

SUSTAINABLE TRANSFORMATION

COMPENDIUM

10TH INTERNATIONAL MANAGEMENT CONFERENCE

Navigating the Future:
Management Strategies for
Sustainable Transformation

21st - 22nd February, 2025





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**10th
INTERNATIONAL
MANAGEMENT
CONFERENCE**
21st & 22nd February, 2025

IMCon'25

Compendium

Theme

**Navigating the Future: Management Strategies for
Sustainable Transformation**

Sub-Themes

**Human Resource | Marketing | Finance & Economics |
Technology | Literature & Communication |
Entrepreneurship**

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Keynote



Prof. Biswajeet Pattanayak,
Founder & President, ASBM University,
Presided by

Valedictory Session



Prof. Bibhuti Bhusan Biswal,
Vice-Chancellor,
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Chief Guest



Shri Pradeep Ghosal ,
Head (CSR) ,
TPCODL
Guest of Honour

IMCon'25

PROGRAMME

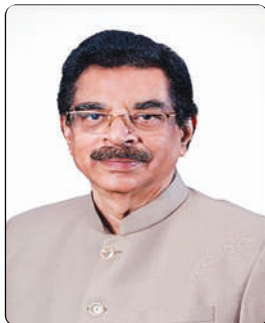
<u>Date</u>	<u>Time</u>	<u>Venue</u>	<u>Programme</u>
21st February, 2025	10 AM	Main Gate	Registration
	11 AM	Central Auditorium	Inaugural Session
	2 PM	C 3	Technical Session- I (OB, HR & CSR)
	2 PM	C 5	Technical Session - II (Technology)
	5 PM	Central Auditorium	Cultural Event
22nd February, 2025	10 AM	Conference Hall	Technical Session-III (Online)
	10 AM	C 3	Technical Session - IV (Finance)
	10 AM	C 5	Technical Session - V (Marketing)
	2.30 PM	Central Auditorium	Valedictory Session

Dr. Hari Babu Kambhampati
Governor, Odisha



RAJ BHAVAN
BHUBANESWAR - 751 008

January 31, 2025



MESSAGE

I am glad to know that the School of Business of ASBM University, Bhubaneswar is organising an International Management Conference 2025 (IMCON'25) on **"Navigating the Future: Strategies for Sustainable Transformation"** on February 21-22, 2025. A Compendium featuring select research papers presented during the event is also being brought out on the occasion.

Sustainable transformation is no longer a choice but a necessity. In an era marked by dynamic economic shifts, technological advancements, and environmental concerns, businesses must integrate economic growth, social progress, environmental responsibility and effective governance. The theme is highly relevant in today's rapidly evolving global landscape, where responsible business practices must be harmonized with sustainable development goals. I believe that the deliberations will provide valuable insights into balancing business expansion with sustainability, ensuring long-term resilience and inclusive development.

The compendium featuring select research papers will serve as a valuable repository of knowledge, offering innovative strategies and fresh perspectives for academia, industry, and policymakers alike. I wish the conference and publication all success.

A handwritten signature in blue ink, appearing to read 'Hari Babu Kambhampati'.

(Hari Babu Kambhampati)

MOHAN CHARAN MAJHI
CHIEF MINISTER, ODISHA



LOKASEVA BHAVAN
BHUBANESWAR

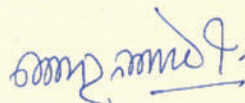


MESSAGE

I am glad to know that the School of Business, ASBM University is organising International Management Conference 2025 on "Navigating the Future: Strategies for Sustainable Transformation" on 21st & 22nd February, 2025 in Bhubaneswar and also bringing out a conference compendium.

Strategies for sustainable transformation should be planned to well integrate environmental, economic and social objectives through supportive and robust policies. It is encouraging that the conference has chosen a relevant topic for deliberation in the context of our vision for a sustainable future. I hope the conference would have effective brainstorming session to come up with valuable outcomes.

I extend my warm greetings to the organizers and delegates and wish the conference a grand success.

A handwritten signature in blue ink, appearing to read 'Mohan Charan Majhi'.

(MOHAN CHARAN MAJHI)



MESSAGE

I am happy to know that ASBM University is organizing the International Management Conference (IMCON'25) on "Navigating the Future: Strategies for Sustainable Transformation".

The central theme, addressing the intersection of responsible business expansion and sustainable development, underscores the need for innovative strategies that drive economic progress while ensuring long-term sustainability. In today's dynamic landscape, businesses must adopt forward-thinking approaches that foster resilience and inclusivity. I am also pleased to know that a compendium featuring selected research papers will be released, serving as a valuable repository of knowledge and innovative ideas for academia and industry.

I extend my best wishes for the grand success of this conference. May this conference foster innovative strategies and meaningful collaborations that contribute to a sustainable and prosperous future.

(**Suryabanshi Suraj**)

ଅରବିନ୍ଦ ଅଗ୍ରୱାଲ, ଭା.ପ୍ର.ସେ.

ଆୟୁକ୍ତ-ତଥା-ଶାସନ ସଚିବ, ଉଚ୍ଚଶିକ୍ଷା ବିଭାଗ

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Commissioner-cum-Secretary to Government
Higher Education Department, Govt. of Odisha



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Message

I am pleased to learn that ASBM University is organizing the **International Management Conference-2025** on "*Navigating the Future: Management Strategies for Sustainable Transformation*" on **21st & 22nd February, 2025** in **Bhubaneswar** and is commemorating the event with a special compendium.

ASBM University has established itself as a premier institution in management education, earning national recognition for its academic excellence. This conference comes at a pivotal time when businesses and management professionals must adopt sustainability-driven strategies. In today's interconnected world, growth in isolation is no longer viable—collaborative, inclusive, and future-ready approaches are imperative for long-term success.

I am confident that this conference will serve as a platform for insightful discussions and the exchange of innovative ideas that will contribute to shaping the future of business and sustainability.

I extend my best wishes to all the delegates and look forward to the success of this prestigious event.

(Aravind Agrawal)

डॉ. (श्रीमती) पंकज मित्तल
(पूर्व कुलपति, बीपीएस महिला विश्वविद्यालय, हरियाणा)
महासचिव

Dr. (Mrs.) Pankaj Mittal
(Former Vice Chancellor, BPS Women University, Haryana)
Secretary General



भारतीय विश्वविद्यालय संघ
Association of Indian Universities

AIU/SGO/2024

December 11, 2024



MESSAGE

I am delighted to extend my warmest congratulations to the **ASBM University** on the occasion of the **upcoming International Management Conference (IMCON'2025)** on “**Navigating the Future: Strategies for Sustainable Transformation.**” This prestigious event promises to be a vital platform for fostering meaningful discourse on sustainable business practices and transformational strategies. As the global community faces the pressing challenges of environmental, economic, and social sustainability, your commitment to leading such a visionary dialogue is commendable. This conference will undoubtedly attract thought leaders, practitioners, and academics who are passionate about shaping a sustainable and resilient future. We are confident that IMCON'2025 will pave the way for innovative insights, collaborative partnerships, and actionable strategies that will inspire progress across industries.

Best wishes for a successful and impactful event!

(Pankaj Mittal)

Preface

In today's fast-changing world, businesses face new challenges and opportunities. The focus is no longer just on profits but on creating long-term value for everyone—customers, employees, shareholders, communities, and the environment. To stay relevant and competitive, companies must shift their strategies towards sustainability.

Sustainable transformation means making changes that benefit both the business and the planet. It involves adopting responsible practices, using technology wisely, and creating a workplace that is inclusive and innovative. Businesses must also balance current needs with future responsibilities, ensuring that their actions today don't harm the world for future generations.

The theme “Navigating the Future – Management Strategies for Sustainable Transformation” highlights how businesses can adapt to these demands. It encourages exploring new management approaches, building strong relationships with stakeholders, and focusing on areas like leadership, technology, skill development, and communication to create a better future.

This conference will bring together industry experts, academics, policymakers, and students to discuss practical ways businesses can thrive while staying socially and environmentally responsible. By sharing knowledge and ideas, we aim to help businesses find new strategies to grow and succeed in a more sustainable way. The road to a better future starts with responsible actions today. Only through collaboration and innovation can we build businesses that are resilient, responsible, and ready for tomorrow.

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ABSTRACTS

NAVIGATING THE FUTURE OF HIGHER EDUCATION: THE IMPACT AND ETHICAL INTEGRATION OF AI

Dr. Rajesh Khajuria, Amber Sironzkar, Dr. Ankit Shah

Abstract:

Artificial Intelligence (AI) is revolutionizing higher education by transforming academic processes, research, and learning experiences. AI-powered platforms and adaptive systems enable personalized learning, improving student efficiency, retention, and engagement. By automating administrative tasks, AI enhances operational capacity, allowing educators to focus on mentorship. However, ethical considerations, including algorithmic bias, equity, and data privacy, necessitate careful integration strategies. This study examines tools for accessibility, blockchain technology, augmented reality (AR), and AI-driven assessments, proposing ethical frameworks to ensure equitable adoption. It explores how AI can foster innovative and inclusive education.

HARNESSING SOCIAL CAPITAL FOR SUSTAINABLE DIGITAL INNOVATION: THE ROLE OF CULTURAL INFLUENCES IN GHANAIAN ORGANIZATIONS

Isaac Dadzie

Abstract

Organizational culture and social capital play critical roles in the adoption and sustainability of digital transformation at public universities in Ghana. Using mixed methods and data from 66 academic, administrative, and technical staff, the research highlights how cultural factors like hierarchical respect and communal norms influence digital adoption. Social capital, embodied in trust and collaboration, helps reduce resistance, with informal discussions driving awareness and acceptance. Barriers such as inconsistent resource allocation and limited evaluation practices hinder sustainability. Findings emphasize the need for culturally tailored strategies, strengthened social collaboration, and better resource management for lasting digital innovation.

