehicles (Lucknow)

Particular	**Details**	**Correlation Coefficients**				**R^2**
Intercept	0.70651	**x_1**	**x_2**	**x_3**	**x_4**	0.85389
Variable	4	-0.43035 (0.01684)	-0.56903 (0.06505)	0.338606 (0.02216)	0.441551 (0.02788)	
D.F	195					
Calculated t Value		-25.5483	-8.74756	15.28019	15.83373	

Source: Authors' Calculation. Figures in parenthesis indicate the value of standard error.

Consumer perception towards electric vehicles was tested by using four mathematical models, i.e. linear regression model, log-linear mathematical model, semi-log (log taken dependent variable) and semi-log (log taken independent variable). It was analysed at the first stage for finalising the best fit mathematical model for further analysis. The value of multiple determinants, called the coefficient regression determinant (R2), is 0.8538, indicating that together, four independent variables have an 85.38 per cent close relation with the dependent variable, and the remaining 14.62 per cent effect was residual on regression determinants (**R^2)**. It was further observed from the table that variable driving range (**x_3**) and infrastructure facility (**x_4**) having coefficient correlation values 0.3386 and 0.4415 indicated that 1 per cent level of driving range and infrastructure facility increased the value of dependent variable increased by 33.86 percent, and 44.15 percent, this shown the variation in the dependent variable. These two variables were statistically significant at a 1 percent level of

significance of 195 degrees of freedom in the case of Lucknow. It was interesting to mention here that the same variables were statistically significant in the case of Dehradun at 145 degrees of freedom. Surprisingly, the relationship between the variable environmental concern (x1) and the price of electric vehicles (x2) was found to have a negative relation with the dependent variable (consumer perception) observed from the result shown in Table 11. It was further noticed that the value of the correlation coefficient of environmental concern (x1) was -0.43035, and the price of vehicles (x2) was -0.5690, indicating that the level of x1 and x2 increased by 1 percent. The variation came in the dependent variable by 43.03 percent and 56.90 percent due to said independent variables. These variables were statistically significant at a 1 percent significance level at 195 degrees of freedom. This indicates that environmental concerns and the price of electric vehicles were not favourable to consumer perception.

Findings

1. The majority of the sample households belong to the age group of 30-39 years (46.8 percent), followed by the 40-49 age group (26.8 percent) and the age group of 20-29(16.4 percent). The other age group is the less utilized vehicle.
2. It is seen from the table that overall, nearly 70 percent of sample households have a monthly income of less than Rs.50,000 per month, whereas, at the district level, Dehradun has a higher number of respondents as compared to Lucknow, who have a monthly family income less than Rs.50,000 per month.
3. Consumer perception of electric vehicles' reliability was estimated using the Cronbach alpha Likert scale with 5 points and 18 items, using 500 sample sizes of 0.834.
4. Overall, 88 per cent of respondents were satisfied with the existing infrastructure facility in both areas. In survey areas, 94 per cent of Dehradun and 84 per cent of people expressed satisfaction with existing infrastructure facilities.
5. It has been observed from the survey areas that consumer perception is apparent in terms of infrastructure facilities, driving range of the vehicles, environmental concern of the area, and price of vehicles may together increase or decrease according to the better and lower level of facilities available in the survey areas.

6. The result shows that vehicle users are interested in shifting their choice of electric vehicle use or purchasing compared to conventional fuel vehicles, i.e., diesel, petrol, and other traditional fuels such as CNG, LPG, etc.
7. It was further seen from the table that the driving range of the vehicle (x3) and the infrastructure facility for the car (x4) variable were found to have a positive relation with consumer perception towards electric cars. On the other hand, it was also necessary to explain the relationship between the independent variable of environmental concern(x1) and the price of electric vehicles (x2) having a negative association with consumer perception level in the present time or condition prevailing or faced by consumers.

Conclusion

It is concluded from the results that the interest in using electric vehicles is increasing among vehicle users and shifting their desire to have electric cars.

From the above facts, it may be concluded that the population in survey areas is very conscious about a clean environment and better health. There is a bright future in the market for electric vehicles, and they are contributing a significant role in reducing carbon dioxide levels and air pollution. The electric vehicle is a better option than fuel-based vehicles to protect the environment and the health of human beings on earth. It may be concluded that the consumer perception of electric cars depends on various factors, such as whether those are favourable or not for electric vehicles. where consumers live and have favourable or non-favourable conditions for electric cars.

Suggestion

- It may suggest that better quality electric battery vehicles must be manufactured.
- They suggested that the quality of electric vehicles needs to be improved to reduce the maintenance cost of vehicles.
- It may be suggested that recharging facilities at an approachable level must be created at a priority level by the government or social trust so that consumer perception towards electric vehicles may not be hurt.

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SUSTAINABLE INDUSTRIAL DEVELOPMENT THROUGH CARBON CREDIT TRADING IN FINANCIAL MARKETS

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Abstract

This study examines the role of carbon credit trading in promoting sustainable industrial development in India. Focusing on the period post–2023, the research explores the challenges and opportunities presented by carbon trading, particularly for small and medium-sized enterprises (SMEs). The research relies on secondary data from government reports, academic journals, and industry publications to assess the regulatory framework and financial incentives supporting carbon trading. The thematic analysis highlights key trends, while the comparative analysis offers insights from both developed and developing nations. Findings indicate that carbon credit trading incentivizes cleaner industrial practices and fosters economic growth. However, SMEs face significant barriers, including high costs, limited market access, and complex regulations. The study underscores the importance of government regulations and financial incentives in facilitating participation in carbon markets, ultimately contributing to sustainable industrial development in India. These findings have implications for policymakers and industry leaders seeking to enhance the effectiveness of carbon trading as a tool for environmental sustainability.

Keywords: Financial market, Sustainable Industrial Development, Carbon Credit Trading

Introduction

In recent decades, concerns about climate change and environmental degradation have spurred global efforts to promote sustainable development. Among the critical sectors driving the global economy, industrial development is often seen as a significant contributor to environmental challenges, particularly in terms of carbon emissions. The industrial sector is a major consumer of resources and energy, which contributes to the depletion of natural resources and leads to large-scale carbon emissions. In response to these environmental challenges, countries and industries worldwide are exploring sustainable methods of industrial growth, aiming to balance economic development with environmental preservation.

One of the most prominent mechanisms introduced to address carbon emissions and promote sustainable industrial practices is carbon credit trading. Rooted in the broader framework of market-based environmental policies, carbon credit trading allows industries and companies to offset their carbon footprint by purchasing carbon credits, which represent the right to emit a certain amount of carbon dioxide or equivalent greenhouse gases. These credits are either allocated by governments under cap-and-trade systems or generated through voluntary measures, such as investing in renewable energy projects or reforestation.

The underlying principle of carbon credit trading is simple industries that cannot immediately reduce their emissions can buy credits from entities that have achieved more significant reductions. This creates a financial incentive for industries to either adopt sustainable practices or invest in carbon-reducing projects. The more industries reduce their emissions, the more credits they can sell, providing a monetary reward for their environmental efforts. On the flip side, industries that continue emitting at high levels must bear the cost of purchasing credits, which encourages them to seek more eco-friendly solutions over time.

The Role of Financial Markets

Financial markets play a pivotal role in carbon credit trading, as they provide the infrastructure for trading these credits and facilitate price discovery. These markets operate much like commodity exchanges, where carbon credits are bought, sold, and traded based on supply and demand dynamics. By integrating carbon credit trading into

financial markets, industries are incentivized to reduce emissions not only for regulatory compliance but also for financial gain. The liquidity, transparency, and efficiency of financial markets can further enhance the effectiveness of carbon trading systems, making it easier for businesses to engage in sustainable practices.

Sustainable Industrial Development

Sustainable industrial development refers to the growth of industries that meet present economic needs without compromising the ability of future generations to meet their own. It encompasses the adoption of cleaner technologies, the reduction of resource consumption, and the minimization of environmental impacts. Through carbon credit trading, industries can achieve sustainable growth by shifting towards greener processes, investing in renewable energy, and reducing their overall carbon footprint.

Carbon credit trading thus serves as a crucial mechanism for sustainable industrial development. It helps industries transition towards more eco-friendly practices without sacrificing economic growth. By putting a price on carbon emissions, it integrates environmental costs into the decision-making process of industries, promoting a shift towards sustainable innovation. Furthermore, as financial markets for carbon credits mature, they will likely attract greater participation from both industries and investors, driving further advancements in sustainable industrial practices.

Challenges and Opportunities

While carbon credit trading offers considerable potential for promoting sustainability, it also faces several challenges. One key challenge is the pricing of carbon credits, which can vary based on market conditions and regulatory frameworks. If carbon credits are priced too low, there may be little incentive for industries to adopt greener practices. Conversely, if prices are too high, industries may face financial strain, especially those operating in developing economies.

Additionally, the effectiveness of carbon credit trading depends on robust regulatory oversight to prevent market manipulation and ensure that carbon credits represent genuine emission reductions. Transparency and accountability are crucial to the success of these markets, as stakeholders need to trust that the credits they are trading correspond to actual environmental benefits.

Despite these challenges, the opportunities presented by carbon credit trading are immense. As industries increasingly recognize the financial benefits of reducing emissions, carbon trading markets are likely to expand, attracting more investment in green technologies and sustainable industrial practices. Moreover, the integration of

carbon credits into financial portfolios allows investors to align their financial objectives with environmental goals, creating a win-win scenario for both the economy and the environment.

Review of Literature

Ankita Verma & Manish Gupta (2021) "Carbon Trading in India: A Tool for Achieving Sustainable Development Goals." The objective this paper to analyse how carbon trading can help India meet its Sustainable Development Goals (SDGs), particularly in industrial emissions reduction. This paper support by Policy analysis and empirical review of carbon trading initiatives in India. This paper examines carbon trading is a powerful tool for aligning industrial growth with sustainable development, but India needs to improve its institutional frameworks to maximize the benefits of carbon trading.

Chandrashekhar Singh & Nandini Sharma (2018) "Carbon Credit Trading: Its Impact on India's Industrial Sector." The Objective of this paper is that to analyse the impact of carbon credit trading on India's industrial sector and its role in promoting sustainable development. For this paper research is based onempirical analysis based on data from Indian industries participating in the carbon credit market. This paper highlights that Carbon credit trading has encouraged Indian industries to adopt cleaner technologies, but challenges like regulatory issues and limited awareness hamper its full potential.

Madhavi Joshi & Rajiv Kumar (2016) "The Role of Carbon Markets in India's Sustainable Industrial Growth." The objective of this paper is to evaluate the role of carbon markets in fostering sustainable industrial growth in India, focusing on industrial emissions. For this paper data collected through secondary sources for Survey of Indian industries engaged in carbon trading and carbon markets. This paper explored that the carbon market in India is still evolving, with mixed success. While some industries have successfully reduced emissions, many remain unaware or unprepared to participate in carbon trading.

Arvind Subramanian & T. Ramesh (2013) "Industrial Sustainability through Carbon Credit Trading in Indian Manufacturing Sector. "The objective of this study to explore how carbon credit trading is influencing sustainability practices in India's manufacturing sector. The section of research methodology covers qualitative interviews with key industry players and analysis of carbon credit transactions in the

manufacturing sector. This study highlights that carbon credit trading has encouraged certain manufacturing industries to invest in eco-friendly technologies, but its overall impact is limited due to regulatory bottlenecks and lack of technical knowledge.

Richard T. Drayton & Gregory T. Wigley (2012) "The Carbon Market Paradox: Efficiency vs. Sustainability." The Objective of this paper to investigate the paradox between achieving carbon market efficiency and ensuring long-term sustainability in industrial practices. The research methodology section covers Empirical analysis of global carbon markets, focusing on efficiency gains and sustainability metrics in industries participating in emissions trading. Findings of this paper discover that while carbon markets have improved efficiency in reducing emissions, they often fall short in promoting true sustainability due to the focus on short-term profits and market volatility.

Benjamin K. Sovacool& Marilyn A. Brown (2010) "Carbon Trading for Climate Change Mitigation: A Critical Review. "The objective of this paper to critically evaluate the effectiveness of carbon trading as a tool for climate change mitigation, with a focus on global policy implications. The research methodology section covers A meta-analysis of international carbon trading schemes, including the EU Emissions Trading System (EU ETS) and the Clean Development Mechanism (CDM). This paper carbon trading can mitigate climate change when properly regulated, but issues such as lack of stringent enforcement and manipulation of carbon prices reduce its potential effectiveness.

S. Ghosh (2010) "Carbon Credits and Sustainable Development: An Indian Perspective." The objective of this study is to study the potential of carbon credits in promoting sustainable development in India, focusing on the energy and industrial sectors. In this paper data gathered through case study analysis of various Indian energy and industrial projects that have earned carbon credits. This paper explored that carbon credits have been a valuable tool for fostering sustainable development in India, but stricter regulations and financial incentives are needed to ensure wider adoption across industries.

Karen L. Palmer & Dallas Burtraw (2007) "Combining Carbon Trading with Renewable Energy Policies." The Objective of this study is to explore how carbon trading can be effectively combined with renewable energy policies to achieve industrial sustainability. For this study research methodology section cover a comparative case study analysis of regions that have implemented both carbon trading

and renewable energy policies. This study highlights that carbon trading, when integrated with renewable energy initiatives, can accelerate industrial decarbonization, but it requires coordinated policy efforts and market incentives to be effective.

David G. Victor & Joshua C. House (2006) "A New Currency: Climate Change and Carbon Credits." The objective of this to analyse the role of carbon credits as a new form of economic currency and their impact on global trade and industrial sustainability. In research methodology section, using case studies from both developed and developing countries, a theoretical review of the economic impact of carbon credits. Findings of this study carbon credits can promote industrial sustainability and economic benefits if integrated into global financial systems, but their success depends on equitable access to carbon markets for all countries.

ChristophBöhringer& Andreas Löschel (2005) "Climate Policy Beyond Kyoto: The Role of Carbon Trading." Objective of this paper is to evaluate the potential role of carbon trading in international climate policy post-Kyoto Protocol, focusing on its implications for industrial sectors. The research methodology section covers a combination of policy analysis and economic modelling to project the long-term impact of carbon trading on emissions reduction and industrial sustainability. This study highlights that Carbon trading is essential for global climate policy, but its success relies on the implementation of strong regulatory frameworks and international cooperation.

Research gap

- Limited research on carbon trading in emerging economies like India compared to developed countries.
- Lack of detailed studies on how different industries are impacted by carbon trading.
- Need for studies assessing the long-term sustainability of carbon trading initiatives.
- Insufficient evidence on how to effectively combine carbon trading with renewable energy policies.
- Need to explore the challenges that small and medium-sized enterprises face in participating in carbon trading.

Research Objectives

- To analyse the impact of carbon credit trading on sustainable industrial development in India.

- To identify the barriers faced by industries, especially small and medium-sized enterprises, in participating in carbon credit trading.
- To assess the role of government regulations and financial incentives in facilitating carbon credit trading.

Research Methodology

This study employs a descriptive research design, relying on secondary sources, data collected from various sources, including academic journals, government reports, industry publications, and relevant databases. Thematic analysis is utilized to identify key trends and challenges related to carbon credit trading and its effectiveness. Comparative analysis focuses on insights from both developed and developing nations to highlight differences in implementation and outcomes.

Impact of carbon credit trading on sustainable industrial development in India:

1. Introduction to Carbon Credit Trading

Carbon credit trading is a market-based mechanism aimed at reducing greenhouse gas (GHG) emissions. Companies that reduce their emissions below a certain threshold earn carbon credits, which they can sell to other companies that exceed their emission limits.

2. Regulatory Framework

The Indian government has established a robust framework for carbon credit trading. The Ministry of Power notified the Carbon Credit Trading Scheme in 2023, which outlines the roles of various stakeholders and sets GHG emission intensity reduction targets. The Bureau of Energy Efficiency (BEE) and the Central Electricity Regulatory Commission (CERC) play key roles in administering and regulating the market.

3. Strategic Drivers

Several strategic drivers are crucial for the sustainable implementation of carbon credit trading in India:

- **Risk Management**: Identifying and mitigating risks associated with carbon credit trading.
- **Reward and Opportunity**: Leveraging financial and ecological benefits.
- **Regulatory Compliance**: Adhering to national and international regulations.

4. Economic Impact

Carbon credit trading incentivizes industries to adopt cleaner technologies and reduce emissions. This can lead to cost savings and new revenue streams from selling excess

credits. It also attracts foreign investment and enhances the global competitiveness of Indian industries.

5. Environmental Impact

By promoting the reduction of GHG emissions, carbon credit trading contributes to environmental sustainability. It encourages industries to adopt renewable energy sources and energy-efficient practices, thereby reducing their carbon footprint.

6. Social Impact

Projects generating carbon credits often have co-benefits such as job creation, improved public health, and community development. These projects align emission reductions with broader social and economic development goals.

7. Challenges

Despite its benefits, carbon credit trading faces several challenges in India:

- **Market Volatility**: Fluctuations in carbon credit prices can affect market stability.
- **Regulatory Uncertainty**: Changes in policies and regulations can create uncertainty for businesses.
- **Awareness and Participation**: Limited understanding and participation among smaller industries.

Barriers faced by industries, especially small and medium-sized enterprises:

1. Financial Constraints

- **High Initial Costs**: Implementing carbon reduction technologies and practices often requires significant upfront investment, which can be prohibitive for SMEs.
- **Limited Access to Capital**: SMEs often struggle to secure financing for green projects due to perceived risks and lack of collateral.

2. Lack of Awareness and Expertise

- **Knowledge Gaps**: Many SMEs lack awareness about carbon credit trading mechanisms and the potential benefits.
- **Technical Expertise**: Limited access to technical knowledge and expertise needed to measure and manage carbon emissions effectively.

3. Regulatory and Policy Challenges

- **Complex Regulations**: Navigating the complex regulatory landscape can be daunting for SMEs, especially with frequent changes in policies.
- **Lack of Supportive Policies**: Insufficient government incentives and support for SMEs to engage in carbon credit trading.

4. Market Barriers

- **Volatility in Carbon Credit Prices**: Fluctuations in the price of carbon credits can create uncertainty and financial risk for SMEs.
- **Limited Market Access**: Smaller enterprises may find it challenging to access carbon credit markets dominated by larger players.

5. Resource Constraints

- **Human Resources**: SMEs often have limited staff and cannot dedicate personnel to manage carbon credit trading activities.
- **Time Constraints**: The time required to understand and participate in carbon credit trading can be a significant burden for SMEs.

6. Measurement and Verification

- **Complexity in Measurement**: Accurately measuring and verifying carbon emissions reductions can be technically challenging and costly.
- **Lack of Standardization**: Inconsistent standards and methodologies for carbon accounting can create additional hurdles.

Addressing these barriers requires targeted support from the government, financial institutions, and industry bodies to create a more inclusive and supportive environment for SMEs in the carbon credit trading market.

Role of government regulations and financial incentives in facilitating carbon credit trading:

1. Regulatory Framework

Governments establish the legal and regulatory framework for carbon credit trading. This includes setting emission reduction targets, defining the rules for carbon credit generation and trading, and ensuring compliance.

Key elements include:

- **Cap-and-Trade Systems**: Governments set a cap on total emissions and issue allowances or credits that can be traded. Companies that reduce emissions below their cap can sell excess credits.

- **Emission Reduction Targets**: National and international targets drive the demand for carbon credits. For example, the Paris Agreement sets binding targets for countries to reduce their greenhouse gas emissions.

2. Financial Incentives

Financial incentives are essential to encourage participation in carbon credit trading. These can include:

- **Subsidies and Grants**: Governments provide financial support to companies investing in clean technologies and emission reduction projects.
- **Tax Incentives**: Tax breaks and credits for companies that reduce their carbon footprint or invest in renewable energy projects.
- **Low-Interest Loans**: Financial institutions, often backed by government guarantees, offer favourable loan terms for green projects.

3. Market Development

Governments play a pivotal role in developing and maintaining carbon credit markets:

- **Market Infrastructure**: Establishing platforms for trading carbon credits, ensuring transparency, and preventing fraud.
- **Standardization**: Creating standardized methodologies for measuring and verifying emission reductions to ensure the integrity of carbon credits.

4. Monitoring and Enforcement

Effective monitoring and enforcement mechanisms are vital to ensure compliance and maintain market integrity:

- **Verification and Reporting**: Regular audits and reporting requirements to verify that emission reductions are genuine and accurately reported.
- **Penalties for Non-Compliance**: Imposing fines and penalties on entities that fail to meet their emission reduction commitments.