COLLABORATIVE COMPETENCE SUPPORTING SOCIAL ENTREPRENEURSHIP FOR SUSTAINABILITY

Douglas J. Gilbert

Abstract

Entrepreneurial approaches to business can play a key role in mitigating the negative effects of unsustainable business practices and orienting new businesses towards the UN Sustainable Development Goals (SDGs). Building sustainable entrepreneurial solutions requires moving beyond the venerated myth of the entrepreneur as a heroic figure capable of superhuman vision and execution. This article suggests moving beyond heroic myths of entrepreneurship based on individual traits as the definition of a successful entrepreneur. Instead, it proposes that social and sustainable entrepreneurship must be solidly grounded in collaborative practices to achieve the SDGs. Collaboration, identified as a key 21st Century skill, is often embedded in models of entrepreneurial competencies without full explanation or development.

LINK PREDICTION ENHANCED WITH COMMUNITY DETECTION IN COMPLEX NETWORKS

Chi Huy Kieu, Thi Thanh Sang Nguyen

Abstract

Over the last decade, complex networks have emerged to be a promising research field. It enables us to extract and comprehend a variety of real systems, ranging from biology, technology, and sociology. To take advantage of the vast benefits that these systems bring, we can predict and perhaps control them by understanding their mathematical descriptions, but the effort is difficult due to the complexity of these systems and the significant differences between them. The background, algorithms, and techniques for identifying communities in complex networks will all be thoroughly explored in this study. Moreover, a solution to improve the performance of the machine learning models with the community detection technique has been proposed and examined in real-world scenarios. The experimental results have shown the outperformance of this solution.

DEVELOPMENT OF A SYSTEMATIC COST CALCULATION FOR RE-MANUFACTURING FACTORIES: A CASE STUDY IN BATTERY PRODUCTION

Hanh Vo Thi Hong

Abstract

This study examines remanufacturing as a key strategy in the Circular Economy, extending product life cycles while offering environmental and economic benefits. It addresses cost estimation challenges in battery remanufacturing due to variable product conditions and return times. Using the Activity-Based Costing (ABC) method, a systematic cost model is developed to optimize expenses and align remanufacturing with conventional manufacturing. The model identifies key resources, equipment, and handlers, linking theory with practice. Findings support remanufacturing's competitiveness if costs remain below new production levels, aiding production planners in process evaluation, performance improvement, and sustainable industry growth

ARTIFICIAL INTELLIGENCE, VIRTUAL REALITY AND HYPERSCANNING FOR THE PERSONNEL RESILIENCE AND SUSTAINABILITY IN THE VUCA ORGANIZATIONAL ENVIRONMENT

Olga Maslova, Vasily Pyatin

Abstract:

The article is the first to examine the integration of digital technologies (VR, AR, AI, hyper scanning) to ensure the personnel resilience and sustainability in the VUCA organizational environment. The features of Industry 4.0 and Industry 5.0 are analyzed. In relation to the human-centered Industrial Revolution 5.0, the special role of AR, VR in this evolution and their complementation with artificial intelligence is demonstrated. It is also shown that all human activities are controlled by neural networks of the social brain. We predicted that hyper scanning combined with VR, AR and AI increases resilience and sustainability in the VUCA organizational environment of Industry 5.0 in the context of evolving digital platforms and ecosystems.

AN OVERVIEW OF AI USAGES IN HRM: EVIDENCE FROM BANGLADESH

**Md. Atiqur Rahman Sarker, Farhana Ferdousi,
Ummea Sahera Noume, Dewan Mehrab Ashrafi**

Abstract

This study examines the role of Artificial Intelligence (AI) in Human Resource Management (HRM) in Bangladesh, focusing on its impact on recruitment, employee engagement, training, performance management, and workforce planning. Primary data from interviews with six industry professionals and secondary data from academic sources reveal that AI improves HR efficiency by automating processes, reducing bias, and providing data-driven insights. However, challenges like data privacy, infrastructure, and skill gaps hinder AI adoption. The paper offers recommendations for effective AI integration to optimize HR functions, enhance employee performance, and foster a responsive, inclusive workplace in Bangladesh.

SOCIAL CAPITAL OF COMPANIES IN A VUKA WORLD: CREATIVITY AND INNOVATIVENESS OF PERSONNEL

Lyudmila Zakharova, Elena Saygina

Abstract

This study examines social capital in turbulent business environments, comparing innovation and personnel management values in India and Russia. It finds that companies require personnel with varying levels of creativity and innovativeness, capable of productive communication for company growth. Through theoretical modeling, a typology of creative and innovative personalities—conservative, adaptor, idea creator, and creative innovator—is developed. The study highlights the importance of adaptors and creative innovators in innovation-driven enterprises. It also explores barriers and opportunities for fostering creative and innovative qualities in employees, and their productive interaction within diverse organizational cultures.

SUSTAINABLE STRATEGIES FOR PROMOTING EXCLUSIVE BREASTFEEDING IN GHANA: LEVERAGING DIGITAL TOOLS TO ENHANCE MATERNAL AND CHILD HEALTH OUTCOMES

Isaac Dadzie, Benjamin Arhin

Abstract

Exclusive breastfeeding (EBF) is just one of the long-term instruments of maternal and child health, but there has not been much increase in uptake across communities because of inadequate support structures and access to needed resources. Much of the research into the possibility of promoting EBF in communities within Ghana focuses on culturally tailored and community-driven programs to explore the use of digital platforms. The study uses a mixed-methods approach by analyzing qualitative results drawn from semi-structured interviews and survey results that enlisted 87 breastfeeding mothers for quantitative findings. There are three main domains within which the study will be situated: accessibility and impact of online lactation education resources, role of health care practitioners as facilitators using digital means, and effectiveness of these digital platforms in providing peer support.

INVENTORY MANAGEMENT ANALYSIS IN THE COFFEE SHOP INDUSTRY

Budi Suprpto, Marcelino Adrian Wenerdi

Abstract

This study analyzes the Economic Order Quantity (EOQ) and Reorder Point (ROP) methods to optimize raw material procurement in a coffee shop. Using qualitative and quantitative approaches, it examines company purchasing policies through interviews and data analysis. EOQ minimizes inventory costs by optimizing order quantities and frequency, while ROP ensures timely reordering to prevent stockouts. Findings highlight differences between the company's purchasing strategy and the EOQ method, emphasizing the benefits of implementing EOQ and safety stock measures for cost efficiency and inventory control. The study provides insights for improving raw material management and procurement strategies.

NOISE TRADER RISK: EVIDENCE FROM VIETNAM STOCK MARKET AND IMPLICATIONS FOR SUSTAINABLE MARKET DEVELOPMENT

Pham Thanh Dat, Pham Dan Khanh

Abstract

This paper investigates the existence of noise trader risk in Vietnam's stock market and its effect on daily stock price returns. The methodologies include estimating a GARCH (1,1) model to filter residuals, followed by a moving average method to assess the impact of information traders. Noise trader risk, defined as the risk stemming from noise traders, is derived by subtracting the impact of rational traders from the residuals. The findings indicate that noise trader risk is present in Vietnam's stock market, and its influence on daily stock returns is unpredictable. In contrast, a positive impact of information traders on stock returns is observed, contributing to market correction as stock prices revert to their fundamental values.

WANGLING THE SUSTAINABLE FUTURE BY REMOLDING HRM STRATEGIES

Dr Sharad R Kulkarni, Dr Sharwari S Kulkarni

Abstract:

The sustainable growth of any organisation in future is possible only when organisation initiates and implements strategies to transform conventional human resource management (HRM) into sustainable HRM practices. In this context this study has been conducted to examine the role of higher education institutes towards sustainable transformation of HRM. It further investigates the influence of sustainable HRM on organisational commitment, innovation and social responsibility. The survey was conducted using structured questionnaire to gather opinions of employees from selected higher education institutes in the jurisdiction of Shivaji University, Kolhapur. The sample of 40 employees was selected randomly. The study reveals that organisational commitment, innovation and social responsibility as fundamental components of sustainable HRM leads to navigate appropriately towards sustainable transformation in future. There is a need to adopt a dynamic approach by organisations to respond quickly and sensitively to upgrade social commitment which will surely ensure a constructive sustainable transformation.

FRAMEWORK OF SOCIAL STOCK EXCHANGE INDICES: INDIAN EVIDENCE

Dr. Karkaria Dusmanta, Ms. Karthika V R

Abstract

The development of any country not only considers the economic boost of that nation but also has several parameters like easy access to healthcare and education system, the advancement of infrastructure and industry, per capita income, gender equality, etc. To attain all these economic and social parameters philanthropists and not-for-profit organizations should come forward and support the upliftment of the underprivileged class of the society. The findings of our study explain that, the education sector receives more donations as compared to the health and livelihood sectors. It has been suggested that more donations should be directed towards other allied sectors such as health, livelihood, rural transformation, and so on, which may benefit the deprived population of society and comprehensive development of nations such as economic growth, progression in hunger index, happiness report, gender inequality index, and also other indexes that are frequently published by various organizations at different indicators.

CONVERTING TEMPLE WASTE TO SUSTAINABLE PRODUCTS- ISSUES AND CHALLENGES ENERGINEE INNOVATIONS PVT LTD

Dr. Arpita Srivastava, Dr. Sunetra Saha, Dr. Nidhi Srivastava

Abstract

Energinee Innovations Pvt Ltd, founded in 2018 by Akash, promotes environmental sustainability by recycling temple waste from Delhi NCR into eco-friendly idols. Following a triple impact strategy—Recycling Waste, Skill Development, and Social Impact—the company faces challenges such as a shortage of trained artisans, expansion beyond Delhi NCR, and diversifying sustainable products. This case study analyzes these challenges using theories of Reverse Logistics, Sustainability, the Three Pillars of Sustainability, SDG 12, and Scalability. Data was collected through focus group discussions with temple management, supervisors, and the founder, offering insights into sustainable entrepreneurship and business expansion strategies.

NAVIGATING THE FUTURE: BANK INVESTMENT STRATEGIES FOR SUSTAINABLE TRANSFORMATION

Sandhiya M, Dr Anli Suresh

Abstract:

This paper explores future bank investment strategies for sustainable transformation, focusing on gender equality. The study analyzes the impact of various sustainable transformation factors on gender categories through a correlation study with a sample size of 112 investors, using a non-probability sampling method. Among nine factors, workforce shift and blockchain technology have the most significant impact on bank investment decision-making. The findings suggest that banks must adapt their operations to address both external and internal challenges and ensure future sustainability through strategic developments. These insights help guide banks in aligning investment strategies with sustainable transformation goals.

COMMUNITY BASED ECOTOURISM (CBET), SUSTAINABLE ENTREPRENEURSHIP – CHALLENGES AND OPPORTUNITIES

Shaheed Khan, Freeda Maria Swarna M

Abstract

India's tourism sector has expanded significantly, with Community-Based Ecotourism (CBET) emerging as a growing niche, particularly in forest-adjacent areas. While large corporations dominate the Tourism, Travel, and Hospitality (TTH) industry, CBET thrives through local stakeholders' entrepreneurial efforts. Forest Department (FD) oversees these sites, collaborating with local communities via Eco-development Committees (EDC) and Ecotourism Management Committees (ETMC). The authors provide case studies from eight Indian states to illustrate the challenges and opportunities of these community-driven ventures, offering insights for academics, practitioners, and researchers on the complexities of CBET's entrepreneurial dynamics.

NEXT-GEN RETAIL: DESIGNING EXPERIENCES, SHAPING ATMOSPHERE, AND DRIVING PURCHASE INTENTIONS WITH SUSTAINABLE STRATEGIES

Dr. Vilas Naik, Dr. Arpita Basak

Abstract

This study investigates the relationship between store design and consumer purchase intentions, focusing on creating an experiential retail environment. As the retail landscape grows increasingly competitive, stores are recognizing the critical role of store design in shaping the shopping experience to attract and retain customers. Using a mixed-methods approach, combining quantitative surveys and qualitative interviews, the research explores consumers' perceptions of key store design elements such as layout, visual merchandising, product display, lighting, and ambiance. The findings reveal that these design elements significantly enhance the shopping experience, leading to increased purchase intentions. Moreover, an experiential retail environment—incorporating interactive displays, sensory experiences, personalized services, and engaging customer interactions—further strengthens consumer behavior, promoting higher purchase intentions. Demographic factors such as age, gender, income level, and shopping preferences are identified as key variables influencing these perceptions.

DRIVING CLIMATE RESILIENCE IN THE STEEL INDUSTRY: DECARBONIZING FOR ACHIEVING CARBON NEUTRALITY AND NET-ZERO GOALS

S N Panigrahi

Abstract

The global steel industry, a cornerstone of the world economy, is also a significant contributor to greenhouse gas (GHG) emissions, responsible for approximately 7-9% of global CO₂ emissions. As the sector faces mounting pressure to align with the Paris Agreement's climate targets, decarbonization has become imperative. This paper examines the urgency and strategies for achieving net-zero emissions in the steel industry, emphasizing the adoption of innovative technologies such as Artificial Intelligence (AI), Machine Learning (ML), Blockchain, and green hydrogen. These advancements aim to enhance energy efficiency, reduce emissions, and transform traditional production methods. This study underscores the necessity of integrating emerging technologies, robust policies, and international collaboration to achieve a sustainable, climate-resilient future for the steel industry.

A CONCEPTUAL FRAMEWORK ON GREEN HRM: AN EMERGING TREND IN HR PRACTICES AND CHANGES NEEDED IN EMPLOYMENT RELATIONSHIPS

Sasmita Sahoo

Abstract

This study explores Green Human Resource Management (GHRM) as a strategy for improving environmental sustainability, particularly during the COVID-19 pandemic. It examines how GHRM minimizes carbon footprints through sustainable outsourcing, onboarding, performance management, training, and paperless compensation systems. The research highlights GHRM's role in shaping employee attitudes, fostering sustainable development, and ensuring stakeholder well-being. Drawing from previous studies, it identifies challenges businesses face in implementing GHRM and its impact on workplace environmental management. The findings emphasize the necessity of integrating GHRM to enhance corporate sustainability, promote eco-friendly practices, and align HR functions with environmental responsibility.

EXPLORING MYSTERY, SYMBOLISM IN THE POETRY OF W. B. YEATS FOR A SUSTAINABLE SOCIO-LITERARY MOVEMENT

Dr. Ajay Kumar Pradhan

Abstract

Literature reflects social norms, belief and tradition. W. B. Yeats expresses the Irish culture occultism and folklore with a spiritual conviction. His poetry shows sustainable social development for an upcoming universal appeal to be ready for the peril of war and devastation. His poetry "Second Coming" and "Sailing to Byzantium" possesses a sustainable spirit to escape from the mechanical monotony to a stable socio-spiritual ambience for quality life and attainment of peace. His use of symbols like Tower, nine bean rows, goldsmith, shows his poetic brilliance.

CORPORATE SOCIAL RESPONSIBILITY PRACTICES FOR AN INCLUSIVE AND SUSTAINABLE GROWTH: EVIDENCE FROM INDIA

Dr. Priyabrata Satpathy

Abstract

The concepts of Sustainability and sustainable development have acquired greater significance over time, as society as a whole have become more aware of its impact on the environmental scenario. Globalization, climate change, effective and efficient management of available resources, as well as their depletion, or the aging of the population, among others, invite society to change the direction of quantitative economic growth towards a more qualitative inclusive and sustainable growth. On the other hand, one of the most accepted views in this field defines CSR as “a concept through which companies integrate social and environmental concerns in their commercial operations and in their interaction with their stakeholders for a sustainable growth. The paper discusses the CSR guidelines and shares its impact on the way CSR is practiced by Indian companies.

SKILL GAP ANALYSIS IN SEAFOOD PROCESSING AND EXPORT UNITS USING AI

Mrs. Sipra Karmakar

Abstract

Skill gaps in the seafood processing and export sector directly impact product quality, compliance, and profitability. This paper explores the application of Artificial Intelligence (AI) in identifying, analyzing, and addressing these gaps. By leveraging AI for data collection, predictive analysis, and training customization, seafood units can enhance operational efficiency and meet global standards. Conducting a Skill Gap Analysis in a seafood processing and export unit with the aid of AI involves leveraging data, predictive analytics, and machine learning models to identify, measure, and address skill deficiencies. The paper outlines methodologies, tools, and frameworks for implementing AI-driven skill gap analysis, supported by case studies and challenges encountered in the process.

WOMEN ENTREPRENEURSHIP AND SUSTAINABILITY IN INDIA

Subhasmita Parida

Abstract

This study examines the role of women entrepreneurs in advancing the three pillars of sustainability—economic, social, and environmental—using secondary data. It highlights the significant contributions of women-led MSMEs in India, which employ 23.3% of the workforce and contribute 20.37% to the economy. The research underscores the need to address gender inequities, increase female representation in managerial roles, and empower women through policy, mentoring, and resource access. It argues that overcoming barriers women face in entrepreneurship will promote gender equality and support the achievement of the SDGs, thereby fostering global social and environmental sustainability.

NAVIGATING THE FUTURE: MANAGEMENT STRATEGIES FOR SUSTAINABLE TRANSFORMATION IN ENTREPRENEURSHIP

Satyaprakash Naik

Abstract

In today's competitive landscape, businesses must integrate sustainability for long-term success. This research examines key management strategies for sustainable transformation, emphasizing responsible resource management, eco-friendly innovation, and socially conscious practices. The role of leadership in fostering a sustainability culture and embedding it into decision-making is explored. Strategic frameworks such as circular economy, green entrepreneurship, and corporate social responsibility are analyzed for their value creation potential. The study highlights the importance of agility in adapting to market shifts and regulatory changes, and how technology and digital innovation can enhance efficiency and scalability, ensuring profitability alongside environmental and social responsibility.

CHALLENGES AND OPPORTUNITIES OF SOCIAL ENTREPRENEURSHIP DURING COVID 19 PANDEMIC IN INDIA

Monalisha Chakraborty, Prof. Prasanta Parida

Abstract

The COVID-19 pandemic led to a major paradigm shift, creating new challenges and opportunities for social entrepreneurship. In response, social entrepreneurs in India adapted by addressing urgent humanitarian needs while advancing social, cultural, and environmental goals. This study explores the obstacles faced and opportunities seized by 50 social entrepreneurs during the pandemic, focusing on their work routines, service adaptations, and barriers like funding and fear management. The findings highlight innovative solutions and new social initiatives, offering valuable insights into the evolving role of social entrepreneurship in crises. A literature review contextualizes these findings, emphasizing their impact on societal welfare.

SUSTAINABLE AGRIBUSINESS STRATEGIES FOR HYBRID PADDY SEED PRODUCTION AND DISTRIBUTION IN ODISHA

Sumit Gouraba Patra, Dr. Manmath Nath Samantaray

Abstract

Agriculture holds a crucial role in India, contributing significantly to food security and the rural economy. In Odisha, paddy cultivation is a fundamental agricultural practice; however, traditional farming methods and the limited uptake of advanced seed technologies restrict productivity. This study explores sustainable agribusiness strategies aimed at improving hybrid paddy seed production and distribution in Odisha. Employing a mixed-method approach, data were gathered from 300 participants, including farmers, seed producers, and distributors, across various agro-climatic zones. The study concludes that strategic efforts focusing on financial support, enhancing distribution networks, and raising farmer awareness are vital for the broader acceptance of hybrid paddy seeds.

LEADERSHIP, SUSTAINABILITY, AND INNOVATION: A CASE STUDY OF TOYOTA'S LEAN MANUFACTURING AND SUSTAINABLE PRACTICES

Yasmine Mnassri

Abstract

This research paper examines Toyota Production System (TPS), the company's sustainability strategies and position, and leadership, highlighting the relationship between leadership, sustainability, and business propensity. The company has established a production system and culture of innovation that have impacted manufacturing worldwide. Furthermore, they took a serious direction towards sustainable transformation; they included it in every part of the vehicle life, and they involved different stakeholders and leadership in it. This case study explores Toyota's approaches and outcomes to draw conclusions on the relationship between leadership, innovation, sustainability, and organisational effectiveness. Additionally, conducting surveys or interviews with Toyota would bring more insights about the areas explored, especially the role of leadership

DIGITAL FINANCE AND ECONOMIC INCLUSION: A SYSTEMATIC LITERATURE REVIEW ON THE ROLE OF FINANCIAL SERVICES IN BRIDGING ECONOMIC DISPARITIES

Bhuteswar Patra, Dr. Anita Pareek

Abstract

This study examines how digital finance reduces economic disparities by enhancing financial access, fostering inclusive growth, and empowering marginalized communities. Based on a review of 26 research papers (2010–2024), it identifies key factors influencing digital financial inclusion and its transformative impact on underserved populations. The findings emphasize the need for policy support, digital literacy, and infrastructure to bridge economic gaps. The study offers strategies for leveraging digital finance toward sustainable development, guiding policymakers, financial institutions, and development organizations in enhancing economic inclusion and ensuring effective interventions for reducing disparities.