5. International Cooperation

Governments collaborate internationally to harmonize carbon credit trading rules and facilitate cross-border trading:

- **Global Agreements**: Participation in international agreements like the Paris Agreement to align national policies with global climate goals.
- **Technical Assistance**: Providing support to developing countries to build their capacity for participating in carbon credit markets.

Conclusion

Carbon credit trading has the potential to drive sustainable industrial development in India by incentivizing industries to adopt cleaner technologies, reduce emissions, and participate in a global low-carbon economy. The regulatory framework established by the Indian government, alongside international agreements, plays a key role in fostering this market. However, challenges remain, particularly for small and medium-sized enterprises (SMEs), which face financial, technical, and regulatory barriers to participation.

While larger industries benefit from better access to capital and expertise, SMEs struggle with high upfront costs, limited market access, and a lack of standardized carbon accounting methods. Addressing these barriers will require stronger government support, such as more inclusive financial incentives, targeted subsidies, and capacity-building initiatives. Government regulations and financial incentives remain essential in creating a stable, transparent, and efficient carbon trading market. By improving market infrastructure, standardizing measurement systems, and ensuring compliance through enforcement, carbon trading can be a powerful tool for achieving India's sustainable development goals.

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AN ANALYSIS OF THE CAUSES OF STRESS AND METHODS FOR MANAGING STRESS AMONG YOUNG PEOPLE

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Abstract

Stress is a mental state of pressure experienced by individuals facing challenges related to their environment and social well-being, often leading to various health issues. Youth is a particularly critical phase of life, marked by significant changes and expectations. During this period, young individuals are often seen as the future leaders of society, making it essential for them to develop effective stress management skills to ensure a healthy transition into adulthood. As young people navigate this stage, they must adapt to new environments, build relationships with unfamiliar people, and deal with numerous life changes. The pressures they face during this time are substantial. Therefore, understanding the sources of stress in youth and identifying effective coping strategies are crucial.Research indicates that major sources of stress among youth include academic demands, interpersonal conflicts, relationship issues, life transitions, and career planning. Such stress can manifest in psychological, physical, and behavioral problems. This study investigates the root causes of stress in young individuals and emphasizes the importance of fostering a supportive environment during their developmental stages. Encouraging a positive upbringing, promoting outdoor activities, and creating a conducive learning atmosphere with minimal exposure to negative stressors are essential strategies. These measures can help mitigate the harmful effects of stress and contribute to healthier development. The findings of this study are valuable for students, educators, scholars, career advisors, and counselling centres.

Keywords: Stress, symptoms, stressors, youth, effects

Introduction

In today's competitive world, reports indicate that the younger generation experiences higher levels of stress. Cases of depression, suicide attempts, and various psychological symptoms are increasingly prevalent among youth. Instances of mental health issues, such as academic dropout, depression, and even suicide, highlight the pressing need to address stressors affecting college students. Fortunately, there is growing awareness about the factors contributing to stress among young individuals. Efforts are being made to foster environments that promote positive thinking and well-being. Both individuals and organizations have initiated various programs to help reduce stress and provide support.

Adolescence is a particularly vulnerable phase characterized by self-discovery and potential role confusion. For many, stress arises from academic pressures, interpersonal conflicts, relationship challenges, financial difficulties, and career uncertainties. This stress often manifests in psychological, physical, and behavioral problems, significantly impacting their well-being.

This study seeks to examine the stressors impacting modern youth and the emotional strategies they use to cope. By gaining insight into these aspects, the research aims to support improved emotional well-being and academic success, fostering smoother and more positive transitions into adulthood.

Literature Review

National Institute on Mental Health (2023) emphasizes the prevalence of stress and anxiety in adolescents, noting the impact on emotional regulation and mental health. The article underscores the importance of early intervention and provides strategies such as open communication and professional help to mitigate these issues National Institute of Mental Health National Institute of Mental Health

National Center for Complementary and Integrative Health (2023) discusses mind-body approaches such as mindfulness meditation, yoga, and other practices. These techniques are shown to reduce stress-related physiological responses and improve

emotional well-being. The resource highlights scientific backing for these interventions and their long-term benefits NCCIH

MedlinePlus (2023) focuses on recognizing when adolescent stress becomes problematic. It highlights symptoms like irritability, trouble sleeping, and withdrawal. Recommendations include creating a supportive environment and encouraging stress-reduction habits such as regular sleep, healthy eating, and physical activity National Institutes of Health (NIH)

National Institutes of Health (2023) provides a practical emotional wellness checklist, emphasizing regular exercise, mindfulness practices, and building strong social networks. These tips aim to enhance emotional resilience and prevent chronic stress National Institutes of Health (NIH) NIH News in Health

National Institute on Mental Health (2023) outlines helpful practices for managing stress, such as reframing stressful situations and seeking professional help when needed. The guidance includes leveraging cognitive-behavioral techniques to improve resilience National Institute of Mental Health

National Institutes of Health: News in Health (2023) explores stress management strategies to build resilience, such as setting realistic goals, maintaining a work-life balance, and engaging in enjoyable activities. It provides a balanced view of self-care and when to seek professional interventions NIH News in Health.

Office of Research on Women's Health (2023) highlights gender-specific responses to stress and the importance of resilience training. It recommends recognizing stress signals, practicing mindfulness, and fostering gratitude to manage stress effectively ORWH

American Psychological Association (2023) discusses trends in stress management across different age groups in the U.S., emphasizing coping mechanisms such as therapy, social support, and stress-reduction activities. The association identifies a need for greater awareness of stress impacts and accessible resources National Institute of Mental Health

Mayo Clinic (2023) offers actionable advice for stress management, advocating for regular physical activity, relaxation techniques like deep breathing, and a focus on positive thinking. The resource encourages integrating these habits into daily routines to prevent stress escalation National Institutes of Health (NIH) NIH News in Health

Centres for Disease Control and Prevention (2023) provides insights into public health approaches to managing stress, such as community-based programs and educational campaigns. The CDC emphasizes addressing stress early to prevent its physical and mental health repercussions.

Social Support Networks Maintaining connections with friends, family, and mentors helps alleviate stress by creating a support system. This approach is supported by findings from the *American Psychological Association* (2023) and *National Institute on Mental Health* (2023) National Institute of Mental Health NIH News in Health

Professional Guidance Consulting mental health professionals for cognitive-behavioral therapy (CBT) or counselling is recommended for severe stress and anxiety, as highlighted by the *Centers for Disease Control and Prevention* and *National Institutes of Health* NIH News in Health ORWH

Digital Tools for Stress Management Digital interventions, such as mobile apps for mindfulness and stress tracking, provide accessible means for young people to manage their stress. The *National Institute on Mental Health* (2023) discusses their growing popularity among adolescents National Institute.

Sources of Stress

Threats

Whenever we fear something or feel its threat looming over us, we enter a stressful state. For example:

- A threat can be losing a job.
- A threat can be incurring a loss in business.
- A threat can be not progressing in life.

- A threat can be having a conflict with someone. Any kind of fear puts us in a stressful situation.

Frustration

Sometimes, we feel disturbed or troubled due to certain things or individuals. Negative situations or negative people around us can also push us into stressful situations, leading to frustration and stress.

Pressure

Whenever we find ourselves in a pressure-filled situation, it invites stress. Pressure can come in many forms, such as:

- Pressure to earn profits.
- Pressure to achieve sales targets.
- Pressure to maintain a relationship.
- Pressure to move ahead in life.
- Pressure to achieve success.

All these pressures can lead to stress in our lives.

Conflict

The fourth source of stress is conflict, which can cause significant tension. In human life, we build many relationships with others, and everyone has different opinions. While some opinions may align with ours, others might not. This disagreement can lead to conflict. Whenever we find ourselves in a situation of conflict, it often results in stress.

Causes of Stress Among Students

Stressors are the events or situations that trigger stress, ranging from physical dangers to everyday challenges like giving a class presentation or managing a tough academic schedule. Some of the major stressors faced by students include:

Academics:

Academic pressure is a significant source of stress for students concerns about performance often lead to symptoms like anxiety, sleep, disturbance, or changes in appetite and mood., many students, as noted by more house state university, struggle

with poor study habits and often cram for exam for last minute. The fear of exam, heavy work load, and a constant stream of assignments are primary causes of stress among university student.

Finances:

Financial issues are another common stressor for young people. Many students lack a steady income, and those with part-time jobs often find their earnings insufficient to meet their needs. The pressure to maintain a desired lifestyle or afford items like mobile phones, bikes, or cars can create significant stress if these demands go unmet.

Relationships:

Navigating relationships, whether friendships or acquaintanceships, is another major source of stress. The desire for meaningful connections can become stressful when students struggle to make or maintain friendships, leading to feelings of isolation or inadequacy.

Career Concerns:

Career-related stress is increasingly prevalent among students. High competition, fear of job insecurity, and the pressure to perform can negatively impact mental and physical well-being. Students often worry about finding job opportunities after graduation and struggle to cope with the intense competition in the job market.

Time Management:

Poor management of time is another critical stressor. academic Balancing, extracurricular activities, and personal life can be overwhelming. Adding a part-time job to the mix makes it even more challenging. The inability to effectively manage time often results in heightened stress levels among students.

Research Methodology

The data for this study was collected through a questionnaire survey aimed at young individuals, including students and professionals working in different organizations. Both primary and secondary sources of information were utilized in the data collection process.

Objectives of the Study

- To examine the symptoms of stress experienced by young individuals.
- To assess the intensity and levels of stress among young people.
- To explore the coping strategies adopted by young individuals to manage stressors.

Research Design

The study's sample consisted of young males and females randomly selected from the regions of Pauri Garhwal District, Uttarakhand in India. A total of 310 questionnaires were distributed, and 220 valid responses were collected.

Data was gathered using a structured questionnaire divided into three sections. The first section focused on identifying symptoms of stress, the second explored potential stressors, and the third examined coping strategies used by the youth. To meet the objectives of the study, both primary and secondary data sources were employed. Primary data was collected through the structured questionnaire and further enriched by discussions with students.

Data Collection

Data Sources:

- **Secondary Data**: Information was gathered from various sources, including the internet, magazines, journals, and books.
- **Primary Data**: Collected using a structured questionnaire.
- **Contact Method**: Involved direct communication with respondents.
- **Personal Interaction**: Engaged through face-to-face discussions to enhance data reliability.

The questionnaire consisted of three key sections: The first section assessed various stress symptoms using a seven-point scale. The second section explored the causes of stress through 25 statements measured on a ten-point scale and last section covers the ten coping strategies.

Data Analysis and Interpretation

The respondents are from the different places of Pauri Garhwal District, Uttarakhand India, some are working and some are doing studies. The table shows that total numbers of respondent were 220.The maximum respondent belong from the age group 21-22 years i.e. 40.45%, 23-24 represents 55 years ie 25%, up to 20yrs represents and 19.09% from >23years. The male respondents are 130 and female are 90. Maximum respondents are from the income level of 10000 to 20000/. Respondent are from the environment where single parent working.

Table 1: Distribution base on age

Age	**No**	**%**
Up to 20Years	42	19.09
21-22 Years	89	40.45
23-24 years	55	25.0
Above 25 years	27	12.27
No Response	7	2.27
Total	**220**	**100**

Table 2: Gender - Based Distribution

Gender	**No**	**%**
Male	134	60.90
Female	86	39.090
Total	220	100.00

Table 3: Distribution Based on Family Monthly Income.

Income	**No**	**%**
Up to Rs 10000	36	16.36
Rs. 10000 – Rs. 20000	50	22.72
Rs. 20001 – Rs. 30000	38	17.27

Rs. 30001 Rs. 40000	25	11.36
Rs. 50000 -Rs Above	28	12.72
No Response	43	19.54
Total	**220**	**100.00**

The table illustrates the employment status of parents. It reveals that 13.63% of respondents have both parents working, while 86.36% have only one parent who is employed.

Table 4: Distribution According to Working Status of Mother

Working Status of Parents	**No**	**%**
Mother & Father Both Working	30	13.63
Working Father	190	86.36
Total	**220**	**100.00**

Stress Symptoms among youth

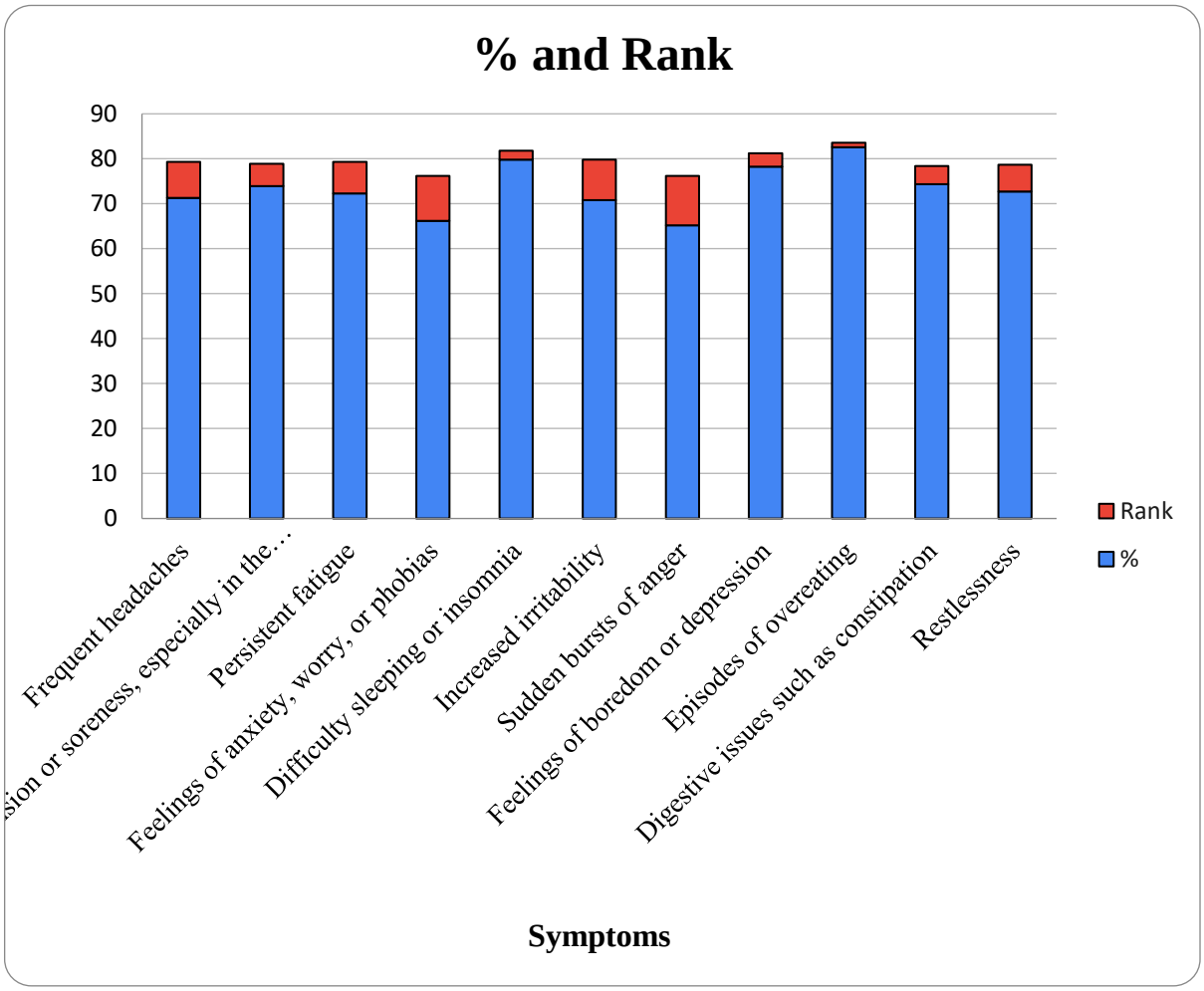
The findings, as presented in Table 5, reveal that students commonly experience stress and its associated symptoms. Depression is the most prevalent, affecting 81.60% of respondents, followed by insomnia (79.82%) and unhealthy eating habits (82.60%). A significant proportion of youth report struggles with depression, tension, and related challenges.

The contemporary lifestyle of young individuals is shaped by diverse ambitions. However, when these aspirations go unmet, it frequently results in stress. This stress often manifests with intense symptoms that hinder their concentration on academics or involvement in sports. Many tend to withdraw from family engagements and social interactions with peers. Furthermore, adolescents may resort to risky behaviours, such as experimenting with drugs or alcohol. Other prevalent concerns include loss of appetite and a decline in immunity.

Table 5: Symptoms

Symptoms	**%**	**Rank**
Frequent headaches	71.29	8
Muscle tension or soreness, especially in the neck	73.91	5

Persistent fatigue	72.30	7
Feelings of anxiety, worry	66.20	10
Difficulty sleeping	79.82	2
Increased irritability	70.84	9
Sudden bursts of anger	65.18	11
Feelings of boredom or depression	78.22	3
Episodes of overeating	82.60	1
Digestive issues such as constipation	74.38	4
Restlessness	72.69	6



Causes of Stress

The questionnaire results highlight various factors contributing to stress. Academics account for a stress level of 62.71%, while relationship-related stress emerges as the highest contributor, influenced significantly by the growing use of social media. Psychological factors are responsible for 72.34% of stress, financial stress affects 70.45% of the younger generation, and career-related stress impacts 68.49%. The elevated percentages across all stressors indicate the pressures of maintaining a modern lifestyle.

Table 6: Level of Stress of Each kind

Kind of stress		**Level of Stress**	**Rank**
Stress of Academic		62.71	5
Stress of Financial and Economic		70.45	3
Stress of Relationship		73.14	1
Future / Career Growth Stress		68.49	4
stress of Psychological		72.34	2
Overall Stress		**69.42**	

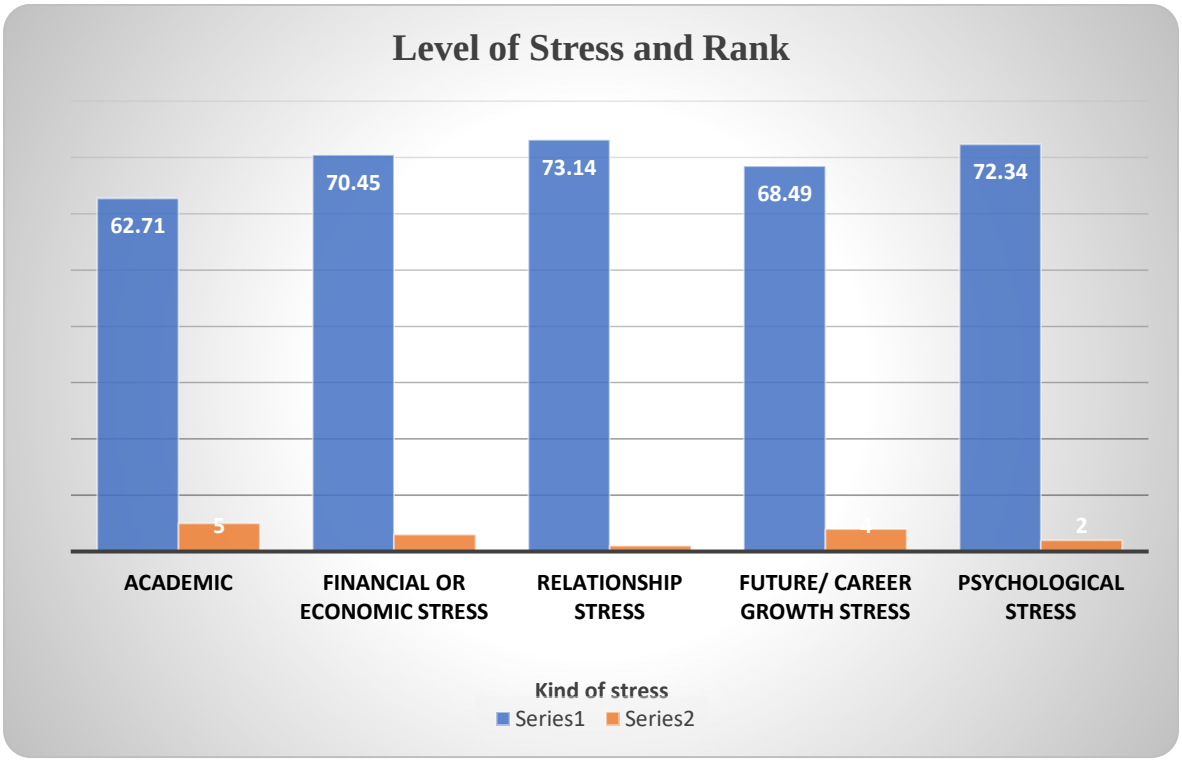
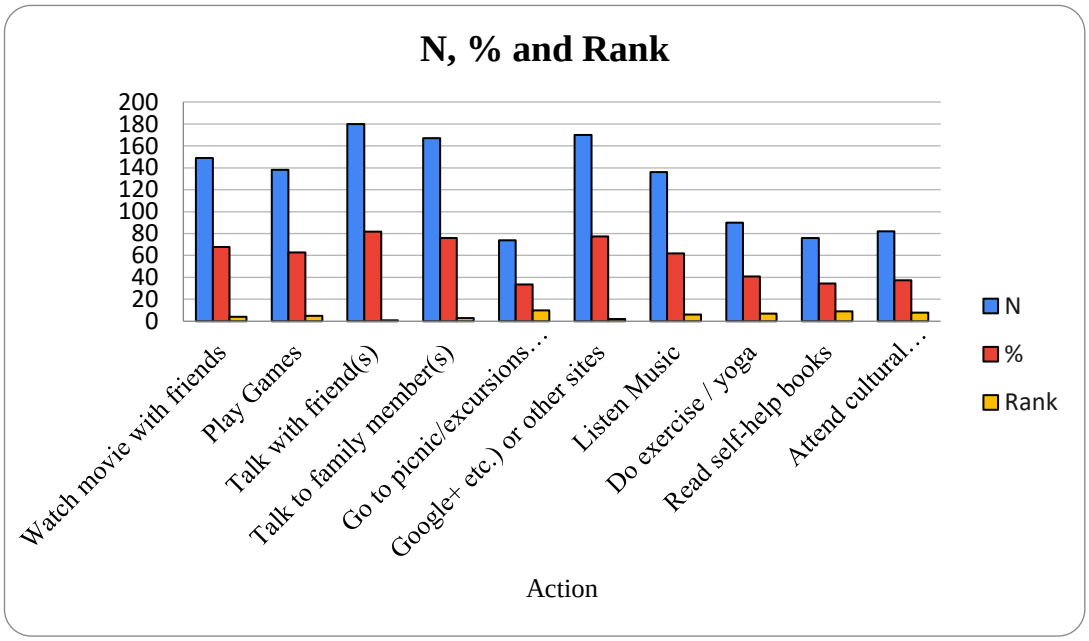


Table 7: Activity to Reduce Stress

Action	N	%	Rank
Watch movie with his friends	149	67.72	4
Games Play	138	62.72	5
Talk with his friends	180	81.81	1
Talk to Family Members	167	75.90	3
Go for Picnic /excursions use of Internet (social networking sites – face book	74	33.63	10
Google and other sites	170	77.27	2
Music Listen	136	61.81	6
Exercise & Yoga Practices	90	40.90	7
Study Self-help Books	76	34.54	9
Go for Cultural Programmes	82	37.27	8



Suggestions to Reduce Stress Among Youth

The youth are the backbone of any nation, serving as the future leaders and innovators. Therefore, addressing the causes, symptoms, and consequences of stress in students is crucial for their individual well-being and the overall development of society.

To mitigate stress among youth, the following strategies are recommended:

Organize Stress-Management Workshops: Integrating stress-reduction workshops and motivational sessions promoting a healthy lifestyle into academic curricula can inspire students to adopt positive habits and realize their inner potential.

Set Goals: Encourage youth to set clear personal and professional objectives to maintain focus and direction.

Stay Organized and Plan Ahead: Effective organization and planning help manage tasks efficiently, reducing the likelihood of feeling overwhelmed.

Practice Time Management: Properly allocating time for studies, extracurricular activities, and leisure ensures a balanced routine.

Stay Current with Coursework: Keeping up with assignments and studies prevents last-minute stress.

Engage in Extracurricular Activities: Participation in hobbies and recreational activities helps in relaxing and rejuvenating.

Maintain Family Communication: Regular interaction with family members provides emotional support and a sense of security.

Build Healthy Relationships: Cultivating meaningful friendships and positive social connections is essential for emotional well-being.

Express Thoughts and Share Problems: Sharing feelings and challenges with a trusted person can alleviate stress and provide fresh perspectives.

Focus on Self-Awareness: Getting to know oneself, including one's strengths and values, helps in building self-confidence and resilience.

Adopt Positive Thinking: Developing an optimistic outlook can improve coping mechanisms and reduce stress levels.

Enhance Life Skills: Adolescents should focus on building competencies, including academic, social, and life skills, to handle challenges effectively.

Embrace a Healthy Lifestyle: Consuming a nutritious diet and engaging in regular physical activity are vital for maintaining physical and mental health.

- Adolescents should dedicate time to unwind and engage in recreational activities.
- Young people should prioritize relaxation and participate in leisure pursuits.
- Teenagers should make time for enjoyable activities or relaxation.
- Adolescents should explore hobbies and spend time on recreational interests.
- Youth should focus on relaxing and engaging in activities they find enjoyable.
- Taking breaks to relax or pursuing hobbies is essential for adolescents.
- Adolescents should allocate time for leisure and develop interests in hobbies.
- Relaxation and recreational activities should be a part of every adolescent's routine.

Conclusion

The findings of the study reveal that stress levels among youth are alarmingly high. Common symptoms of stress include episodes of overeating, difficulty in sleeping and feeling of boredom or depression are most prevalent among students while feeling of anxiety, increased irritability are frequent headaches are found to be the least common symptoms. The primary causes of stress identified include stress of relationship issues, psychological pressures and financial challenges while stress of academics is found to be the least common cause of the stress among students. Further the study concludes that the most common activities to reduces stress among young people include talk with his friend, google and other websites, talk to family members while go for picnic or the use social networking sites and study self-help books are least common activities.

Many youths strive to maintain their social networks, often relying heavily on technology to do so. Career-related stress is another significant concern, with fears about job opportunities and survival in a competitive environment being particularly prominent. Young respondents highlighted coping strategies such as practicing meditation, getting adequate sleep, spending time with friends, and seeking counselling as effective ways to manage stress. However, it has been observed that the excessive use of social media is leading to a self-centred lifestyle among the younger generation. This over-reliance on technology reduces physical activity and limits meaningful

interactions with family and friends, further contributing to stress, depression, and even suicidal tendencies.

To tackle these challenges, young individuals should focus on setting clear goals with a structure plan, maintaining a balance use of technology, and opening to loves once about their emotions. These practices can promote a healthier more balanced, and stress -free life style.

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TIME SERIES ANALYSIS OF FISCAL PARAMETERS: A STUDY OF UTTARAKHAND STATE

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Abstract

Fiscal assessment after an interval gives the real picture and scenario of the economic performance. A wide range of economic activities affects the economic variables as a large scale which direct affect the fiscal health of an economy, considerably global economic pattern create the landscape for small level economies. The impacts of global economic activities also pump-up theeconomic boost as well as economic slowdown. In the case of Indian State 'Uttarakhand' very less attention given to carry out the fiscal stimulus in the State. However, the Revenue Deficit of the State is below critical situation and effective revenue deficit is also in superior state, the major troubles are in two key indicators also such as debt stance and primary deficit in the state. This paper will analysis the time series trend analysis of these pointer frameworks and will give appropriate suggestions to way forward in the pioneer fiscal soundness.

Keywords: Fiscal Deficit, Debt Sustainability, GSDP Growth Rate, Primary Deficit, Revenue Deficit, Debt to GSDP Ratio

Introduction

Stability in fiscal viability and fiscal consolidation determine the inner strength of economic independency, multi economic factors create a wide range of space and scope for economic righteousness. Some of the economic indicators drive the economy in falsehood an hallucination state, such variables represent significant progress and leap forward in economic development. These volatile factors create paradox and trade-off in the economy, the real outcome of the economy can be identifying with simultaneous economic agents and variables. Gross Domestic Product (GDP) used as a universal parameter to determine the economic development.

It is generalised if GDP of the economy shows the positive rays, there will be high employment, low poverty, low fiscal deficit, low revenue deficit, minimum primary deficit, low debt to GDP ratio etc. it is often quoted as trade-off among these variables. But, in actual economic world there may be paradox among these variables, in the case of our research area, it was identified that even higher GSDP does not strike on these supplementary economic indicators.

Review of Literature

Marcelo Piancastelli (1985) this paper discussed the detail update of the measurement of the tax effort made by governments in developed economies and less developed economies. And to measure the fiscal health various indicators has been used like, per capita income, trade to GDP, tax to GDP ratio moreover tax effort index has been used by the author to indicate the fiscal performance of the countries.

Atul Sharma (2002) this paper assessed the fiscal reforms initiated in the 90s by the governmentof India to improve the financial health of the Centre and the States. Only after 1991 governmentstarts thinking about to reduce the fiscal and primary deficit in the country's economy, which result the expenditure of the Central Government also came down.

Objectives of the Study

- To examine the revenue and expenditure of the Uttarakhand State government.
- To examine the tax to GDP ratio performance of Uttarakhand State.
- To examine the fiscal performance of Uttarakhand State.

Research Methodology

The present study is based on secondary data, and the research is qualitative and descriptive in nature. Coefficient of correlation is used to know the relationship between two variables, though coefficient assumes that there is linear relationship between the two variables either positive or negative. But the degree of correlation can be computed how, the two variables are related to one-another.

Methodology of VAR

In forecasting two or more time series, we have gone beyond the ARIMA and ARMA model andused Vector Autoregressive Models (VARs) for this purpose. Here in VAR, we have oneequation for each variable and each equation have only the lagged values of that variable and the lagged values of all other variables in the system. For the case of univariate time series, in VAR we need the time series to be stationary. When each variable in the VAR is stationary then each equation can be estimated by using ordinary least square method OLS. In the studies of macroeconomic problem, it is more common issue, where we have models in which some variables are not only exogenous variables for a given dependent variable; but also explained by the variables that they are used to determine. Therefore, in such cases we have simultaneous equation models, where it is necessary to identify the endogenous and exogenous variables of the system.

Model Used

There has been six various economic model used to analysis the fiscal indicators and their performance. For instance, in equation one fiscal deficit depends upon six variables and two lags of each variable. Similarly, six equations are constructed and each equation has six variables and one intercept and each variable has two lags.

Equation - 1:

$$\begin{aligned} \boldsymbol{FDEF} = {} & \boldsymbol{C_1 FDEF(-1) + C_2 FDEF(-2) + C_3}\left(\frac{\boldsymbol{Rev.Exp.}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1) + C_4}\left(\frac{\boldsymbol{Rev.Exp.}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_5}\left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1)} \\ & \boldsymbol{+ C_6}\left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_7}\left(\frac{\boldsymbol{Tax\ Rev}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1) + C_8}\left(\frac{\boldsymbol{Tax\ Rev}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_9 GSDP\ Growth(-1)} \\ & \boldsymbol{+ C_{10} GSDP\ Growth(-2) + C_{11} Tax\ Buo\ UTK(-1) + C_{12} Tax\ Buo\ UTK(-2) + C_{13}} \end{aligned}$$

Equation-2:

$$\begin{aligned} \left(\frac{\boldsymbol{Rev.Exp.}}{\boldsymbol{GSDP}}\right) = {} & \boldsymbol{C_{14} FDEF(-1) + C_{15} FDEF(-2) + C_{16}}\left(\frac{\boldsymbol{Rev.Exp.}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1) + C_{17}}\left(\frac{\boldsymbol{Rev.Exp.}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_{18}}\left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1)} \\ & \boldsymbol{+ C_{19}}\left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_{20}}\left(\frac{\boldsymbol{Tax\ Rev}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1) + C_{21}}\left(\frac{\boldsymbol{Tax\ Rev}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_{22} GSDP\ Growth(-1)} \\ & \boldsymbol{+ C_{23} GSDP\ Growth(-2) + C_{24} Tax\ Buo\ UTK(-1) + C_{25} Tax\ Buo\ UTK(-2) + C_{26}} \end{aligned}$$

Equation-3:

$$\begin{aligned} \left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right) = {} & \boldsymbol{C_{27} FDEF(-1) + C_{28} FDEF(-2) + C_{29}}\left(\frac{\boldsymbol{Rev.Exp.}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1) + C_{30}}\left(\frac{\boldsymbol{Rev.Exp.}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_{31}}\left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1)} \\ & \boldsymbol{+ C_{32}}\left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_{33}}\left(\frac{\boldsymbol{Tax\ Rev}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-1) + C_{34}}\left(\frac{\boldsymbol{Tax\ Rev}}{\boldsymbol{GSDP}}\right)\boldsymbol{(-2) + C_{35} GSDP\ Growth(-1)} \\ & \boldsymbol{+ C_{36} GSDP\ Growth(-2) + C_{37} Tax\ Buo\ UTK(-1) + C_{38} Tax\ Buo\ UTK(-2) + C_{39}} \end{aligned}$$

Equation-4:

$$\left(\frac{Tax\ Rev}{GSDP}\right) = C_{40}FDEF(-1) + C_{41}FDEF(-2) + C_{42}\left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{43}\left(\frac{Rev.Exp.}{GSDP}\right)(-2) + C_{44}\left(\frac{Debt}{GSDP}\right)(-1) + C_{45}\left(\frac{Debt}{GSDP}\right)(-2) + C_{46}\left(\frac{Tax\ Rev}{GSDP}\right)(-1) + C_{47}\left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{48}GSDP\ Growth(-1) + C_{49}GSDP\ Growth(-2) + C_{50}Tax\ Buo\ UTK(-1) + C_{51}Tax\ Buo\ UTK(-2) + C_{52}$$

Equation - 5:

$$GSDP\ Growth = C_{53}FDEF(-1) + C_{54}FDEF(-2) + C_{55}\left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{56}\left(\frac{Rev.Exp.}{GSDP}\right)(-2) + C_{57}\left(\frac{Debt}{GSDP}\right)(-1) + C_{58}\left(\frac{Debt}{GSDP}\right)(-2) + C_{59}\left(\frac{Tax\ Rev}{GSDP}\right)(-1) + C_{60}\left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{61}GSDP\ Growth(-1) + C_{62}GSDP\ Growth(-2) + C_{63}Tax\ Buo\ UTK(-1) + C_{64}Tax\ Buo\ UTK(-2) + C_{65}$$

Equation-6:

$$Tax\ Buo\ UTK = C_{66}FDEF(-1) + C_{67}FDEF(-2) + C_{68}\left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{69}\left(\frac{Rev.Exp.}{GSDP}\right)(-2) + C_{70}\left(\frac{Debt}{GSDP}\right)(-1) + C_{71}\left(\frac{Debt}{GSDP}\right)(-2) + C_{72}\left(\frac{Tax\ Rev}{GSDP}\right)(-1) + C_{73}\left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{74}GSDP\ Growth(-1) + C_{75}GSDP\ Growth(-2) + C_{76}Tax\ Buyo\ UTK(-1) + C_{77}Tax\ Buo\ UTK(-2) + C_{78}$$

Where,

$\boldsymbol{FDEF}$ **– Fiscal Deficit.**

$\left(\frac{Rev.Exp.}{GSDP}\right)$ **– Revenue Expenditure to GSDP ratio.**

$\left(\frac{Debt}{GSDP}\right)$ **- Debt to GSDP ratio.**

$\left(\frac{Tax\ Rev}{GSDP}\right)$ **- Tax Revenue to GSDP ratio.**

$\boldsymbol{GSDP\ Growth}$ **- GSDP growth rate of Uttarakhand.**

$\boldsymbol{Tax\ Buyo\ UTK}$ **– Tax buoyancy of Uttarakhand.**

Vector Auto Regressive (VAR) Model and Result interpretation

For the analysis purpose we first tested for stationarity test and then gone for co-integration test. After that, we use vector autoregressive model for estimation, as it has merits over single equation model like autoregressive distributed lag model (ARDL)**.** At first level, we tested the stationarity test, because a forecasting and reliability of the result depends on the nature and pattern of the data. It means, if we have data series, which do not havemean, variance, and

covariance constant over time then reliability of the result and forecasting based on that, would be in question. Therefore, the statistical properties must be unchanged with time.

(i) Constant Mean: E (y_t) = E (y_{t-k}) = □

(ii) Constant variance: E[y_t - □]^2=E [y_{t-k} -□]^2 = ε_0 = □^{2}>0

(iii) Constant covariance: E(Y_t -□) (Y_{t-k} - □)= ε_j.

Stationarity Result:-1 (DEBT _TO_GSDP_RATIO)

Null Hypothesis: D(DEBT_TO_GSDP_RATIO_IN_TH) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.652960	0.0595
Test critical values:	1% level	-4.728363	
	5% level	-3.759743	
	10% level	-3.324976	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 15

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(DEBT_TO_GSDP_RATIO_IN_TH,2)

Method: Least Squares

Date: 10/18/20 Time: 00:48

Sample (adjusted): 3 17

Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (DEBT_TO_GSDP_RATIO_IN_TH(-1))	-1.069910	0.292889	-3.652960	0.0033
C	1.135319	3.429498	0.331045	0.7463
@TREND("1")	-0.189146	0.349737	-0.540826	0.5985

R-squared	0.533939	Mean dependent var	-0.164000
Adjusted R-squared	0.456262	S.D. dependent var	7.537105
S.E. of regression	5.557755	Akaike info criterion	6.445122
Sum squared resid	370.6637	Schwarz criterion	6.586732
Log likelihood	-45.33842	Hannan-Quinn criter.	6.443614
F-statistic	6.873847	Durbin-Watson stat	1.909711
Prob(F-statistic)	0.010248		

In the process of determinants investigation, first we run the stationarity test and found that the variable debt to GSDP ratio is stationary at first. As in stationarity result – 1 the probability value is equal to 0.05, which reflect that the null hypothesis of having unit root is rejected at 5% level of significance. However, it was not stationary at level so we have taken first difference and after that it is found stationary. Considering the data generating process, we can observe that the variable debt to GSDP ratio is stationary at first difference with trend and intercept.

Stationarity Result:-2 (FISCAL_DEFICIT)

Similarly, the variable fiscal deficit also found non-stationary at level, but taking first difference it is found stationary. Its probability value at first difference is equal to 0.05. Which reflects that the null hypothesis of non-stationarity is not accepted and the variable fiscal deficit in Crore is stationary. The data generating process shows that the series is stationary with intercept.

Stationarity Result:-3 (GDP_GROWTH)

The stationarity test for GDP growth data series also depicts that the series is stationary at first difference. The probability value is equal to 0.05 at first difference means the data series do not have unit root or stationary at first difference.

Stationarity Result:-4 (REVENUE EXPENDITURE _GSDP Ratio)

The above table representing the stationarity test for the variable revenue expenditure to GSDP ratio. The data series is stationary with trend and intercept after taking first difference. This infers that the mean, variance, and co-variance is constant over time after taking first difference. The probability value of this test is 0.0409 which is less than 0.05 means the series do not have unit root and stationary in nature.

Stationarity Result:-5 (TAX_BUOYANCY IN THE STATE)

Similarly to the above given explanation, the data series related to tax buoyancy is stationary at first difference with intercept not with trend, as reflected by data generating process. Here null hypothesis of unit root is rejected and alternative hypothesis for stationarity of series accepted.

Stationarity Result:-6 (TAX_TO_GSDP RATIO IN UTTARAKHAND)

The variable tax to GDP ratio of Uttarakhand series is not stationary at level. Therefore, we have gone at first level and found the stationary data series at first difference. At first difference, the probability value is 0.0304, which is less than 0.05. The data generating process reflecting that after first difference the series stationary with intercept.

As the whole data series is stationary at first difference, we have tested for co-integration test which is found no co-integration. Therefore, we have gone for vector auto-regressive model (VAR model of estimation). The model used, has its own merits over single equation ARDL model. As it reduces the problem in single equation model and also captures the problem of simultaneity. By using this model, we shall be able to run regression and can investigate about the determinants and strength of a particular variable.

Result and Discussion: Determinants of Fiscal Performance

For the purpose of the determinants of fiscal performance, measurement of the relative strength of a particular variable and investigate the impact of past values of a variables on the present and future values of associated variables, present researcher used VAR model. The detailed methodology is mentioned in methodology.

Here we have estimated six models, because we have six variables (including all endogenous andexogenous variables). We have first tested the stationarity test of the data and found that the series are stationary at first difference (mentioned above in stationarity test result). After that we have gone for co-integration test and found no co-integration (variables are not co-integrated). Therefore, we used unrestricted VAR for our estimation the result is mentioned below.