THE ROLE OF DIGITAL LITERACY IN TRANSFORMING LIVELIHOODS AND SOCIAL EQUITY IN RURAL ODISHA: INSIGHTS FROM GLOBAL AND NATIONAL STUDIES

Mallha Tudu, Dr. Anita Pareek

Abstract

Using both national and international perspectives, this study investigates how digital literacy might improve livelihoods and advance social justice in rural Odisha. The analysis, based on seventeen research papers published between 2014 and 2024, looks at the ways that skill development and internet access support social inclusion, education, and income generation. It draws attention to the difficulties and possibilities of digital literacy in reducing social gaps and enhancing rural communities' standard of living. In order to achieve sustainable development in rural Odisha, the report examines the obstacles to digital adoption and makes policy recommendations to overcome systemic disparities.

SUSTAINABLE PERSPECTIVE OF ELECTRIC VEHICLE AND ITS FUTURE PROSPECTS

Smruti Ranjan Muduli, Dr. Alaka Samantaray

Abstract

The escalating environmental concerns associated with pollution from internal combustion engine (ICE) vehicles underscore an urgent need for sustainable transportation solutions in India. Electric vehicles (EVs) emerge as a transformative response to these challenges, addressing critical issues such as fossil fuel depletion, greenhouse gas emissions, and air quality deterioration. This paper aims to delve into the core elements driving EV adoption, examining how environmentally conscious practices can amplify their appeal. For instance, renewable energy-powered charging stations, sustainable battery production processes, and efficient end-of-life battery management systems play a pivotal role in enhancing the sustainability quotient of EVs. The adoption of EVs is more than a choice—it is a declaration of intent to secure a sustainable tomorrow.

CAN OVERCONFIDENT CEOS DRIVE SUSTAINABLE INNOVATION GROWTH? EVIDENCE FROM INDIA

Gobinda Gopal Pahari, Dr. Chandra Sekhar Mishra

Abstract

Overconfident CEOs tend to underestimate risks, driving greater investment in innovation, which in turn fosters sustainability. While prior research highlights the negative effects of CEO overconfidence, theoretical studies suggest it benefits shareholders by encouraging high-risk investments. Analyzing data from 2009 to 2023, this study finds that firms led by overconfident CEOs allocate more to R&D and achieve higher innovation success, contributing to sustainability. However, this effect is significant only in highly innovative industries. The findings suggest that CEO overconfidence can be an asset, enabling firms to capitalize on growth opportunities in innovation and sustainability.

A STUDY ON INCLUSIVE FINANCE AS A CATALYST FOR RURAL SUSTAINABLE DEVELOPMENT IN ANGUL DISTRICT OF ODISHA

Miss. Subhra Routray

Abstract

Financial inclusion is a key driver of rural development, facilitating the poor's access to basic financial services. This brief explores the multifaceted relationship between financial inclusion and rural development, focusing on the role of microfinance, digital banking, and cooperative models in expanding economic opportunities for rural communities. The study highlights the importance of appropriate financial products, community engagement, and enabling regulatory frameworks to overcome barriers to accessing financial services in rural areas. Ultimately, promoting financial inclusion can foster sustainable development, reduce poverty, and promote economic equity in rural areas.

THE ROLE OF DIGITAL MARKETING IN BANK: CURRENT TRENDS AND FUTURE OUTLOOK

Mr. Ratan Kumar Behera, Prof. Monalisha Pattnaik

Abstract

Digital marketing's evolving role in banking focuses on enhancing service delivery, brand awareness, and customer engagement through strategies like email campaigns, social media marketing, SEO, and personalization. This study employs VOS Viewer and R programming to analyze these tactics and addresses challenges such as data management, cybersecurity, and regulatory compliance. As artificial intelligence, big data analytics, and chatbots revolutionize marketing practices, banks must adopt a customer-centric approach and leverage digital tools to foster loyalty in a competitive environment. The study emphasizes the need for adaptability and innovation to thrive amid ongoing digital transformation.

DIGITALISATION AND ITS CHALLENGES: PERSPECTIVES ON THE DIGITAL SOCIETY

Kingsley Osuji

Abstract

This study analyses the complex issues presented by digitisation in the twenty-first century, highlighting its effects on digital sustainability. Although digital technologies like smartphones, social media, and artificial intelligence have transformed communication, commerce, and education, they also pose considerable social, political, and economic concerns. Principal challenges encompass privacy concerns, cybersecurity dangers, economic inequality, and the digital gap, which intensify existing disadvantages. This study employs a multidisciplinary approach, utilising surveys and interviews to collect insights from a varied array of participants, including industry experts and the general public, to analyse emerging trends and patterns associated with digitalisation.

ADVANCED DIGITALIZATION PROBING THE SUSTAINABLE BANCASSURANCE EXPERIENCE AMID THE INSURED

Aarthi Monalisa M, Anli Suresh

Abstract

The bancassurance industry, which combines banking and insurance services, faces both previously unexplored potential and difficulties in creating long-lasting consumer experiences in the era of sophisticated digitalization. This study explores the impact of advanced digitalization on bancassurance by reviewing industry practices and case studies, highlighting the crucial balance between digital innovation and sustainability as a key value. The results show how digital solutions may provide value for both customers and providers, and they offer strategic frameworks for developing bancassurance experiences that are customer-focused, resilient, and sustainable in the digital age.

CRAFTING EMPLOYEE ENGAGEMENT THROUGH AUTHENTIC LEADERSHIP: EVIDENCE FROM ODISHA'S COAL MINING INDUSTRY

Anuradha Dash, Prof. Ayasakanta Mohanty, Prof. Manoranjan Dash

Abstract

The coal mining sector in Odisha, integral to India's energy supply, faces multifaceted challenges, including environmental, social, and economic issues. Addressing these challenges requires competent leadership capable of navigating complex dynamics. This study examines the impact of authentic leadership (AL) on work engagement among coal mining industry employees in Odisha. This study employs quantitative research methods to investigate the relationship between authentic leadership behavior and employee work engagement. This study highlights the importance of embracing genuine leadership qualities in the coal mining sector of Odisha. By fostering authentic leadership behaviors, organizations can establish a more encouraging, involved, and efficient workforce, ultimately leading to sustainable business strategies and enhanced employee contentment.

MILLENNIALS' PERCEPTIONS AND ADOPTION OF CHATBOTS FOR USING ONLINE SERVICES IN PURI DISTRICT

Ms. Soumya Mohanty, Dr. Manmath Nath Samantaray

Abstract:

This research seeks to identify and examine the key determinants influencing millennials' intention to adopt AI-powered chatbots in online service contexts. Adopting a quantitative research design, the study utilized a structured survey instrument to collect data from a sample size of 113 millennials, employing a convenience sampling technique. The theoretical framework for this study is grounded in the Technology Acceptance Model (TAM), which has been widely utilized to assess user acceptance of emerging technologies. The results of the study reveal that all four factors such as PU, PEOU, trust, and social influence significantly and positively influence millennial intention to adopt AI chatbots in online services.

SUKUMAR RAY'S LITERARY NONSENSE: A STUDY ON THE SUSTAINABILITY OF INDIAN IDENTITY, CULTURE AND NATIONALIST SPIRIT

Aradhana Bose, Dr. Emily Pandey

Abstract

Sukumar Ray pioneered the veiled movement for the people of India particularly those of Bengal to be aroused from the inert state of their native dignity, distinct cultural identity and national sentiment through his nonsense literature which, though meant for children, is expressive of his hidden attempt to re-awaken and harden the feeling of native identity and national spirit among them. He wrote nonsense verses to satirize colonial rule, castigate slavish loyalty and lampoon 'Babu culture' in order to inspire the Bengali intellectuals to honour and sustain their national spirit. The satiric theme of Sukumar Ray's literary nonsense is relevant in post colonial India as the western culture is found to have been dominant in Indian society. The study and understanding of his literary nonsense will prevent Indian cultural and linguistic invasion by the language and culture of the West and weakening effect on Indian patriotic spirit.

PROMOTING SUSTAINABLE TOURISM AND LIVELIHOODS: COASTAL GOVERNANCE AT CHILIKA LAKE, ODISHA, INDIA

Joyant Y. Sahoo, Dr. Pravash R. Mohapatra, Dr. Siddharth Misra

Abstract

Chilika, Asia's largest saline lagoon, faces ecological decline, threatening the livelihoods of 200,000 fisherfolk. This qualitative study, based on Focused Group Discussions in Satapada, Puri district, examines tourism's role in livelihood security and ecological protection. Findings reveal that the excavation of a new sea mouth in 2000 disrupted the fishing industry, leading communities to depend on juvenile fish-catching and dolphin-based tourism. Increased motorboat use has endangered dolphins and aquatic life, making this form of ecotourism unsustainable. The study advocates for an adaptive governance framework involving collaborative efforts and ongoing communication with local communities.

ANTECEDENTS TO SUSTAINABLE SERVICE QUALITY IN RETAIL BANKING- AN EMPIRICAL INVESTIGATION

Ms. Swayansidha Mishra, Dr. Manmath Nath Samantaray

Abstract

The Indian banking sectors has witnessed various changes. As a result, the entry of private sector banks and foreign banks in India who strongly emphasize the standardization of 'high-tech' service and their use in retail banking have augmented competitive pressures on the nationalized banks. The study tries to identify and confirming the factors of SERVQUAL in retail banking. Data reduction techniques and confirmatory factor analysis were used in this study to identify the elements of service quality. 524 customers of different banks provided the data, which were gathered using convenient sampling techniques. The study determined that the tangibility, reliability, assurance, responsiveness, compliance, empathy are the factors of SERVQUAL quality for retail banks.