VAR Result

Vector Autoregression Estimates
Sample (adjusted): 3 17
Included observations: 15 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	FISCAL_DEFICIT__	EXP_TO_GSDP_RATIO	DEBT_TO_GSDP_RATIO_IN_TH	TAX_REVENUE_TO_GDP	GDP_GROWTH	TAX_BUOYANCY_IN_THE_STAT
FISCAL_DEFICIT__(-1)	-1.055887	-0.003050	7.916097	-0.040217	1.821646	-0.422253
	(0.75843)	(2.78368)	(4.52065)	(0.98468)	(1.31888)	(0.61706)
	[-1.39221]	[-0.00110]	[1.75110]	[-0.04084]	[1.38121]	[-0.68430]
FISCAL_DEFICIT__(-2)	0.001543	1.382949	-0.020167	0.538358	1.988957	-0.076265
	(0.18433)	(0.67654)	(1.09869)	(0.23932)	(0.32054)	(0.14997)
	[0.00837]	[2.04414]	[-0.01836]	[2.24957]	[6.20506]	[-0.50854]
EXP_TO_GSDP_RATIO(-1)	0.342365	1.030938	0.568384	0.016144	0.301856	-0.015923
	(0.06411)	(0.23532)	(0.38215)	(0.08324)	(0.11149)	(0.05216)
	[5.33999]	[4.38105]	[1.48733]	[0.19395]	[2.70745]	[-0.30526]
EXP_TO_GSDP_RATIO(-2)	0.418579	-0.497537	-2.951640	-0.046799	-1.146729	0.188856
	(0.28868)	(1.05954)	(1.72067)	(0.37479)	(0.50200)	(0.23487)
	[1.44999]	[-0.46958]	[-1.71540]	[-0.12487]	[-2.28433]	[0.80410]
DEBT_TO_GSDP_RATIO_IN_TH(-1)	-0.091906	-0.124871	0.684379	-0.117699	-0.017543	-0.017836
	(0.10034)	(0.36828)	(0.59809)	(0.13027)	(0.17449)	(0.08164)
	[-0.91594]	[-0.33906]	[1.14428]	[-0.90347]	[-0.10054]	[-0.21848]
DEBT_TO_GSDP_RATIO_IN_TH(-2)	0.021025	-0.215680	-0.784664	-0.039012	-0.108221	0.049875
	(0.07088)	(0.26014)	(0.42246)	(0.09202)	(0.12325)	(0.05766)
	[0.29664]	[-0.82909]	[-1.85736]	[-0.42395]	[-0.87805]	[0.86492]
TAX_REVENUE_TO_GDP(-1)	0.576319	-1.489433	-9.113411	0.195741	-1.066308	0.217897
	(0.50431)	(1.85098)	(3.00595)	(0.65475)	(0.87697)	(0.41030)
	[1.14279]	[-0.80467]	[-3.03179]	[0.29895]	[-1.21590]	[0.53106]
TAX_REVENUE_TO_GDP(-2)	-0.622320	-0.341213	2.193463	-0.150591	0.559656	0.058733
	(0.45446)	(1.66803)	(2.70884)	(0.59004)	(0.79029)	(0.36975)
	[-1.36935]	[-0.20456]	[0.80974]	[-0.25522]	[0.70816]	[0.15885]
GDP_GROWTH(-1)	-0.595071	0.166848	2.576910	0.129753	-0.062597	-0.065071
	(0.16931)	(0.62142)	(1.00918)	(0.21982)	(0.29442)	(0.13775)
	[-3.51470]	[0.26849]	[2.55348]	[0.59027]	[-0.21261]	[-0.47239]
GDP_GROWTH(-2)	-0.504772	0.301914	5.329110	-0.093734	1.835682	-0.422996
	(0.37218)	(1.36603)	(2.21840)	(0.48321)	(0.64721)	(0.30281)
	[-1.35626]	[0.22102]	[2.40223]	[-0.19398]	[2.83631]	[-1.39692]
TAX_BUOYANCY_IN_THE_STAT(-1)	-4.170773	-4.232466	17.86943	-1.626094	-2.769967	0.049853
	(1.12643)	(4.13438)	(6.71415)	(1.46247)	(1.95882)	(0.91646)
	[-3.70264]	[-1.02372]	[2.66146]	[-1.11188]	[-1.41410]	[0.05440]

TAX_BUOYANCY_IN_THE_STAT(-2)	-0.385936	3.480569	14.26649	0.501677	7.754211	-1.968756
	(1.21299)	(4.45207)	(7.23007)	(1.57484)	(2.10934)	(0.98689)
	[-0.31817]	[0.78179]	[1.97322]	[0.31856]	[3.67614]	[-1.99492]
C	11.74358	30.42683	-7.549470	14.75991	-2.090957	4.001381
	(6.87682)	(25.2402)	(40.9896)	(8.92831)	(11.9585)	(5.59497)
	[1.70770]	[1.20549]	[-0.18418]	[1.65316]	[-0.17485]	[0.71517]
R-squared	0.988864	0.979827	0.955261	0.949521	0.988223	0.892471
Adj. R-squared	0.922046	0.858786	0.686826	0.646646	0.917563	0.247295
Sum sq. resids	0.828104	11.15570	29.42105	1.395880	2.504177	0.548158
S.E. equation	0.643469	2.361747	3.835430	0.835428	1.118968	0.523526
F-statistic	14.79942	8.095043	3.558631	3.135028	13.98561	1.383299
Log likelihood	0.440920	-19.06333	-26.33653	-3.475141	-7.858402	3.535231
Akaike AIC	1.674544	4.275110	5.244871	2.196685	2.781120	1.261969
Schwarz SC	2.288188	4.888754	5.858514	2.810329	3.394764	1.875613
Mean dependent	4.335732	24.45747	33.44733	9.813588	10.88400	1.616000
S.D. dependent	2.304668	6.284850	6.853639	1.405414	3.897240	0.603428
Determinant resid covariance (dof adj.)		0.000000				
Determinant resid covariance		0.000000				

In the above result the first, second and third row shows the coefficients, standard error and t- statistics respectively. The R- square for the each model is high. However, the adjusted R-square for is also high except the last model related to tax buoyancy in the state. For the significanceand probability value (p-value) we have estimated each equations separately and the result is mentioned below.

Result of Estimation

System: UNTITLED
Estimation Method: Least Squares
Sample: 3 17
Included observations: 15
Total system (balanced) observations 90

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.055887	0.758427	-1.392207	0.1891
C(2)	0.001543	0.184327	0.008371	0.9935
C(3)	0.342365	0.064113	5.339995	0.0002
C(4)	0.418579	0.288676	1.449994	0.1727
C(5)	-0.091906	0.100341	-0.915940	0.3777
C(6)	0.021025	0.070876	0.296639	0.7718
C(7)	0.576319	0.504307	1.142793	0.2754
C(8)	-0.622320	0.454462	-1.369355	0.1960
C(9)	-0.595071	0.169309	-3.514698	0.0043
C(10)	-0.504772	0.372180	-1.356257	0.2000
C(11)	-4.170773	1.126431	-3.702644	0.0030
C(12)	-0.385935	1.212987	-0.318170	0.7558
C(13)	11.74357	6.876819	1.707705	0.1134
C(14)	-0.003050	2.783683	-0.001096	0.9991
C(15)	1.382949	0.676543	2.044142	0.0635
C(16)	1.030938	0.235318	4.381047	0.0009

C(17)	-0.497537	1.059539	-0.469578	0.6471
C(18)	-0.124871	0.368285	-0.339061	0.7404
C(19)	-0.215680	0.260140	-0.829091	0.4232
C(20)	-1.489433	1.850977	-0.804674	0.4367
C(21)	-0.341213	1.668028	-0.204561	0.8413
C(22)	0.166848	0.621422	0.268494	0.7929
C(23)	0.301914	1.366027	0.221016	0.8288
C(24)	-4.232466	4.134381	-1.023724	0.3262
C(25)	3.480569	4.452069	0.781787	0.4495
C(26)	30.42683	25.24024	1.205489	0.2512
C(27)	7.916050	4.520467	1.751157	0.1054
C(28)	-0.020324	1.098702	-0.018498	0.9855
C(29)	0.568357	0.382158	1.487227	0.1628
C(30)	-2.951558	1.720595	-1.715429	0.1119
C(31)	0.684373	0.598118	1.144209	0.2748
C(32)	-0.784648	0.422463	-1.857319	0.0880
C(33)	-9.113336	3.005966	-3.031749	0.0104
C(34)	2.193339	2.708916	0.809674	0.4339
C(35)	2.576940	1.009182	2.553494	0.0253
C(36)	5.329098	2.218359	2.402270	0.0334
C(37)	17.86931	6.713924	2.661531	0.0207
C(38)	14.26651	7.229878	1.973271	0.0719
C(39)	-7.549994	40.99004	-0.184191	0.8569
C(40)	-0.040217	0.984681	-0.040843	0.9681
C(41)	0.538358	0.239316	2.249572	0.0440
C(42)	0.016144	0.083240	0.193950	0.8495
C(43)	-0.046799	0.374794	-0.124866	0.9027
C(44)	-0.117699	0.130275	-0.903467	0.3841
C(45)	-0.039012	0.092020	-0.423951	0.6791
C(46)	0.195741	0.654752	0.298954	0.7701
C(47)	-0.150591	0.590037	-0.255223	0.8029
C(48)	0.129753	0.219818	0.590274	0.5660
C(49)	-0.093734	0.483209	-0.193981	0.8494
C(50)	-1.626094	1.462468	-1.111883	0.2880
C(51)	0.501677	1.574844	0.318556	0.7555
C(52)	14.75991	8.928308	1.653158	0.1242
C(53)	1.821646	1.318876	1.381211	0.1924
C(54)	1.988957	0.320538	6.205059	0.0000
C(55)	0.301856	0.111491	2.707454	0.0190
C(56)	-1.146729	0.501997	-2.284334	0.0414
C(57)	-0.017543	0.174489	-0.100539	0.9216
C(58)	-0.108221	0.123251	-0.878049	0.3972
C(59)	-1.066308	0.876971	-1.215899	0.2474
C(60)	0.559656	0.790292	0.708164	0.4924
C(61)	-0.062597	0.294422	-0.212609	0.8352
C(62)	1.835682	0.647208	2.836311	0.0150
C(63)	-2.769967	1.958821	-1.414100	0.1827
C(64)	7.754211	2.109337	3.676136	0.0032
C(65)	-2.090957	11.95852	-0.174851	0.8641
C(66)	-0.422253	0.617056	-0.684303	0.5068
C(67)	-0.076265	0.149968	-0.508539	0.6203
C(68)	-0.015923	0.052163	-0.305261	0.7654
C(69)	0.188856	0.234867	0.804096	0.4370
C(70)	-0.017836	0.081637	-0.218478	0.8307
C(71)	0.049875	0.057665	0.864919	0.4040
C(72)	0.217897	0.410304	0.531062	0.6051
C(73)	0.058733	0.369750	0.158846	0.8764
C(74)	-0.065071	0.137750	-0.472387	0.6451
C(75)	-0.422996	0.302806	-1.396923	0.1877
C(76)	0.049853	0.916464	0.054397	0.9575
C(77)	-1.968756	0.986885	-1.994919	0.0693

C(78)	4.001381	5.594975	0.715174	0.4882
Determinant residual covariance		0.000000		

Equation – 1 :

$$FDEF = C_1 FDEF(-1) + C_2 FDEF(-2) + C_3 \left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_4 \left(\frac{Rev.Exp.}{GSDP}\right)(-2) + C_5 \left(\frac{Debt}{GSDP}\right)(-1) + C_6 \left(\frac{Debt}{GSDP}\right)(-2) + C_7 \left(\frac{Tax\ Rev}{GSDP}\right)(-1) + C_8 \left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_9 GSDP\ Growth(-1) + C_{10} GSDP\ Growth(-2) + C_{11} Tax\ Buo\ UTK(-1) + C_{12} Tax\ Buo\ UTK(-2) + C_{13}$$

Observations: 15

R-squared	0.988864	Mean dependent var	4.335732
Adjusted R-squared	0.922046	S.D. dependent var	2.304667
S.E. of regression	0.643469	Sum squared resid	0.828104
Durbin-Watson stat	2.944415		

The estimated result of equation – 1 reflects that the R square and adjusted R-Square both are high. Here three variables (first lag of expenditure to GSDP ratio, GSDP growth, and tax buoyancy) are found significant at 5% level of significant. This shows that the past value of one lag of these variables greatly determines the fiscal deficit of the Uttarakhand. The result finds its correlation with theoretical grounds and shows that if expenditure to GSDP ratio will increase, the fiscal deficit will also increase. Means it has negative impact on fiscal performance of the state. However, the one lag value of GSDP growth and tax buoyancy has positive impact on the fiscal performance of state, as it is negatively associated with tax buoyancy and GSDP growth. **Equation 2:**

$$\left(\frac{Rev.Exp.}{GSDP}\right) = C_{14} FDEF(-1) + C_{15} FDEF(-2) + C_{16} \left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{17} \left(\frac{Rev.Exp.}{GSDP}\right)(-2) + C_{18} \left(\frac{Debt}{GSDP}\right)(-1) + C_{19} \left(\frac{Debt}{GSDP}\right)(-2) + C_{20} \left(\frac{Tax\ Rev}{GSDP}\right)(-1) + C_{21} \left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{22} GSDP\ Growth(-1) + C_{23} GSDP\ Growth(-2) + C_{24} Tax\ Buo\ UTK(-1) + C_{25} Tax\ Buo\ UTK(-2) + C_{26}$$

Observations: 15

R-squared	0.979827	Mean dependent var	24.45747
Adjusted R-squared	0.858786	S.D. dependent var	6.284850
S.E. of regression	2.361747	Sum squared resid	11.15570
Durbin-Watson stat	2.795683		

In the second equation the R-square and Adjusted R-square both are high reflecting the good explanatory power of the model. However, in this model most of the coefficients are found insignificant. Only two variables fiscal deficit with lag two and one lag of expenditure to GSDP ratio found significant. Here fiscal deficit in the lag one period do not have impact on expenditure to GSDP ratio but the two period lag of fiscal deficit has great impact on the expenditure to GSDP ratio. On the other hand, it is seen that the expenditure to GSDP ratio is also greatly determined by its own one lagged value.

Equation 3:

$$\left(\frac{\boldsymbol{Debt}}{\boldsymbol{GSDP}}\right) = \boldsymbol{C_{27}FDEF(-1) + C_{28}FDEF(-2) + C_{29}\left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{30}\left(\frac{Rev.Exp.}{GSDP}\right)(-2)} + \boldsymbol{C_{31}\left(\frac{Debt}{GSDP}\right)(-1) + C_{32}\left(\frac{Debt}{GSDP}\right)(-2) + C_{33}\left(\frac{Tax\ Rev}{GSDP}\right)(-1)} + \boldsymbol{C_{34}\left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{35}GSDP\ Growth(-1) + C_{36}GSDP\ Growth(-2)} + \boldsymbol{C_{37}Tax\ Buo\ UTK(-1) + C_{38}Tax\ Buo\ UTK(-2) + C_{39}}$$

Observations: 15

R-squared	0.955261	Mean dependent var	33.44733
Adjusted R-squared	0.686826	S.D. dependent var	6.853639
S.E. of regression	3.835430	Sum squared resid	29.42105
Durbin-Watson stat	3.243332		

The Equation-3 gives some important result, as the R^2 and adj-R^2 both are good and six variables are found significant at 5% level of significant. The Debt to GSDP ratio is greatly determined by these variables having different relative strengths. The variables debt to GSDP ratio with two lag, tax revenue to GSDP ratio with a lag, GSDP growth with both lags and tax buoyancy with both the lags are significant.

Equation 4:

$$\left(\frac{\boldsymbol{Tax\ Rev}}{\boldsymbol{GSDP}}\right) = \boldsymbol{C_{40}FDEF(-1) + C_{41}FDEF(-2) + C_{42}\left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{43}\left(\frac{Rev.Exp.}{GSDP}\right)(-2)} + \boldsymbol{C_{44}\left(\frac{Debt}{GSDP}\right)(-1) + C_{45}\left(\frac{Debt}{GSDP}\right)(-2) + C_{46}\left(\frac{Tax\ Rev}{GSDP}\right)(-1)} + \boldsymbol{C_{47}\left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{48}GSDP\ Growth(-1) + C_{49}GSDP\ Growth(-2)} + \boldsymbol{C_{50}Tax\ Buo\ UTK(-1) + C_{51}Tax\ Buo\ UTK(-2) + C_{52}}$$

Observations: 15

R-squared	0.949521	Mean dependent var	9.813588
Adjusted R-squared	0.646646	S.D. dependent var	1.405414
S.E. of regression	0.835428	Sum squared resid	1.395880
Durbin-Watson stat	2.856152		

Here the above equation takes Tax to GSDP ratio as dependent variable and other six variables as independent equation. The regression result found only one variable as significant and reflecting no serious implications. Therefore, we move forward to equation 5.

Equation 5:

$$\boldsymbol{GSDP\ Growth} = \boldsymbol{C_{53}FDEF(-1) + C_{54}FDEF(-2) + C_{55}\left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{56}\left(\frac{Rev.Exp.}{GSDP}\right)(-2)} + \boldsymbol{C_{57}\left(\frac{Debt}{GSDP}\right)(-1) + C_{58}\left(\frac{Debt}{GSDP}\right)(-2) + C_{59}\left(\frac{Tax\ Rev}{GSDP}\right)(-1)} + \boldsymbol{C_{60}\left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{61}GSDP\ Growth(-1) + C_{62}GSDP\ Growth(-2)} + \boldsymbol{C_{63}Tax\ Buo\ UTK(-1) + C_{64}Tax\ Buo\ UTK(-2) + C_{65}}$$

Observations: 15

R-squared	0.988223	Mean dependent var	10.88400
Adjusted R-squared	0.917563	S.D. dependent var	3.897240
S.E. of regression	1.118968	Sum squared resid	2.504177
Durbin-Watson stat	3.256460		

The 5th Equation of the VAR result reflects the determinants of GSDP growth and found five variables as significant. These variables greatly determines the GSDP growth in Uttarakhand state. The variables fiscal deficit with lag two, expenditure to GSDP ratio with one and two lag, GSDP with one lag and two period lag of tax buoyancy greatly determines the GSDP in the state. The R-square and adj-R square both are high reflecting the model is appropriate for investigation.

Equation 6:

$$\boldsymbol{Tax\ Buo\ UTK = C_{66}FDEF(-1) + C_{67}FDEF(-2) + C_{68}\left(\frac{Rev.Exp.}{GSDP}\right)(-1) + C_{69}\left(\frac{Rev.Exp.}{GSDP}\right)(-2)}$$
$$\boldsymbol{+ C_{70}\left(\frac{Debt}{GSDP}\right)(-1) + C_{71}\left(\frac{Debt}{GSDP}\right)(-2) + C_{72}\left(\frac{Tax\ Rev}{GSDP}\right)(-1)}$$
$$\boldsymbol{+ C_{73}\left(\frac{Tax\ Rev}{GSDP}\right)(-2) + C_{74}GSDP\ Growth(-1) + C_{75}GSDP\ Growth(-2)}$$
$$\boldsymbol{+ C_{76}Tax\ Buyo\ UTK(-1) + C_{77}Tax\ Buo\ UTK(-2) + C_{78}}$$

Observations: 15

R-squared	0.892471	Mean dependent var	1.616000
Adjusted R-squared	0.247295	S.D. dependent var	0.603428
S.E. of regression	0.523526	Sum squared resid	0.548158
Durbin-Watson stat	2.748697		

The equation - 6 takes tax buoyancy of Uttarakhand as dependent variable and other six indicators as independent. The R-square and adj. R-square both are highly low and the all the indicators except tax buoyancy with two lag found insignificant.

Conclusion and Suggestions

Prosperity lead the foundation of financial righteousness and financial righteousness break the vicious cycle of economic backwardness.Every economy suffers the darkest era to stand alone for economic stability. There has been tremendous growth in all spheres of economic development and fiscal discipline in the state but still there are some shortcomings in fiscal consolidation and fiscal discipline in thestate and these are.

- The revenue expenditure of the state is very high then the capital expenditure.
- Non-plan expenditure still having larger part in the total expenditure.
- Tax to GSDP ratio is lower in the state.
- Own tax to GSDP ratio also below the 10 per cent.
- Debt to GSDP ratio is very high in the state.
- Fiscal deficit is not controllable.
- Primary deficit widening the gap of deficit.
- Interest payment is very high in the state.

These major shortcomings affecting the state financial position and fiscal health; therefore, state government needs to take corrective measures to overcome from these challenges.

1. The high revenue expenditure of the government worsens the fiscal deficit, as it has negative impact on fiscal performance of the state.
2. As the GSDP growth increases, it brings the better fiscal performance of the state. Therefore, the state must take measures to boost its GSDP growth via strengthening tourism (as the state has more potential in it), manufacturing, agro-processing and herbal and medicine industry.
3. The increase in the tax buoyancy, the government must find sources to boost its revenue and invest it to attract private investment.

Suggestions

The overall economic performance of Uttarakhand is appreciable and a matter of pride, the balanced economic development has taken place in the state, which is leading its economic development into the next level. There are large possibility of economic development and fiscal discipline in the state and this is possible if the state government initiates some corrective measures and these suggestions are.

- Increase the capital expenditure on various sectors such as Primary sector and tertiary sector also.
- Minimise the revenue expenditure as much as possible.
- Increase the tax to GSDP ratio in the state.
- Tax base need to be revised for better tax collection.
- Tax administration should work efficiently.
- A strong law should be enforced for tax evasion.
- Increase its fiscal capacity.
- Government should follow the path of fiscal consolidation.
- Government should fix some range of fiscal deficit, revenue deficit and primary deficit just likeinflation range in the country.
- Unnecessary government expenditure should minimise.

- Capital expenditure and receipts should also increase.

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INDIAN TEXTILE INDUSTRY: EMBRACING INNOVATION AND SUSTAINABILITY

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Abstract

The textile industry in India is among the oldest in the world. with a history that spans over 5,000 years. Cotton threads from India date back to around 4000 BC, and evidence of dyed fabrics can be traced to about 2500 BC. Over the centuries, the industry has evolved significantly, setting global standards in fabric production and influencing international fashion trends. Renowned for its high-quality textiles, the industry showcases the diverse cultural heritage of India's regions. Contributing around 2.3% to India's GDP, excluding related sectors, it accounts for 7% of the country's industrial production in value. In 2020-21, textiles, apparel, and handicrafts represented 11.4% of India's total exports, positioning India as the fourth-largest textile and apparel exporter worldwide. Industry includes both the handloom and machine-made textiles, produced from cotton, silk, wool, and jute. It spans a variety of products and processes, such as fiber manufacturing, yarn spinning, fabric weaving, and dyeing and printing. With agriculture providing vital raw materials like cotton, silk, and jute, the sector is also second-largest employment generator in India, following agriculture, making it a key player in the country's economy.

Keywords: textile industry, Innovation, Sustainability, economy, employment, export.

Introduction

Indian textile industry holds a crucial place in the nation's economy and cultural heritage. It has evolved significantly, moving from traditional village handlooms to modern, advanced textile mills. As one of the earliest industries in India, it continues to play an essential role in the country's economic structure. Currently, the textile sector contributes 13% to total industrial production, 12% to overall exports, and 2.3% to the national Gross Domestic Product. It is also the second-largest employment generator in India, underscoring its importance in both economic and social contexts. India ranks as the sixth largest exporter of textiles and apparel globally, with textiles, apparel, and handicrafts making up 8.21% of the country’s total exports in 2023-24.

India holds a 3.91% share in global textile and apparel trade, with the USA and the EU being the primary export markets, accounting for about 47 percent of total exports.The industry is a major source of employment, directly providing jobs to over 45 million people and indirectly supporting the livelihoods of over hundred million, including a large proportion of women and rural populations. The sector aligns with key central government initiatives such as Make in India, Skill India Misson, Youth Employment and Women Empowerment. To promote inclusive and participative growth, the government is focused on improving textile manufacturing by developing world-class infrastructure, encouraging innovation, upgrading technology, and leveraging traditional strengths in the sector.

However, environmental challenges like waste and pollution remain significant issues. In response, the industry is adopting sustainable practices, including circular fashion and renewable energy. With a vision to establish India as a global textile manufacturing hub, the goal is to create a $250 billion textile industry and achieve $100 billion in exports by 2030. This will involve focusing on high-tech, high-growth products, sustainability, large-scale infrastructure, and self-reliance in raw materials, while also ensuring substantial livelihood opportunities and supporting textile sectors.

Objectives and Research Methodology

This study adopts a quantitative approach using secondary data from books, newspapers, journals, economic magazines, research reports, and online sources.

Statistical tools like percentage and correlation analysis were used to explore relationships between variables, offering deeper insights into the data. The objectives are-

- To analyze the Textile industry and to focus on contribution to Indian Economy.
- To understand the recent emerging trends in Textile industry.
- To study the challenges faced by the Textile industry.
- To give suggestions to overcome the challenges of the textile industry.

Raw Material Assistance

Cotton: India is the world's largest cotton producer, accounting for 23% of global fiber production and 60% of its textile raw material consumption. The country cultivates cotton on 126.80 lakh hectares, with both rain-fed and irrigated areas. In 2023-24, India produced 436 kg/ha, benefiting around sixth million farmers. The central government sets a Minimum Support Price (MSP), with the Cotton Corporation of India (CCI) overseeing procurement, buying significant quantities each year to support farmers.

Silk: India is the 2nd-largest producer and the largest consumer of silk, producing all four commercial varieties: Mulberry, Tasar, Muga, and Eri. In 2023-24, India produced 38,913 MT of silk. The sericulture industry is employment-intensive and offers lucrative returns. India's silk production includes both bivoltine and vanya silks, with increased output of bivoltine raw silk in recent years.

Jute: Jute, primarily grown in eastern India, supports around 40 lakh farm families. India has 111 composite jute mills, with the government purchasing jute for packaging under the Jute Packaging Material Act, 1987. Initiatives like Jute-ICARE aim to improve fiber quality and increase farmers' income by 50%, while the National Jute Board promotes sector growth.

Wool: The Integrated Wool Development Programme (IWDP) focuses on boosting India's wool sector. It aims to strengthen the wool supply chain, enhance wool quality, and promote coarse wool in technical textiles. Key initiatives include skill development, modernizing machinery, and promoting branding for Pashmina and carpet-grade wool, particularly in the Hilly region.

Man-Made Fibre: India's MMF value chain is vertically integrated, connecting raw materials to finished goods. While the global market is dominated by MMF, India has historically concentrated on cotton. The government is now focusing on expanding MMF production, establishing the Textile Advisory Group on MMF in January 2023

to address value chain challenges. In FY 2023-24, India's MMF textile and apparel exports reached USD 8.19 billion, with further growth potential. To ensure quality, a Quality Control Order for Viscose Staple Fibre imports was introduced in December 2022.

The Value Chain: The Indian textile industry boasts a robust value chain that encompasses natural and man-made fibers, apparel, and home furnishings, catering to both domestic and international markets. With abundant raw materials like cotton, silk, wool, and jute, alongside a highly skilled workforce, India is well-positioned for continued growth and expansion in the global textile sector.

India has significant potential to excel across the textile value chain, supported by 168 power-intensive textile firms and 31 operational textile parks. The industry spans a broad spectrum of segments, from Indian traditional handlooms, handicrafts, wool, and silk products to large-scale organized sectors that employ capital-intensive technologies for mass production. This diverse structure positions India to capitalize on its strengths and expand its footprint in the global textile market.

The PLI Scheme: Production-Linked Incentive Scheme for Textiles, with a ₹10,683 crore budget over five years, aims to boost MMF apparel, fabrics, and technical textiles. The scheme has two parts:

- **Part-1**: Requires ₹300 crore investment and ₹600 crore turnover per company.
- **Part-2:** Requires ₹100 crore investment and ₹200 crore turnover per company. Incentives are based on achieving threshold and incremental turnover.

Technology Support: The Amended Technology Fund Upgradation Scheme (ATUFS), launched in January 2016 with a ₹17,822 crore budget, promotes technology modernization through credit-linked subsidies. By March 2022, 14,389 UIDs were issued, encouraging investment and modernization in the textile sector, especially in MSMEs.

Support for Skilling: The Samarth scheme, under the Ministry of Skill Development & Entrepreneurship, includes advanced features like Aadhaar-based attendance tracking, mobile app-based monitoring, and a comprehensive Management Information

System (MIS). Key features include online proposal submission, trainee registration, and certification modules.

Infrastructure Development

Govt. of India is establishing seven PM-MITRA parks to create modern, large-scale textile infrastructure, with a budget of ₹4,445 crores for 2021-2027. These parks will include facilities for the entire textile value chain and will adopt a Public-Private Partnership model. The Textile Cluster Development Scheme (TCDS) aims to modernize outdated clusters, improving operational and financial viability through technology access and promoting sustainability. The handloom sector, employing over 35 lakh people, is crucial to India's economy, especially for women's empowerment. The sector is known for eco-friendly, innovative, and exportable products, supported by government schemes. The number of clusters that received financial assistance from 2018–19 to 2023–24 is broken out as follows:

Table:1

Cluster wise financial assistance during 2018-19 to 2023-24

Year	**Number of sanctioned cluster**	**Amount released (Cr.)**
2018-19	16	8.56
2019-20	21	16.84
2020-21	2	17.60
2021-22	69	59.92
2022-23	110	76.20
2023-24	96	76.35

Source: Annual Reports, Ministry of Textiles 2023-2024

Sivasagar (Assam), Varanasi (Uttar Pradesh), Virudhunagar and Trichy (Tamil Nadu), Murshidabad (West Bengal), Godda and surrounding districts (Jharkhand), Prakasam and Guntur (Andhra Pradesh), Bhagalpur (Bihar), and East Imphal (Manipur) are the eight states where nine Mega Handloom Clusters are currently under development. A

total of ₹14.28 crore has been set aside as of January 11, 2024, to carry out different projects inside these Mega Clusters.

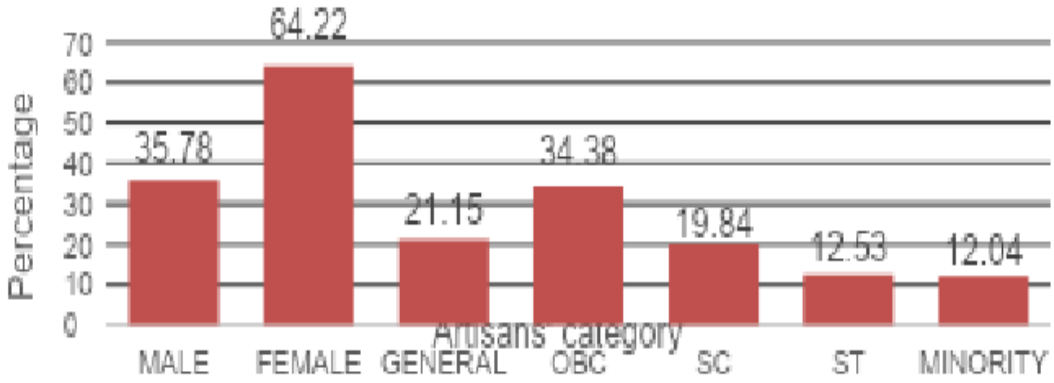
Handloom Schemes:

1. **Raw Material Supply Scheme (RMSS):** Implemented from 2021-22 to 2025-26, this scheme ensures the availability of all types of yarn for handloom weavers across the country. It is managed by the National Handloom Development Corporation and state governments, with freight reimbursements and depot operating charges offered to agencies.
2. **Handlooms Act, 1985:** This Act protects handloom weavers from competition with powerlooms and mills by reserving certain articles for handloom production. Enforcement offices in Delhi, Ahmedabad and Chennai ensure its implementation.
3. **National Handloom Development Programme (NHDP):** The updated guidelines for NHDP, effective from 2022-23 to 2025-26, focus on the integrated growth of handlooms and the welfare of weavers. Scheme provides support for design inputs, technology upgrades, marketing through exhibitions, infrastructure development like Urban Haats, and the creation of an e-marketing web portal for handloom products

Handicrafts Sector:

India's economy greatly benefits from the handicrafts sector, which employs a large number of artisans in rural and semi-urban areas. It is essential for maintaining the country's cultural legacy and generating foreign exchange profits. In addition to providing possibilities for newcomers to the industry, handicrafts support the livelihoods of millions of craftspeople. However, obstacles including inadequate market access, low cash, lack of exposure to technology, and lack of knowledge impede growth.

The Ministry of Textiles has issued artisan ID cards and mobilised 32.03 lakh craftsmen under the "Pahchan" scheme. Below picture show the demographic profile of the artisans who have been granted an artisan ID card:



Handicrafts Sector Schemes:

The Office of Development Commissioner of the Handicrafts manages significant programs aimed at fostering the growth of this sector, such as the National Handicrafts Development Programme and the Comprehensive Handicrafts Cluster Development Scheme. These initiatives focus on the overall development of handicraft clusters and artisans.

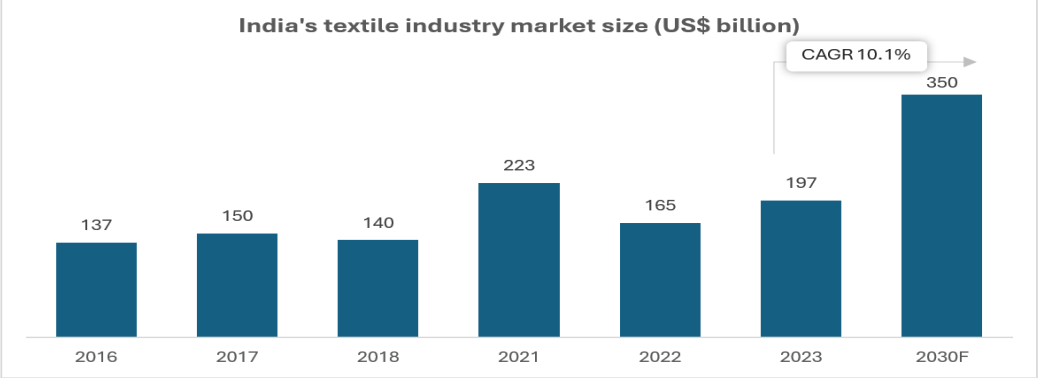
1. The National Handicrafts Development Programme (NHDP) encompasses:
    - Skill Development
    - Ambedkar Hastshilp Vikas Yojana
    - Marketing Support & Services
    - Welfare Benefits for Artisans
    - Research and Development
    - Infrastructure and Technology Support
2. The Comprehensive Handicrafts Cluster Development Scheme takes an integrated approach to the development of sector.

Direct Benefit Transfer (DBT) Scheme:

The DBT scheme aims to bring transparency and eliminate fund mismanagement by directly transferring benefits to beneficiaries' bank or postal accounts linked with Aadhaar. The scheme is monitored through the DBT Bharat Portal, ensuring efficient and timely delivery of benefits, while reducing pilferage and duplication.

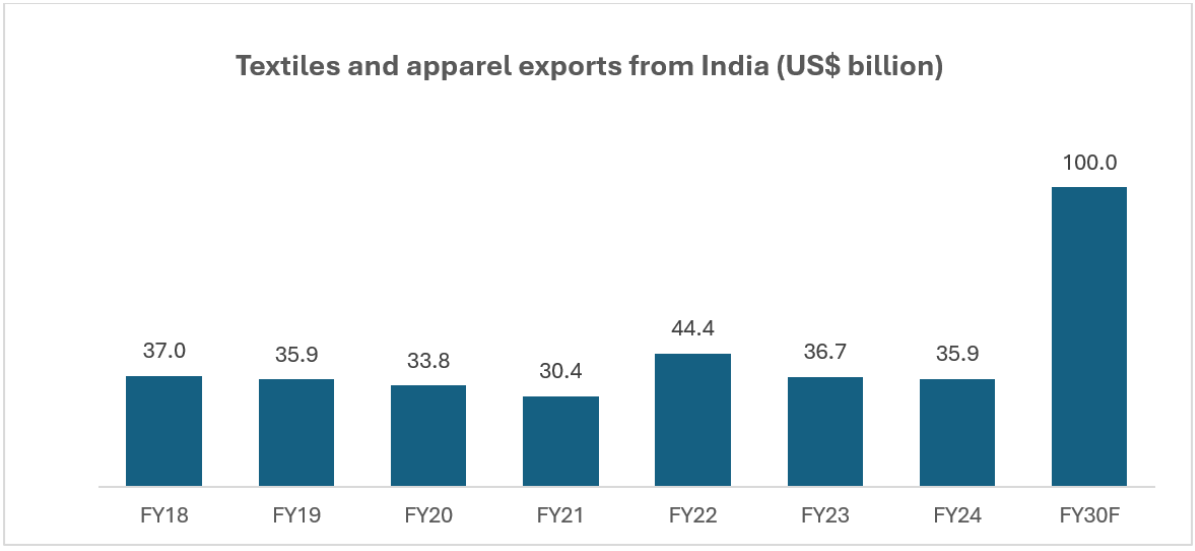
current state of the Indian textile industry: Indian textile industry has undergone significant transformation over the last decade, establishing itself as a world leader in

textile production and export from the country. Historically known for its rich heritage in handloom and cotton, the industry has evolved through modernization, technology adoption, and policy support. Key milestones include the rise of man-made fibers, the growth of the apparel and garment sector, and the development of textile parks and clusters. With advancements in machinery, automation, and skill development, India has solidified its position as one of the largest producers, exporters, and consumers of textiles, contributing significantly to global supply chains and the domestic economy.



Source: Financial Express T

According to Texprocil, Textile market in the country is expected to grow at a robust Compound Annual Growth Rate of 10.1 percent, from USD 197 billion in 2023 to USD 350 billion by 2030. Technological developments, the growing demand for textile products worldwide, and pro-business government policies have all contributed to this growth, making India a significant player in the global textile market.



Source: AEPC

With 4.6% of global trade, India is currently the second-largest producer of textiles and clothing worldwide. It is the third-largest exporter of textiles, after Germany and China. India's textile exports were valued at US$35.9 billion in FY24 and are expected to reach US$100 billion by FY30. About 4.5 crore people are employed in India's vast and expanding textile industry, which includes 35 lakh handloom workers. This industry, which benefits from a sizable, highly qualified workforce and substantial growth potential, is essential to both the domestic economy and international trade.

Free Trade Agreements under WTO

India signed FTA with Australia in 2022 and is currently negotiating FTAs with the EU, UK, Canada, Israel, and other nations. These agreements are anticipated to offer price advantages to Indian textiles, enabling Indian firms to compete effectively with companies from Vietnam and Bangladesh, whose products enjoy duty-free access to major markets.

The expansion of India's textile industry following the year 2005.

Following the elimination of the quota system, India's textile exports saw an increase in value. However, its global share in textile exports only rose slightly, from 4% in 2005 to 5.7% in 2022.

Table - 2

India's Textile Exports After the Annual Quota Was Eliminated in 2005		
Year	**Worth ($Billion)**	percentage of global exports
2000	5.08	3.5
2005	7.86	4.2
2010	13	5.12
2022	18.9	5.6

Source: World Trade Statistical Review, World Trade Organization.

After the elimination of the quota system, India's textile exports experienced a significant increase from 2.69% in 2004-2005 to 23.14% in 2005-2006. Nevertheless, exports fell in the following years, especially after the 2008 subprime crisis, which hampered the US economy and led to a 15% increase in the rupee's value against the US dollar, affecting exports to the US, which is India's main textile importer. In 2011-12, exports increased by 26.23% because of a depreciated rupee and a resurgence in demand from key markets. However, ongoing growth was impeded by difficulties including a complicated supply chain, elevated logistics expenses, stringent labor regulations, high cotton prices, and sluggish domestic demand.

Table - 3

India's Top Ten Export Destinations for Handicrafts and Textile and Apparel Products		
Name of the Country	**Export 2022-23 in USD Million**	**Percentage Share**
United States of America	10,460	29
European Union	7,678	21
Bangladesh	2,530	7
United Arab Emirates	2,090	6
UK	2,105	6
Turkey	719	2
Sri Lanka	728	2
Australia	659	2
Canada	573	2
Saudi Arabia	576	2
Sub-Total	8,570	23
Total exports of textiles and apparel, including handicrafts	**36,684.00**	**100**

Source: DGCI&S(Provisional)

India's top market for textile and clothing exports is the US, with significant demand also coming from the European Union, Bangladesh, the UK, and the United Arab Emirates. The US continues to be the top market for Indian textile exports, and these areas are crucial to the growth of India's textile exports.