LEADER MEMBER EXCHANGE THEORY APPROACH, ORGANIZATIONS TRANSFORMATIONS TO DIGITALIZATION

Syed Zeeshan Haider

Abstract:

Leadership has always played an important role in making and in implementing the company vision. The organization transformation in the digital era is a crucial task for the managers to motivate the some of the Out-group member of the team. This paper applies dimensions of Leader member exchange theory to identify the role of team members in organization transformation. This research aims to investigate the relationship between Leader member exchange theory and organization transformation, digitalization and team efficiency in manufacturing industry. This study will contribute to the industry and academic literature insights.

ARTIFICIAL INTELLIGENCE ROLE IN SUSTAINABLE STRATEGY OF INDIAN STEEL INDUSTRY

Bishnu Prasad Anant, Raj Kishor Pradhan

Abstract

This article collects perceptions and needs expectations and experiences concerning the application of Artificial Intelligence (AI) and Machine Learning in the sustainable steel sector. It contains a about Steel Industry, its process technology and themes discussed within the Steel Plant entitled “Impact and Opportunities of Artificial Intelligence in the Steel Industry”. The event aimed at analysing the diffusion of AI technologies in steelworks and at providing indications for future research, development and innovation actions addressing the sector demands. The chapters treat general analyses on transversal themes and applications for process optimization, product quality enhancement, yield increase, optimal exploitation of resources and smart data handling.

EMOTIONAL INTELLIGENCE: A THEORETICAL AND EMPIRICAL REVIEW OF ITS FIRST 15 YEARS OF HISTORY

Dr. Abhipsa Mohanty

Abstract

The term Emotional Intelligence (EI) was first introduced in the scientific literature in 1990. Since then, the development of models of EI and research in this field has increased substantially. In this manuscript, a theoretical and empirical review of the first 15 years of history of EI is presented. First, the broad interest on this concept is shown through qualitative and quantitative indexes. Then, current theoretical models of EI: the mental ability model; the Bar-On Model of Emotional-Social Intelligence; and Goleman's model of EI are described in depth. Finally, authors give relevant keys about future considerations for research on EI. Specifically, authors 1) propose some ideas concerning the measurement of the construct and the use of ability and self-reported measures; 2) discuss the learning, development, and training potential of EI; and 3) consider the cross-cultural validity of EI.

SUSTAINABLE BUSINESS MODELS FOR ECO-FRIENDLY SANITATION SOLUTIONS FOR WOMEN: EXPLORING MARKET POTENTIAL, SOCIAL IMPACT, AND PROFITABILITY

**Jita Rani Pati, Itishree Nayak, Dr. Rasmilata Nayak,
Dr. Dharendra Kumar Jena**

Abstract

Sanitation for women is a critical global challenge that is pressing and underexplored in an era of extreme environmental sustainability and social equity. Can eco-friendly solutions be affordable and scalable enough to change environmental outcomes and women's lives in underserved communities? The knowledge gap of sustainable business models for eco-friendly sanitation products is addressed regarding market potential, social impact, and profitability. This research in North Odisha, India, surveyed 102 women working in orphanages in the Balasore district. The contribution of this research to the design of sustainable business models is to highlight the integration of community-based strategies, innovative pricing, and education campaigns. The findings demonstrate how eco-friendly sanitation is not just a nice to have but a necessity in a world that is moving fast.

MODERATING EFFECT OF INFORMAL LEARNING ON ORGANIZATIONAL CLIMATE AND JOB INVOLVEMENT

Mayuri Dilani, Prof. (Dr.) Praveen Kumar Tomar

Abstract

The study is exploring the moderating role of the informal learning among the relationship between organizational climate and job involvement. Organizational climate is with the understanding of the shared perception of organizations with the values, policies and the significant influence of this towards the employee engagement is identified with their role. This is mainly with the adaptability, motivation and the connections towards the work environment. There should be a supportive organizational climate and this should be well addressed with the communication, trust, and development opportunities. The study is having a higher contribution towards the organizational behavior with the required actions towards organizational climate development and job involvement enhancement.

BUILDING ON TAX PRACTICES AND CSR: A FOLLOW-UP TO THE IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON TAX STRATEGIES

Moses Pinto

Abstract

This paper builds upon findings from the author's previous research presented at the 9th International Management Conference, which explored arguments favoring tax deductions for CSR expenditures by MNEs. Drawing on new data and analysis inspired by suggestions made during the prior conference, this study examines the correlation between CSR-related tax incentives and effective tax rates (ETRs) among multinational enterprises (MNEs). It highlights the transition from theoretical propositions to empirical validation, demonstrating that host country tax policies favoring CSR activities can align with global taxation norms, fostering transparency and enhanced corporate accountability. The findings confirm key forecasts made in the earlier research, offering new insights into the intersection of CSR and international tax policies.

MITIGATING STEREOTYPE THREAT IN FEMALE LEADERSHIP ASPIRATIONS

Hani Abdul Resheed, Dr. Irina Sergeevna

Abstract

The psychological phenomenon known as stereotype danger can impede the goals and accomplishments of women who aspire to leadership roles. It develops when people are afraid of confirming unfavorable preconceptions about their social group, which lowers motivation and performance. The idea of stereotype danger is examined in this article along with how it affects female leadership goals and countermeasures. The article offers a framework for companies, policymakers, and educational institutions to assist women's leadership development and fight gender-based stereotypes by utilizing psychological theories, organizational practices, and intervention tactics.

THE IMPACT OF AI TOOLS ON E-SHOPPER'S PURCHASE BEHAVIOR: A STUDY OF E-COMMERCE PLATFORMS

Monalisa Pattanayak, Dr. A. Udaya Shankar

Abstract:

This study explores the impact of Artificial Intelligence (AI) tools—such as recommendation engines, chatbots, predictive analytics, and personalized marketing—on e-shopper behavior. It examines how these technologies influence decision-making, satisfaction, trust, and purchasing behavior in the e-commerce domain. The research is based on a comprehensive analysis of secondary data collected from various e-commerce platforms. It evaluates the role of AI-driven technologies in shaping consumer behavior and optimizing key business metrics, such as customer retention and conversion rates. The findings reveal that AI technologies significantly enhance the online shopping experience by delivering personalized product recommendations, improving customer service, and optimizing pricing strategies.

DIGITAL DOPPELGANGERS: EXPLORING THE EMERGENCE AND INFLUENCE OF VIRTUAL AVATARS

Astha Trivedi, Shreelakshmi V, Yadhul Mohan, Libin Baby

Abstract

The concept of avatars has transcended its initial use in social media platforms like Instagram and Snapchat, finding applications in education, healthcare, gaming, and even political campaigns, such as the Election Commission of India's initiative in 2024. Avatars, as virtual representations, have evolved significantly, leveraging advancements in artificial intelligence, motion capture, and graphics to transform how humans interact digitally. This paper explores the historical evolution of avatars, from mythological origins to their modern-day integration across various domains. It examines the psychological appeal of avatars, their impact on self-expression and identity, and the dual-edged implications of their use in digital communication.

ECO-AI NARRATIVES: ANALYSING SUSTAINABLE DEVELOPMENT THEMES IN WALL-E AND THE WILD ROBOT

Jyoti Prakash Nayak

Abstract

This Research article explores the junction of sustainable development and artificial intelligence (AI) within the scope of two well received narratives: the animated movies Wall-E (2008) and The Wild Robot (2024). The latter is based on a novel by the same name written by Peter Brown. Both the narratives present strong commentaries on anthropomorphic associations of technology and the environment, portraying AI entities as manager of ecological restoration and sustainable practices. This study analyses the narratives' central themes that include loss of environmental quality, ethical AI and the role of technology in reconstructing ecosystems. By contextualizing these fictional works within the contemporary discourse on AI's potential to contribute to a sustainable future.

A STUDY ON FACTORS INFLUENCING USING OF DEODORANTS IN PURCHASE BEHAVIOR OF MEN AND WOMEN IN VIJAYAWADA

Guru Gowtham Bhuma, Dr. Uday Shankar

Abstract

Deodorant use, a universal solution to body odor management, is the focus of this study which explores the purchase behavior of men and women in Vijayawada, India. The research delves into the factors influencing their deodorant choices, examining potential similarities and differences between the genders. Given Vijayawada's unique blend of tradition and modernity, its socioeconomic realities, climatic conditions, and cultural influences are all potential factors shaping deodorant preferences. This study aims to understand how these aspects, along with individual needs and marketing strategies, interact to influence deodorant purchase behavior within the city. The research might explore deodorant preferences among non-binary individuals in Vijayawada, aiming to understand their unique needs and considerations when making deodorant purchases.

UNDERSTANDING THE CONSUMER JOURNEY IN ELECTRIC BIKE PURCHASES IN INDIA

Kokku Siddhartha, Dr. Uday Shankar

Abstract

The electric vehicle (EV) market has seen remarkable growth globally, with India emerging as a significant player in the electric two-wheeler sector. Among these, electric bikes (e-bikes) have gained attention due to their affordability, eco-friendliness, and efficiency in addressing urban mobility challenges. The research investigates factors such as consumer awareness, perceptions about e-bike features, environmental concerns, government incentives, pricing, and infrastructure readiness (such as charging stations). It also examines the role of marketing strategies and brand trust in shaping purchasing decisions. By understanding the consumer journey, this study aims to provide insights that can help e-bike manufacturers, retailers, and policymakers improve market penetration and create a more favorable environment for sustainable transportation options in India.

ARTIFICIAL INTELLIGENCE IN BANKING: UNLOCKING NEW FRONTIERS FOR FINANCIAL INCLUSION IN INDIA

Mr. Prafulla Kumar Dwibedi, Dr. Manoj Kumar Sahoo

Abstract

Artificial Intelligence (AI) is transforming the banking sector in India by increasing financial inclusion through better security, affordability, and accessibility. This study explores the potential and benefits of AI in banking, highlighting how technologies like chatbots, machine learning, and predictive analytics are making financial services more inclusive, particularly for underserved populations in rural and unbanked areas. It assesses the impact of AI in promoting financial inclusion by enabling better credit scoring, risk assessment, and secure customer verification. Additionally, the study discusses challenges in AI adoption within the banking sector, such as infrastructure gaps, data privacy concerns, and technological disparities.

FUTURE-PROOFING HR: REIMAGINING HUMAN CAPITAL MANAGEMENT FOR THE FUTURE ENTERPRISE TO CREATE SUSTAINABLE TRANSFORMATION

B. Durga Vijay Chand, Dr. Jibitesh Rath

Abstract

This study explores “Future-Proofing HR,” examining how human capital strategies adapt to evolving workforce demands. It highlights technology, workforce analytics, and sustainability in transforming HR functions. Using qualitative and quantitative data, it analyzes AI-driven talent acquisition, employee experience platforms, and remote work policies. Case studies from leading firms illustrate how adaptive HR practices enhance resilience, innovation, and sustainability. The research underscores continuous learning, diverse talent pipelines, and agile leadership as critical for future workforce readiness. It provides a strategic roadmap for organizations to foster sustainable transformation while addressing societal and environmental responsibilities.

CONSUMER-CENTRIC MARKETING: SHAPING THE FUTURE OF ORGANIZED RETAIL IN ODISHA

Mr. Pratap Kumar Pati, Mr. Supratim Pratihari

Abstract

This study examines consumer perceptions of organized retailing in Odisha, identifying factors influencing preferences, satisfaction, and shopping behavior. Findings show a growing preference for organized retail due to convenience, product variety, and modern infrastructure, particularly among younger, educated, and higher-income consumers. High satisfaction was linked to store ambiance, staff competence, and digital integration, while challenges included parking and payment options. Key satisfaction drivers include operational efficiency, service quality, and product reliability. The study highlights the need for tailored strategies in urban and semi-urban markets, recommending improvements in customer services, technology, and infrastructure.

INTEGRATING SUSTAINABILITY-ORIENTED STRATEGIES FOR COMPETITIVE ADVANTAGE: A CONCEPTUAL FRAMEWORK FOR BUSINESSES IN ODISHA

**Sukanya Nisitgandha Biswal, Dr. Phalgu Niranjana,
Dr. Smaraki Pattanayak**

Abstract

In a VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) environment, organizations face the challenge of maintaining competitiveness while prioritizing sustainability to protect their company, employees, customers, and the environment. Emphasizing sustainability not only benefits the environment but also enhances societal image, resulting in long-term strategic advantages. It fosters relationships, drives economic growth, and promotes equality, creating inclusive organizations. This conceptual study explores the facets of sustainability, demonstrating its role in improving brand image and competitive advantage. The recommendations offered address current sustainability issues, ensuring benefits for both present and future generations.

THE PHILOSOPHY OF CHAITANYA MAHAPRABHU: A STUDY OF THE SUSTAINABLE GROWTH OF MORAL AND ETHICAL VALUE IN INDIAN SOCIETY

Khadija Khatun

Abstract

Chaitanya Mahaprabhu is universally revered as a philosopher of immeasurable height and His philosophy which is essentially Vedantic is aimed at inculcating spiritual value in humans to let them each realize the self and the path of perfection. His philosophy teaches the value of ethics and morality in the process of the attainment of perfection for every individual in the society to transform Indian caste-ridden and disintegrated social life during His times in the 16th century, which was found to have been morally degenerating owing to casteism and discrimination and various socio-political and religious misconceptions. Chaitanyadev crusaded against casteism and the fast weakening of ethical and moral sense and spirit in people for the attainment of moksha (emancipation). He taught people to shun the path of engrossment in material life and follow the spiritual path. His philosophy asserts moral and ethical value as one of the foundations of the spirituality of life.

A LITERATURE REVIEW STUDY ON ‘CUSTOMER PERCEPTION IN METRO RAIL

Rohit Turani, Dr. Kartik Uttarwar, Dr. Rahul Kapale

Abstract

This study investigates factors influencing consumer perceptions of metro rail service quality through a review of 1,000 research papers using the keywords “perception” and “metro rail” via Harzing’s Publish or Perish software and Google Scholar. After manual screening, 72 relevant studies were identified. A second screening for Scopus-indexed journals resulted in 41 papers, deleting 31 that did not meet the criteria. The review identifies key attributes affecting perceptions: ‘safety’, ‘waiting time’, ‘security’, ‘comfort’, ‘fare’, ‘accessibility’, and ‘travel time’. These findings provide valuable insights for enhancing metro rail service quality and customer experience.

THE EFFECT OF PROMOTION AND PRICING STRATEGY ON SOCIAL MEDIA TOWARD CONSUMERS PURCHASE DECISIONS

Eka Jiwatha Dharma, Budi Suprpto

Abstract

In recent years, the local fashion products experienced a significant increase, marked by the emergence of various local brands that has a place in the hearts of consumers. The development of the fashion sector is certainly supported by rapid technological advances. Digital technology, such e-commerce, and social media, allowing local brands to expand their market reach, simplify the marketing process, and increase interaction with consumers. The purpose of this study was to figure out the effect of promotions and prices strategy on social media toward consumer purchasing decisions. The data collection technique used was by purposive sampling and the data obtained from distributing questionnaires using google form namely 176 respondents but only 150 respondents fit the criteria. The results found in this study are that promotion and pricing strategy significantly influence consumers purchasing decisions.

HIGHER EDUCATION AND SUSTAINABLE DEVELOPMENT: AN OVERVIEW

Arindam Mondal, Dr. Smaraki Pattanayak, Dr. Phalgu Niranjana

Abstract

Sustainability integrates various disciplines, and higher education institutions (HEIs) play a vital role in advancing sustainable development. Despite its importance, sustainability is often overlooked within HEIs. These institutions contribute to sustainable development through education, research, and governance. They equip societies with knowledge and tools necessary for a prosperous and sustainable future. This review chapter explores the relationship between HEIs and sustainable development, emphasizing their influence and the crucial roles they play in promoting sustainability across various sectors. The study highlights the need for HEIs to actively engage in sustainability to drive societal progress.

MANAGEMENT STRATEGIES FOR SUSTAINABLE TRANSFORMATION IN DEVELOPMENT FINANCE LANDSCAPE

Sidhant Mohanty

Abstract

Leadership commitment to sustainability transformation can be achieved through stakeholder engagement and collaboration, adoption of ESG, innovation and technology, process optimization and sustainability, process mining by uncovering opportunities for circularity, responsibility, monitoring, and accountability systems, and adoption of risk management.

EFFECT OF INNOVATIVE TALENT ATTRACTION STRATEGIES ON ORGANIZATIONAL PERFORMANCE: A CASE STUDY OF SBI

Ms. Sunita Sharma, Dr. Ruchi Jain

Abstract

This study examines how innovative talent attraction strategies impact the organizational performance of the State Bank of India (SBI). In a competitive banking environment, attracting the right talent is crucial for success. The research focuses on SBI's recruitment approaches, including digital platforms, employer branding, and data-driven selection, and their influence on performance metrics such as customer satisfaction, service quality, and business growth. Based on the Resource-Based View Theory, this research considers human resources to be a significant source of competitive advantage. This study concludes that the use of advanced hiring technologies enhances KPI; thereby inviting further studies on the impact other talent management practices may have on the success of organizations.

DEVELOPING RESILIENT LEADERSHIP: HR STRATEGY FOR NAVIGATING FUTURE CRISES - A LITERATURE REVIEW

Sitara Nazir, Dr. Harinarayan Sahoo

Abstract

In today's fast-paced world, marked by rapid technological advances, globalization, and frequent socio-economic upheavals, the need for resilient leadership has never been more critical. This paper delves into the essential role that Human Resources (HR) strategies play in developing leaders who can effectively navigate and lead through future crises. The journey begins with understanding what resilience in leadership truly means. It's about staying calm, adaptable, and resourceful during tough times. To cultivate a pipeline of resilient leaders, HR must adopt forward-thinking and proactive strategies. This includes identifying and nurturing potential leaders early on, investing in continuous learning and development programs, and creating a supportive organizational culture. The paper emphasizes the importance of supporting leaders' mental well-being and promoting effective communication during crises.

INTELLIGENT SOIL MANAGEMENT SYSTEM USING ARTIFICIAL INTELLIGENCE FOR SUSTAINABILITY OF AGRICULTURE

S. S. Dora, S. Nayak, S. Pradhan, P. Sahu

Abstract

Soil health is a cornerstone of sustainable agriculture, directly influencing crop productivity, resource efficiency, and environmental conservation. Traditional soil management systems often lack the precision and scalability required to address modern agricultural challenges such as soil degradation, climate change, and resource scarcity. Using machine learning algorithms, the system processes this data to predict soil conditions, identify deficiencies, and recommend targeted interventions. This innovative approach demonstrates the potential of AI in revolutionizing soil management by enhancing precision, reducing costs, and promoting sustainable agricultural practices. The system empowers stakeholders to achieve higher productivity and contribute to global food security while preserving soil resources for future generations.

RATING OF PSYCHOLOGICAL READINESS OF INDUSTRIAL COLLEGE STUDENTS TO WORK IN THE ORGANISATIONAL ENVIRONMENT OF INDUSTRY 4.0

Lyudmila Zakharova, Elena Saygina, Dr. Irina Leonova

Abstract

This study examines social capital in turbulent business environments, comparing innovation and personnel management values in India and Russia. It finds that companies require personnel with varying levels of creativity and innovativeness, capable of productive communication for company growth. Through theoretical modeling, a typology of creative and innovative personalities—conservative, adaptor, idea creator, and creative innovator—is developed. The study highlights the importance of adaptors and creative innovators in innovation-driven enterprises. It also explores barriers and opportunities for fostering creative and innovative qualities in employees, and their productive interaction within diverse organizational cultures.

MACHINE LEARNING-DRIVEN PRICE PREDICTION FOR RIPPLE (XRP) AND CHAINLINK (LINK): A HYBRID MODEL APPROACH

**Susrita Mahapatro, Prabhat Kumar Sahu,
Prem Purusottam Jena, Chitaranjan Behera**

Abstract

Cryptocurrency has evolved as a prominent asset class with a large market capitalization, attracting attention from traders, investors, and researchers. However, correctly anticipating price fluctuations is difficult due to its high volatility and dynamic character. In recent years, machine learning and deep learning approaches have produced encouraging results in financial forecasting. This study uses deep learning models to thoroughly examine price fluctuations in utility cryptocurrencies, notably XRP and Chainlink. The study evaluates different methods for predicting price variations, focusing on Long Short-Term Memory (LSTM) and Gated Recurrent Units. The models are trained and assessed using historical price data for XRP and Chain-link.