Need for sustainable transition

The rapid growth of the textile industry and increased use of synthetic fibers have raised environmental concerns. While production has doubled, garment lifespans have decreased by 36% in the past 15 years, and only 1% of fibers are recycled into new clothing. The industry's reliance on chemicals, dyes, and fuels leads to issues like wastewater discharge, pollution, and workplace safety risks. In response, India is focusing on sustainable manufacturing through eco-friendly practices, such as recycling, water conservation, and bio-friendly textiles. Initiatives like the 'Mega Investment Textile Parks aim to make sustainable manufacturing more accessible.

- **Recycling and Upcycling**: Companies like Pomogrenade, Second Life, and Patch over Patch are converting textile waste into new garments, contributing to the circular economy.
- **Using Solar Energy**: Textile factories, including Welspun, are adopting rooftop solar panels to reduce fossil fuel usage and enhance energy efficiency.
- **Eco-Conscious Water Management and Dyeing**: Companies like BRFL Textiles are reusing wastewater and implementing innovative dyeing processes, such as sulphur dyeing, to reduce water consumption and promote sustainability.

Innovations in the Textile Industry:

- **Pleating Technology and Nanotechnology**: Pleating creates texture changes, while nanotechnology promotes water-resistant, energy-efficient production methods.
- **3D Printing**: Enhances yarn processing and textile design flexibility, allowing customized and unique products.
- **Biodegradable Textiles**: The use of biodegradable fabrics is reducing waste, showcasing the industry's commitment to sustainability and minimizing environmental impact.

- **Artificial Intelligence**: AI is revolutionizing design, enabling the creation of innovative patterns based on data-driven insights.

Government Initiatives for Sustainable Textile Industry:

Sustainable Resolution: This initiative outlines a 5-point plan for the textile industry to:

- Ensure traceability of sustainable raw materials across the value chain.
- Develop sustainable sourcing with eco-friendly raw materials.
- Shift a significant portion of the supply chain to sustainable practices by 2025, in line with UN Sustainable Development Goals.
- Assess the environmental impact of current garment production.
- Inform consumers and participants about sustainability efforts.

Pradhan Mantri Mega Integrated Textile Region and Apparel (PM MITRA): With an investment of US$ 541.82 million (Rs. 4,445 crore) till 2027-28, this initiative aims to support India's textile sector in achieving UN SDG 9 by setting up seven textile parks.

Production-Linked Incentive (PLI) Scheme: Focused on boosting domestic manufacturing, this scheme provides incentives based on cumulative sales of locally produced goods. The government allocated Rs. 10,683 crore (US$ 1.44 billion) for the textile sector under this initiative in September 2021.

Amended Technology Up-gradation Fund Scheme: This scheme provides credit-linked capital investment subsidies to support ease of business, create employment, and promote exports. A total of US$ 75.74 million (Rs. 621.41 crore) has been distributed across 3,159 cases.

Opportunities

Opportunities for India arise from the limitations faced by China and Pakistan in the textile sector. China's share in global textile trade has declined due to ongoing accusations of human rights violations, particularly related to forced labor, which led to actions like the US's Uyghur Forced Labour Prevention Act and stricter European Commission policies.

Pakistan, once a leader in textiles, is currently facing a crisis due to economic instability, floods in 2022, and high inflation. These factors, including rising interest rates and restrictions on imports, have made it difficult for Pakistani textile companies to operate efficiently, creating potential market share to the India's textile exports.

Navigating Challenges in Indian Textile Industry

The Indian textile sector has a number of difficulties. due to its complex and decentralized structure, which involves multiple players across the value chain. Key challenges include:

- **Supply Chain Complexity**: The decentralized nature of the supply chain creates coordination issues, hindering the smooth implementation of sustainable practices.
- **Lack of Manufacturer Capabilities**: Many manufacturers lack the technological expertise or financial resources to adopt sustainable practices on a large scale.
- **Cultural and Language Barriers**: Diverse cultural and language differences among workers can create communication barriers, making it difficult to implement and standardize sustainable initiatives across regions.

Despite these challenges, competition in this sector can drive innovation and encourage the adoption of cost-effective, green technologies. Collaboration among manufacturers to share resources and best practices can help overcome some of these hurdles, achieving economies of scale necessary for sustainable investments.

Findings and Suggestions

Export Trends: The textile and apparel export sector has shown mixed trends:

• Positive Growth: Export values have increased for categories such as carpets, silk products, jute products, cotton textiles, and man-made textiles.

• Negative Growth: The export values of wool textiles, handloom goods, and ready-made clothing have decreased.

CAGR Insights: Compound Annual Growth Rates (CAGR) help gauge the average annual growth for each textile category, highlighting the key performers in the export sector.

Global Trends: The textile industry's performance impacts world merchandise trade patterns. While there were fluctuations in the global textile market, there was overall positive growth, particularly in 2021. However, the share of textile and clothing in world trade has shown volatility.

Imports and Consumption: The rising trend in imports suggests increased demand for textiles and apparel, despite a sharp dip in 2020-21, likely due to economic disruptions like the COVID-19 pandemic. The decline in exports from 2018-2020 could be due to global factors like trade tensions or shifts in demand.

Recommendations

- **Diversification**: Expanding the export base in categories that are showing positive growth can offset declines in others.
- **Adopt Sustainability**: Manufacturers should embrace sustainable practices to align with global demand for eco-friendly products and strengthen their export potential.
- **Collaborate and Innovate**: Pooling resources and sharing knowledge will allow manufacturers to overcome challenges, improve productivity, and reduce costs while adopting green technologies.

Conclusion

Due to changing market demands, regulatory frameworks, and environmental concerns, India's textile industry is moving towards sustainability and technological advancement. In an effort to reduce their environmental impact and boost their competitiveness, manufacturers are progressively implementing eco-friendly production techniques and sustainable materials. Prominent businesses like Raymond Limited, Welspun India, Arvind Limited, and Aditya Birla Fashion are prime examples of the benefits of incorporating sustainable practices into their daily operations. However, realizing complete sustainability will require coordinated efforts among manufacturers, policymakers, and consumers. With its ongoing growth and innovation, India's textile sector holds significant potential to establish itself as a global leader in sustainable production.

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महिला सशक्तिकरण में पंचायती राज की भूमिका : उत्तराखंड राज्य के पौड़ी गढ़वाल जिले के संदर्भ में

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शोध सारांश

शोध का उद्देश्य पौड़ी गढ़वाल जिले में पंचायती राज व्यवस्था में महिला सशक्तिकरण की भूमिका का विश्लेषण करना है। यह अध्ययन यह समझने का प्रयास करता है कि पंचायतों में महिलाओं की भागीदारी ने किस प्रकार स्थानीय विकास को प्रभावित किया है और किस प्रकार की चुनौतियाँ और सफलताएँ सामने आई हैं। इसमें महिला प्रधानों और पंचायत सदस्यों के अनुभवों, उनके द्वारा सामना की गई समस्याओं और उनकी सफलताओं का गहन विश्लेषण किया है। शोध के दौरान गुणात्मक और मात्रात्मक शोध विधियों का प्रयोग किया गया, जिसमें साक्षात्कार, प्रश्नावली, और सरकारी रिपोर्टों का विश्लेषण शामिल है। शोध के लिए जिलों की विभिन्न पंचायतों से महिला प्रतिनिधियों का चयन किया गया और उनसे उनके अनुभवों, चुनौतियों और पंचायत में उनके योगदान पर चर्चा की गई। इस शोध पत्र के माध्यम से यह विश्लेषण प्रस्तुत किया है कि किस प्रकार से पंचायती राज संस्थाएँ पौड़ी गढ़वाल जिले की महिलाओं के लिए सशक्तिकरण का मार्ग प्रशस्त कर रही हैं और भविष्य में इस प्रक्रिया को और अधिक प्रभावी बनाने के लिए क्या कदम उठाए जा सकते हैं।

मुख्य शब्द :– उत्तराखंड, पौड़ी गढ़वाल, पंचायती राज, महिला सशक्तिकरण, निर्णय निर्माण।

प्रस्तावना

महिला सशक्तिकरण भारत के विकास और सामाजिक सुधार के लिए एक महत्वपूर्ण पहलू है। यह एक ऐसी प्रक्रिया है जिसके तहत महिलाओं को समाज में उनके अधिकारों के प्रति जागरूक

किया जाता है, जिससे वे व्यक्तिगत, सामाजिक, और राजनीतिक निर्णय लेने में सक्षम हो सकें। महिला सशक्तिकरण का मुख्य उद्देश्य उन्हें आत्मनिर्भर बनाना और समाज में समान भागीदारी सुनिश्चित करना है।

पंचायती राज संस्थाएं भारत में ग्रामीण स्तर की लोकतांत्रिक संस्थाएं हैं, जिनका गठन ग्रामीण क्षेत्रों में स्थानीय शासन और विकास कार्यों को सुचारू रूप से संचालित करने के लिए किया गया है। 1992 में 73वें संविधान संशोधन के बाद, महिलाओं के लिए पंचायतों में 33प्रतिशत आरक्षण का प्रावधान किया गया, जिसे कई राज्यों ने 50 प्रतिशत तक बढ़ा दिया है। उत्तराखंड राज्य भी इस बदलाव से अछूता नहीं रहा और पंचायतों में महिलाओं की भागीदारी को प्रोत्साहित किया गया है। यह संशोधन महिला सशक्तिकरण की दिशा में एक महत्वपूर्ण कदम साबित हुआ, क्योंकि इससे महिलाएं न केवल स्थानीय प्रशासन में हिस्सा लेने लगीं, बल्कि वे सामुदायिक विकास और निर्णय–निर्माण की प्रक्रियाओं में भी सक्रिय भूमिका निभाने लगीं।

भारत में पंचायती राज व्यवस्था ग्रामीण शासन का एक महत्वपूर्ण अंग है, जो लोकतांत्रिक विकेंद्रीकरण को बढ़ावा देती है यह कदम महिलाओं के राजनीतिक सशक्तिकरण की दिशा में एक महत्वपूर्ण पहल मानी जाती है, क्योंकि इसने उन्हें ग्रामीण क्षेत्रों के स्थानीय शासन में सक्रिय रूप से भाग लेने का अवसर प्रदान किया है।

उत्तराखंड, विशेषकर पौड़ी–गढ़वाल जिला जो हिमालय की गोद में बसा एक महत्वपूर्ण पर्वतीय क्षेत्र है, में महिला सशक्तिकरण की परंपरा और चुनौतियाँ विशेष रूप से उल्लेखनीय रही हैं। राज्य में पंचायतों के माध्यम से महिलाओं की भागीदारी न केवल उनकी सामाजिक और राजनीतिक स्थिति को सुधारने में सहायक साबित हुई है, बल्कि यह ग्रामीण विकास की दिशा में भी महत्वपूर्ण योगदान दे रही है। यहाँ की महिलाएँ न केवल अपने घरों और खेतों का प्रबंधन करती हैं, बल्कि पंचायतों में नेतृत्व की भूमिकाएँ निभाकर सामुदायिक विकास और पर्यावरण संरक्षण जैसे मुद्दों पर भी सक्रिय रूप से कार्य कर रही हैं।

पौड़ी गढ़वाल उत्तराखंड राज्य का एक प्रमुख पहाड़ी जिला है, जो गढ़वाल मंडल में स्थित है। यह जिला हिमालय की तलहटी में फैला हुआ है और इसकी ऊँचाई समुद्र तल से लगभग 500 से 3000 मीटर तक है। इसकी भौगोलिक स्थिति इसे एक प्राकृतिक और सांस्कृतिक रूप से विविध क्षेत्र बनाती है। यहाँ की प्रमुख नदियाँ अलकनंदा और भागीरथी हैं, जो इस क्षेत्र के प्राकृतिक संसाधनों का मुख्य स्रोत हैं। जिले में वन क्षेत्र भी बड़े पैमाने पर हैं, जो जल, लकड़ी और अन्य प्राकृतिक संसाधनों के स्रोत हैं।

पौड़ी गढ़वाल की ग्रामीण आबादी का एक बड़ा हिस्सा कृषि और पशुपालन पर निर्भर है। पहाड़ी क्षेत्र होने के कारण, कृषि भूमि सीमित और अविकसित है। यहाँ के लोग मुख्यतः छोटे खेतों पर जैविक खेती करते हैं और उनके पास सीमित संसाधन होते हैं। इसके साथ ही जलवायु और भौगोलिक कठिनाइयों के कारण खेती का पूरा समय साल भर नहीं होता, जिससे अन्य प्रकार के रोजगार और संसाधनों पर भी निर्भरता बढ़ जाती है।

पौड़ी गढ़वाल की सामाजिक संरचना परंपरागत रूप से पितृसत्तात्मक है, जहाँ परिवार और समुदाय के निर्णयों में पुरुषों की अधिक भूमिका रही है। हालाँकि, महिलाओं का योगदान घरेलू, आर्थिक, और सामुदायिक कार्यों में अत्यधिक महत्वपूर्ण है। यहाँ की महिलाएँ कृषि कार्यों, पशुपालन, और वनों पर आधारित संसाधनों के प्रबंधन में प्रमुख भूमिका निभाती हैं। ग्रामीण जीवन में महिलाओं की भूमिका पारिवारिक गतिविधियों से लेकर सामुदायिक विकास तक विस्तृत होती है।

शोध के उद्देश्य

- महिला सशक्तिकरण की स्थिति का मूल्यांकन
- पंचायती राज की भूमिका का विश्लेषण
- चुनौतियों की पहचान और समाधान

इस शोध में 'गुणात्मक' और 'मात्रात्मक' दोनों शोध विधियों का उपयोग किया गया । गुणात्मक शोध से महिला सशक्तिकरण की गहन समझ प्राप्त की जाएगी, जबकि मात्रात्मक शोध पंचायती राज में महिलाओं की भागीदारी और उसके प्रभाव के आंकड़ों को मापने के लिए किया गया ।

वर्तमान शोध में यह भी विश्लेषण किया गया कि कैसे पंचायती राज संस्थाएँ महिलाओं को सशक्त बनाने में सहायक हो रही हैं और किस प्रकार की नीतियों और पहलों की आवश्यकता है ताकि महिलाओं का नेतृत्व और भी प्रभावशाली हो सके। इस अध्ययन के परिणाम स्थानीय प्रशासन और विकास योजनाओं के लिए मूल्यवान अंतर्दृष्टि प्रदान करेंगे और भविष्य में महिला सशक्तिकरण की दिशा में की जाने वाली पहलों को सुधारने में सहायक होंगे।

अध्ययन क्षेत्र

पौड़ी गढ़वाल जिले में 15 विकासखंड और 08 तहसील है। अध्ययन हेतु कोटद्वार तहसील का चयन किया गया है इसमें कोटद्वार तहसील में आने वाले गांव की 50 महिलाओं से तथ्यों को संकलित किया गया है।

उत्तराखंड के पौड़ी गढ़वाल जिले के कोटद्वार तहसील के ग्राम रामडी पुलिंदा, उत्तिरछा, और बल्ली की ग्राम प्रधान शीतल नेगी, दीपा रावत, सुशीला देवी, भागेश्वरी देवी, कल्पना देवी और मधु देवी सहित अन्य महिलाओं से अनुसूची के माध्यम से तथ्यों को संकलित किया गया है

डेटा संग्रह की विधियाँ

प्राथमिक डेटाः साक्षात्कार पंचायतों में महिला प्रतिनिधियों, महिला प्रधानों और अन्य महिलाओं के साथ साक्षात्कार लिया गया, ताकि उनकी वास्तविक चुनौतियों, अनुभवों और सशक्तिकरण की स्थिति को समझा जा सके।

फोकस ग्रुप डिस्कशन ग्रामीण महिलाओं के बीच चर्चा आयोजित की गया, ताकि महिलाओं की सामूहिक दृष्टिकोण और अनुभवों को समझा जा सके।

द्वितीयक डेटाः सरकारी रिपोर्ट्स और दस्तावेज, पंचायती राज में महिलाओं की भागीदारी पर उपलब्ध सरकारी रिपोर्ट्स और नीति दस्तावेजों का अध्ययन किया गया। अकादमिक साहित्य महिला सशक्तिकरण और पंचायती राज पर पूर्व प्रकाशित शोध पत्र, किताबें और लेखों का विश्लेषण किया गया ।

विषयवस्तु विश्लेषणः साक्षात्कार और फोकस ग्रुप डिस्कशन से प्राप्त गुणात्मक डेटा का विषयों के आधार पर विश्लेषण किया गया । उदाहरण के लिए, महिलाओं की चुनौतियों, उनके सशक्तिकरण के अनुभवों, और पंचायतों में उनकी भूमिका का विश्लेषण किया गया। महिला सशक्तिकरण में पंचायती राज की भूमिका पर शोध करने के लिए कई अध्ययनों और शैक्षिक साहित्य का अवलोकन किया गया। यह अवलोकन विभिन्न विद्वानों, सरकारी रिपोर्ट्स, और अन्य स्रोतों पर आधारित है, जिन्होंने पंचायती राज में महिलाओं की भूमिका और उनके सशक्तिकरण पर गहन अध्ययन किया है।

महिला सशक्तिकरण की अवधारणा

सेन, अमर्त्य का तर्क है कि महिलाओं का सशक्तिकरण केवल आर्थिक स्वतंत्रता से नहीं, बल्कि उनके शिक्षा स्तर, सामाजिक स्थिति और राजनीतिक भागीदारी से भी संबंधित है। (1) एस. वाल्टर की पुस्तक महिला सशक्तिकरण के विभिन्न पहलुओं पर एक संसाधन पुस्तक के रूप में काम करती है। इसमें सामाजिक नीति, शिक्षा, स्वास्थ्य, और आर्थिक सशक्तिकरण से संबंधित मुद्दों का व्यापक अध्ययन किया गया है।(2) पंचायती राज में महिलाओं की भागीदारीः अर्थशास्त्र और राजनीतिक साप्ताहिक (म्ँ, 1995) में प्रकाशित एक अध्ययन के अनुसार, 73वें संविधान संशोधन ने ग्रामीण शासन में महिलाओं की भागीदारी को वैधानिक रूप से सुनिश्चित किया, जिससे

पंचायतों में महिलाओं की भागीदारी का स्तर बढ़ा। इससे महिलाओं की सामाजिक स्थिति में सुधार हुआ और उन्हें निर्णय–निर्माण की प्रक्रियाओं में भाग लेने का अवसर मिला। (3) गोयल, एम, (2013) के अध्ययन के अनुसार, पंचायती राज के तहत महिलाओं को आरक्षण देने से स्थानीय शासन में उनके नेतृत्व की स्थिति मजबूत हुई है। महिलाओं ने सामाजिक मुद्दों जैसे कि शिक्षा, स्वास्थ्य, और स्वच्छता पर अधिक ध्यान देना शुरू किया, जिससे ग्रामीण समाज में महत्वपूर्ण बदलाव देखने को मिले हैं।(3)

महिला नेतृत्व और ग्रामीण विकास

भटनागर, एस, (2010) के अध्ययन में पाया गया कि महिला नेतृत्व वाली पंचायतों ने ग्रामीण विकास के कई क्षेत्रों में बेहतर प्रदर्शन किया है। विशेष रूप से, महिलाओं के नेतृत्व वाली पंचायतों ने महिला स्वास्थ्य, बालिका शिक्षा और पेयजल व्यवस्था जैसे मुद्दों पर अधिक जोर दिया।(4) चटर्जी, पी, (2004) के अनुसार, महिला प्रधानों की पंचायतों में महिलाओं की आवाज अधिक मुखर हुई है, जिससे ग्रामीण समाज में महिलाओं की स्थिति और उनके अधिकारों के प्रति जागरूकता बढ़ी है।(5)

महिला सशक्तिकरण में पंचायती राज की चुनौतियाँः

राय एस, (2007) का अध्ययन बताता है कि भले ही पंचायती राज में महिलाओं की भागीदारी बढ़ी है लेकिन पितृसत्तात्मक समाज और पारंपरिक सोच अभी भी महिला नेतृत्व के समक्ष बड़ी चुनौती है। कई जगहों पर महिलाओं को नाममात्र का नेतृत्व मिलता है, जबकि असली फैसले उनके परिवार के पुरुष सदस्य लेते हैं। (6) भारतीय सामाजिक अध्ययन संस्थान (2008) की रिपोर्ट में कहा गया है कि पंचायती राज में महिलाओं को सशक्त बनाने के लिए कानूनी ढांचे के साथ–साथ सामाजिक और सांस्कृतिक बदलाव की भी आवश्यकता है। जब तक समाज में महिलाओं को समान दृष्टि से नहीं देखा जाएगा, तब तक उनकी वास्तविक सशक्तिकरण की प्रक्रिया अधूरी रहेगी।(7)