DEVELOP A SIMULATION EXERCISE TO MODEL THE VIETNAM ELECTRONIC CUSTOMS DECLARATION PROCESS FOR EXPORT WITHIN THE ECUS5 SOFTWARE

**Tien Ha Minh, Tu Vo Huynh Minh, Linh Nguyen Pham
Khanh & Trinh Nguyen Cao Kieu & Phung Huynh Kim**

Abstract

The expansion of Vietnam's export activities has led to a growing demand for skilled personnel in electronic export declarations. However, the Logistics sector faces challenges in both workforce quantity and quality. Additionally, the rapidly evolving nature of the industry necessitates regular updates to training content. Therefore, it is crucial to provide a scalable, efficient, and updatable training solution for learners in electronic customs declaration processes. The research team has developed a training module for electronic customs declaration by applying the ADDIE model specifically for MOOCs, alongside reverse engineering techniques to analyze and simulate the ECUS5 customs declaration software. This training document includes an instructional guide and an ECUS5 simulation exercise, accessible via Google Drive. The simulation, implemented on the Excel platform, facilitates easy adjustments to the interface and frequent updates with new exercises and content.

ADVANCEMENTS AND TRENDS IN GREEN HUMAN RESOURCE MANAGEMENT: (2010 – 2024) A SYSTEMATIC LITERATURE REVIEW

Dostdar Hussain, Muhammad Hassnain

Abstract

Green HRM recognizes the importance of balancing environmental sustainability through green HR practices. A systematic literature review approach was used to examine studies on Green HRM published between 2010 and 2024. Key themes from the Green HRM literature were used to categorize the articles selected from reputable academic databases. The review first outlines the rapid growth of Green HRM over the last 14 years; Sustainable performance results, environmentally friendly employee behavior, and environmental training initiatives are the focus. A total of 85 articles were reviewed; many of them used quantitative research methods in developed and emerging markets and examined green HRM practices. This study seeks to improve understanding of the role of HRM in promoting environmental sustainability in organizations by presenting developments in Green HRM and positioning this area of HRM for sustainability.

AN ANALYSIS OF THE DETERMINANTS INFLUENCING THE ADOPTION PROCESS OF ONLINE SHOPPING DECISIONS IN THE FASHION INDUSTRY

Deepak Singh

Abstract

In this study, we investigated the main influencing factors that may influence the adoption of online shopping in Gwalior region. A conceptual framework was proposed based on the Technology acceptance Model (TAM). This study is important because it can help e-commerce work to better understand consumer behavior and enhance their marketing Strategies, which will have a meaningful positive impact on the fields of marketing and information technology. This research takes on a mixed-method methodology that blends qualitative interviews with quantitative survey data. Using an online questionnaire, 300 active e-commerce users provided quantitative data, and 25 respondents participated in in-depth interviews that give qualitative data. The present study suggests that additional investigation is warranted to examine other variables, including the impact of social media and fashion trends on the behavior of online shoppers.

NAVIGATING WORK-LIFE BALANCE IN EDUCATIONAL INSTITUTIONS: EMPLOYEE PERSPECTIVES AND IMPLICATIONS

Janani Meher, Sayam Sweta Parija

Abstract

Pursuing work-life balance (WLB) is crucial for preserving employee productivity, job satisfaction, and well-being, especially in educational institutions where the demands of both personal and professional lives collide. This study explores the intricate problems of work-life balance among employees of educational institutions, emphasizing the effects of stress and mental health disorders on their general well-being and productivity. The study outlines the detrimental impacts of occupational stress, such as increased turnover rates, decreased productivity, and an elevated risk of mental and physical health issues like anxiety disorders and cardiovascular issues, based on significant findings about workplace stressors. This study uses surveys and statistical tools to analyze work-life balance (WLB) in an educational institution.

FUTURE OF DRONES IN LOGISTICS SUPPLY CHAIN IN INDIA – BEYOND THE HORIZON

Dr. Rabi Narayan Padhi, Prof. Pratap Kumar Pati

Abstract

The use of innovative technology in logistics supply chain has a significant influence on the mobility of *goods and people* and also on the performance of the logistics firm. Due to this growth of technology and globalization it has become mandatory for the organisations to adopt with next generation technologies which help in gaining a competitive advantage and increased profitability. Earlier the *Unmanned Aerial vehicles or drones* were used only in developed countries and in India drones were most commonly associated with *military operations*. With the development and advancement in technology, better integration, cheaper and small sensor and ease-of use options, tools are used for various applications. A Markets and Markets report values drone logistics at USD 0.9 billion, projected to reach USD 16.1 billion by 2030, with a 50.1% CAGR. Emerging technologies could create vast job opportunities and boost the economy significantly.

THE ROLE OF AI IN MONITORING AND ENHANCING DIVERSITY, EQUITY, AND INCLUSION (DEI) THROUGHOUT THE EMPLOYEE LIFECYCLE

Debabrata Sahoo, Dr. Smaraki Pattanayak, Dr. Phalgu Niranjana

Abstract

Diversity, Equity, and Inclusion (DEI) have emerged as critical components of modern organizational success, fostering innovation, employee engagement, and a positive work culture. However, traditional DEI initiatives often struggle to address deeply ingrained biases and monitor inclusivity effectively. The integration of Artificial Intelligence (AI) and predictive analytics in DEI initiatives offers transformative opportunities to identify and mitigate biases, monitor inclusivity, and promote equitable treatment throughout the employee lifecycle. This paper explores the role of AI in enhancing DEI across recruitment, onboarding, career development, performance evaluation, and off boarding processes. This research provides valuable insights for HR professionals, policymakers, and researchers aiming to leverage AI for sustainable DEI practices.

WORDS THAT LEAD: HARNESSING LITERATURE AND LANGUAGE FOR TRANSFORMATIVE BUSINESS COMMUNICATION

Dr. Pranamita Pati, Dr. Emily Pandey

Abstract

In the rapidly evolving global business environment, effective communication is pivotal for fostering innovation and achieving sustainable growth. This paper explores the intersection of literature, language, and business communication, emphasizing their role in shaping transformative strategies for organizations. Literature, with its rich narratives and diverse perspectives, offers timeless insights into human behavior, cultural diversity, and ethical decision-making, which are vital for sustainable management. Language, as a medium, transcends barriers, enabling leaders to build trust, negotiate effectively, and navigate cross-cultural challenges in the global market. The study highlights how literary tools and linguistic strategies can be integrated into business communication to enhance leadership, employee engagement, and customer relationships.

GREEN HRM PRACTICES: EXPLORING AWARENESS AND ADOPTION ACROSS DEMOGRAPHIC GROUPS

Rishita Mohanty, Sweta Agarwal, Dr. Jayashree Jethy

Abstract

Green Human Resource Management (Green HRM) refers to the integration of eco-friendly practices and policies within human resource management to enhance organizational sustainability. It incorporated environmental considerations into key HR functions, such as recruitment, training, performance evaluation, and employee engagement. This study primarily focused on evaluating the awareness and adoption levels of Green HRM practices among individuals with varying demographic characteristics, including age, gender, and education. Data were collected using a primary survey method, and correlation and regression analyses were conducted using SPSS to derive insights.

DEVELOPING RESILIENT LEADERSHIP: HR STRATEGIES FOR NAVIGATING FUTURE CRISES

Sitara Nazir, Dr. Hari Narayan Sahu

Abstract

In today's fast-paced world, marked by rapid technological advances, globalization, and frequent socio-economic upheavals, the need for resilient leadership has never been more critical. This paper delves into the essential role that Human Resources (HR) strategies play in developing leaders who can effectively navigate and lead through future crises. By reviewing contemporary research and real-world case studies, it identifies key HR practices that are vital for building leadership resilience. The paper also emphasizes the importance of supporting leaders' mental well-being and promoting effective communication during crises.

DEVELOPING RESILIENT LEADERSHIP: HR STRATEGIES FOR NAVIGATING FUTURE CRISES: ROLE OF CAREER COMMITMENT ON SUBJECTIVE CAREER SUCCESS

Lipsa Jena

Abstract

Subjective career success is highly important for employees by enhancing motivation, self-satisfaction and improving performance. It helps realization of accomplishment and recognition. The study attempts to find out the mechanism for strengthening employee performance and subjective career growth of employees. Results of the study shows that impression management tactics strengthens the relationship between employee performance and subjective career growth of employees. The study attempts to understand the importance of employee career commitment that supports fostering employee subjective career growth with the moderating impact of impression management that have seemingly not been researched.

PREDICTION MODEL OF DRINKING WATER QUALITY: A CASE STUDY ON DHANKAUDA REGION OF SAMBALPUR, ODISHA

Abhishek Pati, Prof. Monalisha Pattnaik, Rajnandini Sahoo

Abstract

Groundwater is an essential and vital component of any life support system. It is not only the basic need for human existence but also a vital input for all development activities. Accurate water prediction is required for the environmental management and is of great significance for water environment protection. Binary Logistic Regression model is applied to predict the drinking water quality for Sambalpur District of Odisha. This study covered only the selected Dhankauda block for which prediction models of drinking water quality is developed. The results showed that the use of Logistic regression model can describe the potable behaviour of water quality from different parameters with higher accuracy (92.6%). The Hosmer and Lemeshow Test shows a significant goodness of fit having p-value 0.319.

THE IMPACT OF ENVIRONMENTAL AND SOCIAL GOVERNANCE (ESG) FACTORS ON PORTFOLIO PERFORMANCE AND RISK

Rasmita Panda

Abstract

In recent years, there has been a growing recognition among investors of the importance of considering Environmental, Social, and Governance (ESG) factors in investment decision-making. This study delves into the nuanced relationship between ESG considerations and portfolio performance and risk. Furthermore, this paper explores the mechanisms through which ESG considerations influence portfolio performance and risk. This paper contributes to the ongoing discourse on sustainable finance by offering a comprehensive analysis of the impact of ESG factors on portfolio performance and risk. By illuminating the complex relationship between financial outcomes and non-financial considerations, this study provides valuable insights for informed decision-making in the pursuit of both profit and sustainability.