सरकारी नीतियाँ और पहल

राष्ट्रीय पंचायती राज मंत्रालय (2015) की रिपोर्ट में बताया गया है कि सरकार ने पंचायती राज संस्थाओं में महिलाओं की भूमिका को मजबूत करने के लिए कई नीतिगत पहल की हैं। इनमें महिलाओं के लिए प्रशिक्षण कार्यक्रम, नेतृत्व विकास योजनाएँ, और वित्तीय सहायता शामिल हैं, ताकि महिलाएँ पंचायत के कार्यों में अधिक सक्रियता से भाग ले सकें। (8) यूएनडीपी (2017) द्वारा प्रकाशित रिपोर्ट में कहा गया है कि पंचायती राज में महिलाओं की भागीदारी न केवल

भारतीय संविधान का हिस्सा है, बल्कि इसे सतत विकास लक्ष्यों के तहत वैश्विक मान्यता भी प्राप्त है। इससे महिलाओं की राजनीतिक, आर्थिक, और सामाजिक स्थिति में सुधार हुआ है। (9)

सशक्तिकरण के परिणामः

कुशवाहा, आर (2018) के अनुसार, पंचायती राज में महिलाओं की सक्रिय भूमिका ने ग्रामीण क्षेत्रों में महिला सशक्तिकरण के नए रास्ते खोले हैं। अब महिलाएँ अधिक आत्मनिर्भर हो रही हैं और अपने अधिकारों के प्रति जागरूक हो रही हैं। (10) त्रिपाठी, जे, (2019) का अध्ययन बताता है कि जिन पंचायतों में महिलाएँ नेतृत्व कर रही हैं, वहाँ विकास कार्यों की गुणवत्ता में सुधार हुआ है। इसके साथ ही, महिलाओं के प्रति होने वाले भेदभाव और हिंसा के मामलों में भी कमी आई है।(11)

राजनितिक क्रियाकलापों में भाग

पंचायती राज का उद्देश्य ग्रामीण स्तर पर स्थानीय स्वशासन को स्थापित करना है। पंचायती राज ब्यवस्था में महिलाओं को एक तिहाई आरक्षण देकर सरकार ने अहम भूमिका निभाई है। जिससे महिलाये भी रजनीतिक क्रियाकलापों में भाग लेने लगी है। महिलाओं में रजनीतिक जागृति के साथ सामजिक चेतना भी बढ़ी है। पंचायती राज ने छुआछूत और भेदभाव की दीवारों को जबरदस्त धक्का पहुचाया है। प्रस्तुत अध्ययन में इस विषय पर शोध किया गया है कि महिलाये राजनितिक क्रियाकलापों में भाग लेना चाहती है या नही। इस पर उत्तरदाताओ से सूचनाये संकलित की गयी है। जो सरणी संख्या 1.1 में दर्शाया गया है।

सारिणी 1.1

रजनीतिक क्रियाकलापों में भाग	उत्तरदाताओ की संख्या	प्रतिशत
हाँ	36	72
नहीं	14	28
योग	**50**	**100**

- **परिजनों द्वारा राजनीति में भागीदारी के लिए प्रेरित** :–

पंचायती राज व्यवस्था में महिलाओं एक तिहाई आरक्षण दिया गया है, लेकिन साथ साथ यह भी जरुरी है की महिलाओं के परिजन भी उन्हें राजनीति में भाग लेने के लिए प्रेरित करे जिससे वे सशक्त हो सके। प्रस्तुत अध्ययन में इस विषय पर शोध किया गया है कि उत्तरदाताओ को उनके परिजनों द्वारा राजनीति में भागीदारी लेने के लिए प्रेरित करते है या नही। इस पर सूचनाये संकलित की गयी है । जो सारणी संख्या 1.2 में प्रदर्शित है ।

सारिणी 1.2

राजनीति में भागीदारी के लिए प्रेरित	उत्तरदाताओ की संख्या	प्रतिशत
हाँ	30	60
नहीं	20	40
योग	**50**	**100**

• ग्राम पंचायत सदस्य :–

महिलाओं की स्थिति में सुधार हेतु राज्य सरकार ने अनेक प्रयास किये है। प्रत्येक ग्राम पंचायत में एक तिहाई महिलाये सदस्य होंगी। प्रस्तुत अध्ययन में इस विषय पर शोध किया गया है । कि उत्तरदाता ग्राम पंचायत का सदस्य है । इस पर सूचनाये संकलित की गयी है । सारणी संख्या 1.3 में प्रदर्शित है।

सारिणी 1.3

पंचायत के सदस्य	उत्तरदाताओ की संख्या	प्रतिशत
हाँ	09	18
नहीं	41	82
योग	**50**	**100**

• मीटिंगों में अपना पक्ष रखने की स्वतंत्रता :–

पंचायती राज व्यवस्था में मीटिंग होती रहती रहती है । जिसमे व्यक्ति अपना पक्ष रखते है। किसी निति या मुद्दे पर अपने विचार रखते है । प्रस्तुत अध्ययन में इस विषय पर सूचनाये

संकलित की गयी है उत्तरदाताओ से पूछा गया की उन्हें अपना पक्ष रखने की स्वतंत्रता है या नही। जो सारणी संख्या 1.4 में प्रदर्शित है।

सारिणी 1.4

पंचायत मीटिंग में अपना पक्ष रखने की स्वतंत्रता	उत्तरदाताओ की संख्य	प्रतिशत
हाँ	35	70
नहीं	15	30
योग	**50**	**100**

• पंचो द्वारा समानता का व्यवहार :–

हमारे समाज में पुरुषो व महिलाओं के बीच भारी असमानता है, महिलाओं को भेदभाव का सामना करना पड़ता है, घर से लेकर कार्यस्थल तक उनके साथ दोयम दर्जे का व्यवहार किया जाता है, प्रस्तुत अध्ययन में इस विषय पर सूचनाये संकलित की गयी है की पंचो द्वारा महिलाओं के साथ समानता का व्यवहार किया जाता है या नहीं, जो सारणी संख्या 1.5 में प्रदर्शित है ।

सारिणी 1.5

पंचो द्वारा समानता का व्यवहार	उत्तरदाताओ की संख्या	प्रतिशत
हाँ	25	50
नहीं	25	50
योग	**50**	**100**

• पंचायती राज व्यवस्था महिला के सशक्तिकरण में सहायक :–

पंचायती राज व्यवस्था महिला सशक्तिकरण में सहायक है क्योकि वर्तमान समय में सरकार द्वारा महिला सशक्तिकरण के लिए पंचायतो में 50 प्रतिशत का आरक्षण निर्धारित किया है ताकि महिलाओं का प्रतिनिधित्व बढ़ सके और समाज में समानता के अधिकार से रह सके और जागरूक हो सके। प्रस्तुत अध्ययन में उत्तरदाताओ से इस विषय पर सूचनाये संकलित की है जो सारणी संख्या 1.6 में प्रदर्शित है।

सारिणी 1.6

महिला सशक्तिकरण में सहायक	उत्तरदाताओ की संख्या	प्रतिशत
हाँ	50	100
नहीं	–	–
योग	**50**	**100**

• यदि सहायक है तो कैसे :–

पंचायती राज व्यवस्था में महिलाओं को दिया गया 1 तिहाई आरक्षण एक साहसिक कदम है, ग्रामीण विकास को त्वरित करने एवम अधिक प्रभावी बनाने में आधा योगदान महिलाओं का होना आवश्यक है। प्रस्तुत अध्ययन में उत्तरदाताओ से इस विषय पर सूचनाये संकलित की गयी है जो सारणी संख्या 1.7 में प्रदर्शित है।

सारिणी 1.7

हाँ तो कैसे	उत्तरदाताओ की संख्या	प्रतिशत
स्व प्रतिनिधित्व से	10	20
सरकारी निर्देशों से	20	40
दोनों से	20	40
योग	**50**	**100**

• उत्तरदाताओ द्वारा पंचायती राज ब्यवस्था में सुधार हेतु उपाय :–

पंचायती राज व्यवस्था ने महिलाओं को रजनीतिक अधिकार, सुदृढ़ अर्थव्यवस्था, महिला सशक्तिकरण हेतु विभिन्न योजनाओं के चलते अब महिलाओं में चेतना आ रही हैं और वह दिन दूर नहीं जब वे वर्तमान स्थिति से ऊपर उठकर, घर, परिवार राष्ट्र स्तर पर अहम भूमिका निर्वहन करेगी। आज हमारे देश की प्रथम नागरिक अर्थात राष्ट्रपति एक जनजातीय समाज की महिला द्रोपदी मुर्मू है। प्रस्तुत अध्ययन में उत्तरदाताओ ने पंचायती राज व्यवस्था में सुधार हेतु सुझाव दिए है। इस पर सूचनाये संकलित की गयी है जो सारणी संख्या 1.8 में प्रदर्शित है।

सारिणी 1.8

सुझाव	उत्तरदाताओ की संख्या	प्रतिशत
महिलाओं का और अधिक प्रतिनिधित्व	09	18
अधिक अधिकार	10	20
आर्थिक स्वावलम्बी	08	16
उपरोक्त सभी	23	46
योग	**50**	**100**

निष्कर्ष

यह शोध पत्र महिला सशक्तिकरण में पंचायती राज की भूमिका पर केंद्रित है, जिसमें यह विश्लेषण किया गया है कि भारत के ग्रामीण क्षेत्रों में महिलाओं को सशक्त बनाने में पंचायती राज संस्थाओं ने किस प्रकार की भूमिका निभाई है। 73वें संविधान संशोधन के बाद पंचायतों में महिलाओं के लिए 33:आरक्षण की व्यवस्था की गई, जिसने महिलाओं को स्थानीय शासन और विकास में भाग लेने के लिए प्रेरित किया। इस शोध का मुख्य उद्देश्य यह समझना है कि पंचायती राज के माध्यम से महिलाएं किस प्रकार निर्णय–निर्माण की प्रक्रियाओं में भागीदारी करती हैं और उनके नेतृत्व में किस प्रकार के सामाजिक और आर्थिक बदलाव आते हैं। पंचायती राज में महिलाओं की भागीदारी ने उन्हें नेतृत्व की नई जिम्मेदारियों से सशक्त किया है, जिससे वे न केवल अपने अधिकारों के प्रति जागरूक हुई हैं, बल्कि सामुदायिक विकास में भी महत्वपूर्ण योगदान दे रही हैं। इसके साथ ही, सामाजिक बाधाओं, पितृसत्तात्मक मानसिकता, और अशिक्षा जैसी चुनौतियों का भी सामना करना पड़ता है। हालाँकि, महिलाओं का आत्मविश्वास और उनके द्वारा उठाए गए सामाजिक मुद्दों पर ध्यान देने से समाज में सकारात्मक बदलाव आ रहे हैं।

पौड़ी गढ़वाल जिले की महिलाएँ पंचायती राज संस्थाओं के माध्यम से अपने सशक्तिकरण की दिशा में महत्वपूर्ण कदम उठा रही हैं। यद्यपि सामाजिक और आर्थिक चुनौतियाँ अब भी मौजूद हैं, फिर भी पंचायतों में महिलाओं की भागीदारी से यह स्पष्ट होता है कि वे न केवल अपने परिवारों के लिए बल्कि पूरे समाज के लिए सकारात्मक बदलाव ला रही हैं। महिला सशक्तिकरण का यह सफर तभी पूरी तरह से सफल होगा, जब समाज में महिलाओं को समान अवसर और सम्मान मिलेगा, और इसके लिए पंचायती राज एक सशक्त मंच के रूप में कार्य कर रहा है।

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कृषि और ग्रामीण विकास में डिजिटलीकरण की भूमिका : संभावनाएँ एवं चुनौतियाँ

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वी०बी० चौरसिया

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सार

सूचना, तथ्यों एवं जानकारियों के डिजिटल प्रारूप को डिजिटलीकरण कहा जाता है। डिजिटलीकरण जनसंवाद स्थापित करने के लिए त्वरित एवं सुलभ माध्यम है। वर्तमान समय में कृषि और ग्रामीण विकास में डिजिटलीकरण की भूमिका महत्वपूर्ण है। भारत अपनी भौगोलिक, सामाजिक एवं सांस्कृतिक विविधताओं वाला देश है। विविधता पूर्ण देश में प्रत्येक क्षेत्रों के सर्वांगीण विकास हेतु सूचना एवं जानकारी का समान वितरण आवश्यक है। कृषि और ग्रामीण अर्थव्यवस्था में डिजिटलीकरण की भूमिका को संदर्भित करने के लिए कृषि पद्धतियों में डिजिटल प्लेटफॉर्म को जोड़ने से उनकी उत्पादकता तथा कृषि के पारंपरिक तरीकों में समयानुसार बदलाव की आवश्यकता है। ग्रामीण भारत में शहरी और हिमालयी एवं पर्वतीय ग्रामीण क्षेत्रों में विविधता पाई जाती है। इन क्षेत्रों में विनिर्माण, कृषि, स्वास्थ्य एवं शिक्षा जैसे महत्वपूर्ण क्षेत्रों में डिजिटल माध्यमों के प्रचार एवं प्रसार से सरकार के कार्यक्रमों एवं योजनाओं का क्रियान्वयन समावेशी रूप से किया जा सकता है। यह अध्ययन कृषि और ग्रामीण विकास में डिजिटलीकरण की भूमिका का अध्ययन करना तथा डिजिटलीकरण के क्रियान्वयन एवं संपूर्ण प्रसार से संबंधित समस्याओं के निराकरण हेतु सुझाव प्रदान करता है। यह शोध पत्र विवरणात्मक पद्धति तथा द्वितीय आंकड़ों पर आधारित है। डिजिटलीकरण के माध्यम से गवर्नेंस और सेवाओं तक सभी क्षेत्रों की एक समान पहुँच संभव हुई है। कृषि में डिजिटलीकरण तथा ग्रामीण विकास हेतु कार्यक्रमों और योजनाओं का नवीनतम सूचनाओं के साथ प्रसार ग्रामीण विकास में सहायक सिद्ध होगा।

मुख्य शब्द : डिजिटलीकरण, ग्रामीण विकास, ग्रामीण अर्थव्यवस्था, विविधतापूर्ण, सामाजिक–आर्थिक

प्रस्तावना

सूचनाओं, तथ्यों एवं जानकारीयों के इलेक्ट्रॉनिक प्रारूप को डिजिटलीकरण कहा जाता है। जन संवाद स्थापित करने के लिये डिजिटलीकरण त्वरित माध्यम है। कृषि एवं ग्रामीण विकास में डिजिटलीकरण की पहुंच सीमित क्षेत्रों तक ही है। भारत में कृषि क्षेत्र और ग्रामीण अर्थव्यवस्था देश की समग्र आर्थिक वृद्धि के लिए महत्वपूर्ण भूमिका निभाते हैं। देश की लगभग 60 प्रतिशत आबादी कृषि और कृषि आधारित गतिविधियों पर निर्भर है। जबकि कृषि क्षेत्र देश की जीडीपी में लगभग 17 प्रतिशत का योगदान करता है। डिजिटलीकरण ने कृषि और ग्रामीण विकास के लिए सार्वभौमिक पहुँच का मार्ग प्रशस्त किया है। भारत में वर्तमान समय में 120 करोड़ मोबाइल फोन उपयोगकर्ता है। साथ ही 66 करोड़ स्मार्टफोन उपयोगकर्ता तथा 95 करोड़ लोग इंटरनेट यूजर्स हैं। इंटरनेट एवं इलेक्ट्रॉनिक डिवाइस के बढ़ते प्रचलन से डिजिटल सेवाओं एवं सूचनाओं का निर्बाध रूप से संचालन सुनिश्चित करना आवश्यक है। यह लोगो के आर्थिक विकास एवं सामाजिक प्रगति का भी परिचायक है। इसके साथ ही कृषि और ग्रामीण क्षेत्रों में सूचनाओं एवं जानकारीयों का डिजिटलीकरण के माध्यम से सुगम क्रियान्वयन करना आवश्यक है। किसान अब आधुनिक तकनीकों ई कॉमर्स, डिजिटल भुगतान प्रणाली और सूचना एवं संचार प्रौद्योगिकी के माध्यम से अपनी उपज को बाजार भेज सकते हैं और उत्पादकता में सुधार कर सकते हैं। डिजिटल तकनीक के माध्यम से भूमि रिकॉर्ड एवं डिजिटलीकरण कृषि उत्पादों के लिए ऑनलाइन बाजार, मौसम और मिट्टी की जानकारी की डिजिटल पहुँच संभव हुई है। ग्रामीण क्षेत्रों में डिजिटलीकरण से शिक्षा, स्वास्थ्य, बैंकिंग, गवर्नेंस, ग्रामीण क्षेत्रों में वित्तीय समावेशन तथा ग्रामीण रोजगार और उघमिता आदि ग्रामीण विकास में महत्वपूर्ण भूमिका निभा रहे हैं। सरकारी योजनाओं और ई गवर्नेन्स से सीधे लाभ कृषि और ग्रामीण क्षेत्रों के सामाजिक–आर्थिक विकास को नई दिशा दे रहा है। लेकिन इसके साथ ही कई चुनौतियां भी हैं जैसे डिजिटल साक्षरता की कमी, इंटरनेट कनेक्टिविटी और ग्रामीण क्षेत्रों में बुनियादी ढांचे की कमी, समग्र डिजिटलीकरण हेतु कृषि और ग्रामीण क्षेत्रों में पर्याप्त विकास होना अभी बाकी है।

वर्तमान अध्ययन के उद्देश्य निम्नलिखित है–

(1) कृषि और ग्रामीण विकास में डिजिटलीकरण की भूमिका का अध्ययन करना तथा

(2) डिजिटलीकरण के क्रियान्वयन एवं संपूर्ण प्रसार से संबंधित समस्याओं के निराकरण हेतु नीति निहितार्थ प्रस्तुत करना है।

यह वर्णनात्मक अध्ययन द्वितीयक आंकड़ों पर आधारित है। कृषि और ग्रामीण विकास में डिजिटलीकरण से संपूर्ण लाभ के लिए बुनियादी ढाचे के प्रसार में आ रहीं समस्याओं के निराकरण की आवश्यकता है। साथ ही ग्रामीण और कृषि क्षेत्रों में संरचनात्मक ढांचे एवं असमान विकास,

बुनियादी ढांचा में निवेश, मानव पूंजी और एआई (कृत्रिम बुद्धिमता) संचालित कार्यबल निर्माण और सार्वभौमिक पहुँच को बढ़ावा देकर डिजिटलीकरण कृषि के साथ–साथ ग्रामीण विकास में महत्वपूर्ण भूमिका निभा सकता है। यह आधुनिक युग में तकनीकी प्रगति का परिचायक है।

साहित्य की समीक्षा

राठौर, सुविधा (2022) : यह शोध पत्र भारत को डिजिटल रूप से सशक्त समाज और ज्ञान अर्थव्यवस्था में परिवर्तित करने की ओर प्रकाश डालता है। डिजिटल इनफ्रास्ट्रक्चर नागरिको की मांग पर प्रशासन और सेवाएँ प्रदान करके नागरिको को डिजिटली सशक्तिकरण करना इसका प्रमुख लक्ष्य है। डिजिटल प्रौद्योगिकी की सहायता से देश के प्रत्येक क्षेत्र में शासन द्वारा संचालित सेवाओं की इलेक्ट्रॉनिक पहुँच से अधिक लोग अवगत हो सकेंगे। डिजिटल इंडिया कार्यक्रम के माध्यम से सरकार की योजनाएं जैसे, डीजी लॉकर, राष्ट्रीय छात्रवृत्ति पोर्टल, ई स्वास्थ्य, ई शिक्षा, ई बैंकिंग आदि। डिजिटल इंडिया द्वारा भारत प्रौद्योगिकी विकास के रूप में उभर रहा है।

गुप्ता, अमरीशा आदि (2022) : यह अध्ययन प्रकाश डालता है कि, उदारीकरण के बाद, अर्थव्यवस्था में औद्योगिक क्षेत्र और विशेष रूप से सेवा क्षेत्र की हिस्सेदारी बहुत तेजी से बढ़ी है, लेकिन कृषि क्षेत्र लगभग स्थिर रहा है जबकि श्रम शक्ति का बड़ा हिस्सा कृषि क्षेत्र में शामिल है। कृषि का डिजिटलीकरण इस क्षेत्र को अर्थव्यवस्था के अन्य क्षेत्रों तथा क्षेत्रीय आर्थिक विकास एवं सामाजिक प्रगति के लिए के लिए प्रतिस्पर्धी बना सकता है।

कुमार, नवीन (2018) : इस अध्ययन में बताया गया कि भारत सरकार द्वारा शुरू किया गया डिजिटल इंडिया कार्यक्रम शहरी और ग्रामीण भारत के बीच डिजिटल विभाजन को कम करने और नागरिकों को सशक्त बनाने में मदद करेगा। डिजिटल इंडिया के तहत यह सुनिश्चित करना है कि, ऑनलाइन बुनियादी ढांचे में सुधार करके और इंटरनेट कनेक्टिविटी बढ़ाकर, दूरदराज के क्षेत्रों में नागरिकों को इलेक्ट्रॉनिक रूप से सरकारी सेवाएँ उपलब्ध कराई जाएँ। ग्रामीण क्षेत्रों में इसके सफल कार्यान्वयन में चुनौतियां भी है, जैसे डिजिटल निरक्षरता, खराब बुनियादी ढाँचा, कम इंटरनेट स्पीड, विभिन्न विभागों के बीच समन्वय की कमी, कराधान से संबंधित मुद्दे प्रमुख है।

शोध प्रविधि

इस शोध पत्र में द्वितीयक आंकड़ों का विवरणात्मक विश्लेषण किया गया है। द्वितीयक समंकों का एकत्रीकरण उद्देश्यपूर्ण सुविधाजनक तकनीक से विभिन्न शोध पत्र, पत्रिकाओं, समाचार पत्रों के आलेख, विभिन्न संस्थाओं की आधिकारिक वेबसाइट्स, भारत सरकार के आधिकारिक विभागों की वेबसाइट्स तथा इंटरनेट आर्टिकल्स के माध्यम से किया गया है।

कृषि और ग्रामीण विकास में डिजिटलीकरण की भूमिका, संभावनाए एवं चुनौतियाँ

कृषि और ग्रामीण विकास को प्रौद्योगिकी के उपयोग द्वारा कृषि और ग्रामीण जीवन को आधुनिक एवं प्रभावी बनाया जा सकता है। इसका उद्देश्य कृषि उत्पादन और ग्रामीण अर्थव्यवस्था को सुधारना, संसाधनों का कुशलतापूर्वक उपयोग और किसानों के जीवन स्तर में वृद्धि करना है। विभिन्न क्षेत्रों में इसकी भूमिका, संभावनाएं एवं उनसे संबंधित चुनौतियों का विवरण प्रस्तुत किया गया है।

कृषि क्षेत्र : वर्तमान में जलवायु परिवर्तन से कृषि उत्पादन से संबंधित जोखिमों को कम करने, उत्पादकता और स्थिरता को अनुकूलित करने तथा वास्तविक समय में प्रचलित फसल मूल्य निर्धारण करने की जानकारी प्रदान करने में डिजिटलीकरण मदद करता है। डिजिटल ऐग्रिकल्चर मिशन, सितंबर 2021 में प्रारंभ हुआ था। इसमें 1000 ऐग्रीटेक स्टार्टअप्स को प्रोत्साहन दिया जा रहा है। किसान सम्मान निधि के तहत 11 करोड़ कृषकों को 26.4 बिलियन डॉलर की सहायता राशि सीधे उनके बैंक खातों में ट्रांसफर की जा रही है। डिजिटल कृषि से के अंतर्गत किसान कॉल सेंटर से टेली सहायता प्राप्त की जाती है। 2 करोड़ कृषक ई–नाम (राष्ट्रीय कृषि बाजार) से जुड़ें है। जिसमें 20 राज्यों तथा पांच केंद्र शासित प्रदेश के 1500 मंडियां इस प्लेटफार्म से जुड़े हुए हैं। डिजिटलीकरण से फसल की कीमतों में उतार चढ़ाव और बाजार की मांग जैसी समस्याओं के बारे में त्वरित जानकारी मिलती है। ई–कॉमर्स प्लेटफॉर्मों और डिजिटल भुगतान प्रणालीयों के माध्यम से किसान अपनी फसलों को बेहतर मूल्य पर बेच सकते हैं और उनके लिए नये बाजारों में प्रवेश करना संभव हुआ है। डिजिटलीकरण कृषि उत्पादन की लागत को कम करने में मदद करता है तथा उत्पादकता को बढ़ाने और रोजगार सृजन एवं ग्रामीण क्षेत्रों में उद्यमिता को प्रोत्साहित करता है। डिजिटल तकनीकों में ड्रोन सेंसर, डेटा एनालिसिस का उपयोग कर फसलों की निगरानी और जल तथा उर्वरक की उचित मात्रा का निर्धारण किया जाता है। ग्रामीण क्षेत्रों में इंटरनेट और मोबाइल फोन के माध्यम से किसानों को खेती की नई तकनीक और इससे जुड़ी सरकारी योजनाओं की जानकारी मिल रही है। नवीन सूचनाएं न केवल उनकी कृषि प्रक्रियाओं को सुधारती है बल्कि ग्रामीण विकास को भी बढ़ाती है। डिजिटल माध्यमों से किसान एक दूसरे के साथ जुड़ सकते हैं और कृषि से संबंधित समस्याओं के समाधान हेतु विचार विमर्श कर सकते हैं।

स्वास्थ्य सेवा क्षेत्र : दूर दराज के ग्रामीण क्षेत्र स्वास्थ्य सेवाओं में डिजिटलीकरण के अंतर्गत टेली हेल्थकेयर, एम हेल्थकेर, हेल्थकेर एनालिसिस सेवाएं प्रमुख है। वर्ष 2023 में भारत का डिजिटल स्वास्थ्य क्षेत्र 3.88 मिलियन डॉलर्स का था। यह वर्ष 2032 तक 39.70 बिलियन डॉलर होने का अनुमान किया गया है। वर्ष 2024–2032 तक इसमें 29.5 प्रतिशत की वृद्धि होने का अनुमान

लगाया गया है। डिजिटल माध्यम से ग्रामीण क्षेत्रों के लोगों को गंभीर बीमारियों से बचाव एवं सावधानियों के प्रति जागरूक किया जाता है तथा यह उन्हें गंभीर बीमारियों से बचाव हेतु मदद करता है। कोविड–19 वैश्विक महामारी में डिजिटल जनसंवाद ही कारगर साबित हुआ था। कई ग्रामीण क्षेत्रों में अभी भी इंटरनेट की पहुँच सीमित है, इससे ग्रामीणों को डिजिटल प्लेटफॉर्म तक पहुंचने में कठिनाई होती है। इन्हें स्वास्थ्य सेवाओं का लाभ लेने के लिये आज भी सुदूर क्षेत्रों से शहर की ओर पलायन हेतु विवश होना पड़ता है। डिजिटल साक्षरता की कमी ग्रामीण क्षेत्रों में अधिकांशतः डिजिटल उपकरणों का उपयोग करने में सहज नहीं होते है। जिसके कारण ग्रामीण क्षेत्रों के लोगो को डिजिटल तकनीकों को अपनाना कठिन हो जाता है।

डिजिटल इंडिया : यह योजना 1 जुलाई 2015 को प्रारंभ गई थी। इस योजना को प्रारंभ करने के तीन प्रमुख कारक थे। पहला, सुरक्षित और स्थिर डिजिटल बुनियादी ढांचे का विकास, दूसरा, सरकारी सेवाओं को डिजिटल रूप से वितरित करना तथा तीसरा, सार्वभौमिक डिजिटल साक्षरता स्थापित करना। वर्ष 2030 तक भारत में 1.3 बिलियन इंटरनेट यूजर होने का अनुमान है। वर्ष 2030 तक इसमें 44 प्रतिशत की वृद्धि होने का अनुमान लगाया गया है। भारत में नवंबर 2022 तक 138 बिलियन यूपीआई (यूनिफाइड पेमेंट इंटरफेस) ट्रांजैक्शन हुई है। शहरी ग्रामीण क्षेत्रों तक डिजिटल तकनीक, सरकारी सेवाओं को डिजिटल रूप में वितरित करना तथा सभी लोगों तक इसकी पहुँच को सुनिश्चित करना था। आज भी जिन क्षेत्रों में इसकी पहुँच स्थापित नहीं हो पाई है, उन क्षेत्रों को चिन्हित करके उन क्षेत्रों को भी डिजिटलीकरण के माध्यम से समावेशी विकास की धारणा के तहत लाभ पहुंचना सुनिश्चित किया जाना चाहिए। ग्रामीण क्षेत्रों में ब्लॉक स्तर एवं ग्राम पंचायत स्तरों में उन क्षेत्रों को चिन्हित किया जाए जहाँ पर इंटरनेट, मोबाइल कनेक्टिविटी नहीं है उन क्षेत्रों को डिजिटल रूप से सक्षम बनाकर देश के अन्य भागों के साथ जोड़ा जाना चाहिए। डिजिटल तकनीकों के व्यापक आयामों से लाभान्वित होकर क्षेत्रीय सामाजिक–आर्थिक विकास को प्रोत्साहित करना आवश्यक है।

ई–गवर्नेंस : ई का तात्पर्य इलेक्ट्रॉनिक तथा गवर्नेंस का तात्पर्य सुशासन से है। इसके अंतर्गत आधुनिक तकनीकों के प्रयोग से शासन को बेहतर बनाने की प्रक्रियाओं, कंप्यूटरीकृत भूमि रिकॉर्ड्स, दस्तावेजों और सेवाओं का डिजिटलीकरण शामिल हैं। इसमें सरकार सेवाओं के प्रबंधन और संगठन को बेहतर बनाने के जन उपयोगी उपकरणों का प्रयोग करती है। इसमें सरकार 31 मिशन मोड प्रोजेक्ट पर कार्य कर रही है। एक शोध के अनुसार ई–गवर्नेंस के माध्यम से सरकारों को वार्षिक रूप से हजारों करोड़ रुपए की बचत होती है। ग्रामीण क्षेत्रों में ई–गवर्नेंस की प्रासंगिकता बहुत अधिक है, इसके माध्यम से लोग अपने सुदूर क्षेत्रों में सरकार द्वारा ग्रामीण विकास हेतु संचालित की जा रही लोक कल्याणकारी योजनाओं एवं कार्यक्रमों से सामाजिक एवं आर्थिक लाभ

उठाकर लाभान्वित हो सकते हैं। ई–गवर्नेंस के अंतर्गत लोग, प्रक्रिया, प्रौद्योगिकी और संसाधन प्रमुख स्तंभ है। इसमें नागरिकों को सरकारी सूचनाएं एवं सेवाएं प्रदान करने के लिए वाइड एरिया नेटवर्क (डब्ल्यू ए एन), इंटरनेट और मोबाइल कंप्यूटिंग का उपयोग किया जाता है। ग्रामीण क्षेत्रों में इंटरनेट कनेक्टिविटी की समस्या एवं भौतिक और डिजिटल इनफ्रास्ट्रक्चर की समस्याएं सामने आती है।

शिक्षा : डिजिटलीकरण ने भौगोलिक बाधाओं को पीछे छोड़ते हुए इंटरनेट कनेक्शन के माध्यम से कोई भी व्यक्ति कहीं से भी शैक्षणिक संसाधनों तक डिजिटल रूप से जुड़ाव सकता है। ग्रामीण क्षेत्रों के लिए यह अधिक प्रासंगिक है। वर्ष 2024 में डिजिटल शिक्षा का मार्केट भारत में 6.71 बिलियन डॉलर का था। इसमें वर्ष 2024–2029 तक 24 प्रतिशत की वृद्धि होने का अनुमान है। 14 प्रतिशत लोग वर्ष 2024 में ऑनलाइन शिक्षा का उपयोग कर रहे है। इससे कौशल विकास के अवसर और वैश्विक शिक्षण समुदाय से जुड़ने की क्षमता निहित होती है। डिजिटल शिक्षा से व्यवहारिक एवं तकनीकी ज्ञान की भी प्राप्ति होती है। डिजिटल शिक्षा के माध्यम से ग्रामीण क्षेत्रों की लोगों को वैश्विक तथा राष्ट्रीय स्तर की संस्थानों से जुड़ने तथा उनके अध्ययन सामग्री का लाभ उठाने का अवसर मिलता है। ग्रामीण क्षेत्रों में इंटरनेट की पहुँच सीमित होने के कारण डिजिटल प्लेटफॉर्मों का लाभ उठाने के लिये लोगों को कठिनाई होती है। डिजिटलाइजेशन के लिए बुनियादी ढांचे की आवश्यकता होती है तथा दूरस्थ ग्रामीण क्षेत्रों में मोबाइल, कंप्यूटर, इंटरनेट आदि की सीमित सुविधा होने के कारण इस दिशा में धीमी प्रगति हो रही है। डिजिटल प्लेटफॉर्मों पर अधिकांश अध्ययन सामग्री अंग्रेजी में उपलब्ध होती है, जो ग्रामीण पृष्ठभूमि में रह रहे लोगों के लिए भाषाई अवरोध उत्पन्न करती है। क्षेत्रीय भाषाओं में अनुवाद द्वारा यह जानकारीयां अधिक लाभप्रद होगी।

बैंकिंग : डिजिटलीकरण से बैंकिंग सेवाएं आज ग्रामीण सुदूर क्षेत्रों तक पहुँच संभव हो पाई है। इसके द्वारा ग्रामीण क्षेत्रों में वित्तीय समावेशन स्थापित करना संभव हुआ है। डिजिटल भुगतान जैसे, यूपीआई के माध्यम से सुदूर गांवों में लोग आसानी से ऑनलाइन भुगतान के माध्यम से लेनदेन करने में सक्षम हो पाए हैं। वर्ष 2023 में देश के 74 प्रतिशत बैंक खाता धारक मोबाइल से डिजिटल बैंकिंग तथा 52 प्रतिशत बैंक खाता धारक लैपटाप तथा कंप्यूटर से डिजिटल बैंकिंग का उपयोग करते है। किसानों को बैंकों और अन्य वित्तीय संस्थानों से कर्ज और सब्सिडी सीधे मिल सकती है। जिससे छोटे और सीमांत किसानों को लाभ हुआ है। इन सब सुविधाओं के साथ–साथ डिजिटल भुगतान में साइबर धोखाधड़ी और डेटा चोरी जैसी प्रमुख समस्याएं भी जुड़ी हैं। ग्रामीण क्षेत्रों एवं कृषकों को इसके प्रति जागरूक करना और सुरक्षा उपायों को सतत् अपनाना आवश्यक है।

ग्रामीण रोजगार और उद्यमिता : डिजिटलाइजेशन के माध्यम से वर्तमान में ग्रामीण क्षेत्रों में रोजगार एवं उद्यमिता को प्रोत्साहन मिल रहा है। भारत के सकल घरेलू उत्पाद में एमएसएमई सेक्टर 30 प्रतिशत का योगदान देता है। वर्ष 2024 में देश के 52 प्रतिशत लोगों तक इंटरनेट की पहुँच है। जबकि वर्ष 2014 में देश के 14 प्रतिशत लोगों तक इसकी पहुँच थी। वर्तमान में 1.4 बिलियन लोगों तक इंटरनेट की सुविधा है। ग्रामीण क्षेत्रों में बने जन सुविधा केन्द्रों (सीएससी) के माध्यम से लोग सरकारी सेवाओं का लाभ उठा रहें हैं। इन केंद्रों के बनने से स्थानीय ग्रामीण लोगों को रोजगार मिला है। ग्रामीण क्षेत्रों में उगाई जा रही प्रमुख फसलों एवं ग्रामीण उत्पादों को बाजार तक सीधी पहुँच डिजिटल प्लेटफॉर्म के माध्यम से संभव हुआ है। इससे ग्रामीणों को अपने उत्पादों को बाजारों में बेचना आसान हुआ है, साथ ही ग्रामीण क्षेत्रों के लोगों को डिजिटल माध्यमों से एक दूसरे के साथ जुड़ने और कृषि एवं ग्रामीण विकास से संबंधित समस्याओं के समाधान पर विचार विमर्श करने के लिए डिजिटल समन्वय लाभप्रद होगा।

प्रधानमंत्री ग्रामीण डिजिटल साक्षरता अभियान : इस अभियान के तहत 6 करोड़ लोगों को डिजिटल साक्षर बनाए जाने का लक्ष्य किया गया था। इसमें प्रत्येक परिवार से लोगों को चयनित कर कुल 40 प्रतिशत ग्रामीण परिवारों तक इस अभियान को पहुंचाने का लक्ष्य रखा गया था। इसके द्वारा सभी ग्रामीण लोगों को डिजिटली साक्षर एवं डिजिटल उपकरणों का उपयोग करने का प्रशिक्षण सुनिश्चित किया गया था। ग्रामीण क्षेत्रों के लोगों को डिजिटल रूप से साक्षर एवं सक्षम बनाकर इसके दक्षता पूर्वक उपयोग से शहरी एवं ग्रामीण क्षेत्रों के ज्ञान आधारित असंतुलन को कम किया जा सकता है।

सूचना एवं संचार प्रौद्योगिकी : सूचना एवं संचार प्रौद्योगिकी में डिजिटलीकरण से हुए अभिनव बदलाव कृषि एवं ग्रामीण क्षेत्रों में सूचनाओं को त्वरित प्रेषित किया जाता है। देश भर में लगभग 5.6 लाख जन सुविधा केंद्र (सीएससी) स्थापित है। इसके माध्यम से लोगों को सरकार द्वारा जन उपयोगी कार्यक्रम, योजनाओं तथा प्राकृतिक आपदाओं जैसी आपातकालीन स्थिति में चेतावनी कम समय में शीघ्रता से प्राप्त हो जाती है। जिससे लोग नवीन जानकारीयों के साथ–साथ आपातकालीन परिस्थिति में अधिक सतर्क एवं जागरूक रहे। इससे कृषि एवं ग्रामीण क्षेत्रों में सामाजिक–आर्थिक नुकसान को कम किया जा सकता है। यह त्वरित सतर्कता डिजिटलीकरण के माध्यम से ही संभव हो पाई है। विषम भौगोलिक पारिस्थितिकी वाले कृषि एवं ग्रामीण क्षेत्रों में डिजिटलीकरण हेतु संरचनात्मक ढांचा विकास एवं इंटरनेट कनेक्टिविटी का विकास किया जाना आवश्यकता है।

निष्कर्ष

डिजिटलीकरण की कृषि और ग्रामीण विकास में महत्वपूर्ण भूमिका है। कृषि क्षेत्र में समय के अनुसार हो रहे बदलावों तथा नवीन तकनीकों के प्रयोग से संबंधित जानकारियां डिजिटलीकरण

के माध्यम से कृषकों तक शीघ्रता से पहुँचती है। इससे किसानों को बाजारों तक सीधी पहुँच, नवीनतम कृषि तकनीक, सरकारी योजनाओं और डिजिटल लेन देन के माध्यम से आर्थिक स्थिति को सुधारने का अवसर मिलता है। ग्रामीण विकास में डिजिटलीकरण के द्वारा शिक्षा, स्वास्थ्य, बैंकिंग, गवर्नेंस, ग्रामीण रोजगार और उद्यमिता तथा संचार एवं प्रौद्योगिकी आदि क्षेत्रों में महत्वपूर्ण भूमिका निभाई जा रही है। कृषि एवं ग्रामीण क्षेत्रीय विकास में बुनियादी ढांचे और क्षेत्र अनुसार इनोवेशन में निवेश की कमी, सार्वभौमिक पहुँच, अवसंरचनात्मक निर्माण, इंटरनेट कनेक्टिविटी, साइबर क्राइम, भाषाई अवरोध, डिजिटल साक्षरता, प्रशिक्षण एवं जागरूकता, विषम भौगोलिक क्षेत्रों में ढांचागत निर्माण, बहुआयामी नेटवर्किंग प्रणाली की कमी डिजिटलीकरण से संबंधित प्रमुख चुनौतियां हैं। इन चुनौतियों के समाधान हेतु ग्रामीण क्षेत्रों में बुनियादी ढांचे का विकास, सुदूर ग्रामीण क्षेत्रों में डिजिटल आधारित अवसंरचनाओं का विकास, डिजिटल साक्षरता एवं प्रशिक्षण, साइबर सुरक्षा के प्रति जागरूकता, क्षेत्रीय भाषाओं में कृषि एवं ग्रामीण विकास अनुकूल जानकारियां, इंटरनेट कनेक्टिविटी हेतु सिग्नल टावरों की स्थापना तथा डिजिटल सार्वभौमिक पहुँच आवश्यक है। कृषि एवं ग्रामीण क्षेत्रों में डिजिटल तकनीकों के प्रभावी प्रयोग से ग्रामीण आर्थिक विकास और सामाजिक प्रगति प्राप्त की जा सकती है।

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