A THEORETICAL PERSPECTIVE ON INDIA & NEW LABOUR CODES: PRESENT & FUTURE

Dr. Hari Narayan Sahu

Abstract

The present study analyses the current status of various provisions pertaining to Labour-Management relationships in India revolves around the Labour Codes. Prominent issues like Universal Minimum Wage, better economic benefits & prevention of Sexual Harassment at work has been critically analyzed to know root cause behind these issues. Lacuna lies with the existing Labour Codes has also been critically analyzed using Thematic Analysis. This Article will act as a driving force towards cognitive consonance by creating an understanding about the need of the hour between Employers-Employees Association & Appropriate Govt. It will reenergize the decisive capability of all those who are potential Stakeholders in empowering New India.

SUSTAINABILITY IN SOFTWARE USING AUTOMATIC TESTING FOR POWER CONSUMPTION

Rajeeb Sankar Bal, Jibendu K Mantri, Suwendu K Jaysingh

Abstract

Currently, the relationship between software engineering research and the issues related to sustainability and green Information Technology has been the subject of growing attention. The Software development lifecycle (SDLC) based on systematic execution and software maintenance by dividing the software development process into each phase. The changes in the existing SDLC can lead to less carbon emissions, power and less paper use. Here, we proposed the optimization technique based on artificial bee colony (ABC) algorithm to find the optimal path from automatically generate DFD paths to be executed on software under test (SUT) for which the independent path represents less power consumed.\

STOCK MARKET PREDICTION ON TEXT MINING: NEURAL NETWORK APPROACH

Amiya Kumar Sahoo, Ayushman K Mantri, Ranjan K Ray

Abstract

Globalization has made the stock market prediction accuracy more challenging and rewarding for researchers and other participants in the stock market, as it provides knowledgeable information regarding the current status of the stock price movement for decision making of customers in finalizing whether to buy or sell the particular shares of given stock. Many researchers have focused on this prediction research area, but still the results are not very accurate. This paper proposes a new approach on text mining analysis on BSE and NSE stock market data (from 2008 to 2018) on Neural Network concept. It provides accurate results than the existing models like Roger, Parkinson and German Klass and GARCH model on stock market prediction.

AI DRIVEN HR

Anamika Tripathi, Kusumita Das, Piyush Patnayak, Sibani Sahoo

Abstract

Human Resource Management (HRM) is strategic function for managing an organization's workforce effectively through strategic policies and practices that enhance productivity, employee engagement, and overall business success. This paper explores the central role of technology, particularly Artificial Intelligence (AI), in transforming HRM processes. 'AI-driven HR solutions' have revolutionized traditional HR functions by automating repetitive tasks, enabling data-driven decision-making, and enhancing talent acquisition, employee performance tracking, and personalized learning experiences. The paper also examines the concept of Green HRM, which integrates sustainability into human resource practices.

APPLICATIONS OF IOT'S FOR ARCHIVING SUPPLIER SUSTAINABILITY IN SUPPLYCHAIN WITHSPECIALISED REFERENCE TO TSRTC TELANGANA

Adiraju Santhakumari Praneetha

Abstract

The integration of the Internet of Things (IoT) in supply chain management offers Transformative potential for improving sustainability, especially in public transportation systems like the Telangana State Road Transport Corporation (TSRTC). This paper explores the applications of IoT for enhancing supplier sustainability within the TSRTC supply chain. IoT enables real-time monitoring, data-driven decision-making, and greater transparency, thereby facilitating more sustainable practices. Key IoT applications include smart inventory management, predictive maintenance of vehicles, and efficient fuel usage tracking. The study highlights specific use cases such as real-time GPS-enabled route optimization to reduce fuel consumption and IoT-based fleet tracking systems for monitoring vehicle conditions and supplier-provided spare parts.

THE ROLE OF LITERATURE AND COMMUNICATION IN NAVIGATING THE FUTURE: MANAGEMENT STRATEGIES FOR SUSTAINABLE TRANSFORMATION

Dr. Swagat Patel

Abstract

Sustainable transformation is essential for any organisation and institution to navigate the intricacies of contemporary & modern challenges which includes social inequality, environmental issues, growing demands and economic uncertainty. This research paper navigates the crucial roles that communication literature plays in moulding management strategies aimed at fostering sustainable practices. By exploring how literature communicates, informs, stimulates and offers critical context, together with organizational communication that facilitates collaboration and engagement among stakeholders and investors. The study contains successful examples from India, signifying how institutions and organizations can leverage and use literature and communication for their sustainability. Only, the strategic synergy of literature and communication can result in profound and enduring sustainable change.

SUSTAINABLE TRANSFORMATION: A MANAGERIAL FRAMEWORK

Dr. Jharasri Paikaray

Abstract

Sustainability transformations are fundamental, system-wide reorganization across managerial, technological, economic and social factors, including paradigms, goals and values. The ultimate vision is a harmonious society, integrated economy and thriving ecosystem. To realise this vision it is required to establish equitable working conditions and contributing to social justice. This paper draws on the foundational work on framing which describes the process of how perceptions of social reality can be shaped and how these perceptions mobilise actors and influence their actions. On this sustainable transformation envisages as an opportunity can lead to positive outcomes for the organisation, environment and society at large.

STRATEGIC LEGAL AND TECHNICAL APPROACHES FOR SUSTAINABLE DIGITAL GOVERNANCE: MITIGATING CYBERSQUATTING IN A GLOBALIZED ECONOMY

Dr. Avijit Mondal, Dr. Jharasri Paikaray

Abstract

The rapid expansion of the digital economy necessitates sustainable management strategies to protect online identities and intellectual property. Cybersquatting—the unauthorized registration of domain names mimicking established trademarks—poses a critical threat to digital governance, brand integrity, and economic sustainability. This study explores legal, technological, and strategic approaches to mitigate cybersquatting, emphasizing their role in fostering a secure and resilient digital ecosystem. By integrating legal protections with emerging technologies, businesses, policymakers, and consumers can navigate cybersquatting risks effectively, safeguarding trust and innovation in the digital landscape.

ADAPTIVE MANAGEMENT OF INTELLIGENT COOLING SYSTEMS: A STRATEGIC PATHWAY FOR SUSTAINABLE TRANSFORMATION IN CLIMATE CONTROL

Dr. Avijit Mondal

Abstract

Rising demand for sustainable cooling necessitates innovative solutions. This study introduces the MATLAB Simulink-based Intelligent Fan Air Cooling System (IFACS), employing fuzzy logic to dynamically control a BLDC fan's speed via thermal sensors. A novel MgO-PVDF nanocomposite coating reflects 96.3% solar radiation, emitting 98.5% thermal energy, reducing temperatures by $>10^{\circ}\text{C}$. By leveraging nocturnal cooling and adaptive control, IFACS reduces daily energy use by 25%, aligning with Sustainable Development Goals 7 (Affordable Energy) and 11 (Sustainable Cities). The system merges material innovation and intelligent technology, providing scalable sustainable climate solutions.

DEVELOPING AND VALIDATING THE SCALE FOR MEASURING DIGITAL ADOPTION OF CUSTOMER OF DIFFERENT BANKS IN ODISHA

Ms. Nigar Dash

Abstract

This study intends to understand the reliability and validity of digital adoption of different banks in Odisha. Digital adoption in banks refers to the process of customers and employees embracing digital tools, services, and platforms for banking operations. It has become a key focus area for financial institutions as they aim to enhance customer experiences, improve operational efficiency, and stay competitive. This study attempts to undertake a pilot study among the 47 customers of different banks in Odisha. In this study, we have done the pilot study and reliability and validity test by taking 47 respondents who are the customers of different banks of Odisha. The results indicate that the digital adoption questionnaire is a reliable and valid instrument for measuring the different dimensions.

MEASURING THE IMPACT OF TECHNOLOGY IN REVERSE SUPPLY CHAIN ON CLOTHING RENTAL SECTOR

Dr. Rutuparna Dash, Dr. Golakh Kumar Behera

Abstract

This research aims to investigate the technology adoption in the reverse logistics in clothing rental firms and offering numerous strategies to increase the efficiency in the operation process. A Quantitative approach used to investigate the efficiency improvement potential in reverse logistics within the clothing rental model and 300 valid responses were gathered with the help of the Purposive sampling method. It was found that the alternative hypothesis (H_1) is supported, affirming that the implementation of technological solutions is positively associated with operational efficiency in the context of clothing rental reverse logistics sector (p -value $< .05$). This finding underscores the critical role of technology in improving efficiency.

ANALYZING ENVIRONMENTAL, SOCIAL, AND ECOLOGICAL COSTS UNDER CORPORATE RESPONSIBILITY DISCLOSURE FOR CARBON NEUTRALITY AND SUSTAINABLE INDUSTRY

Dr. Yadav Devi Prasad Behera, Sumitra Behera

Abstract

India's rank among the pollution-emitting countries has increased to 5 th place along with its economic position. But for the sustainability of life, and economy and the promises made under COP26 by our honorable Prime Minister, eminent steps must be taken for reducing the emission for dealing with climate change. The study also intends to hold the industries accountable for the depletion and degradation of resources. So that, they must disclose the different costs borne by society, ecology, and the environment and be more responsive toward the environment in the future time to come. The study will use the interpretivism philosophy with the causative research design. The data analysis will be made through descriptive statistics.

FULL PAPERS

FUTURE-PROOFING HR: REIMAGINING HUMAN CAPITAL MANAGEMENT FOR THE FUTURE ENTERPRISE TO CREATE SUSTAINABLE TRANSFORMATION

B. Durga Vijay Chand, Dr. Jibitesh Rath

Introduction

The future enterprise is characterized by digitalization, globalization, and heightened social accountability. As companies continue to navigate the complexities of the global economy, human capital management (HCM) emerges as a strategic lever that directly influences organizational success. The traditional paradigms of HR, which were once focused predominantly on administrative tasks and compliance, have evolved into more dynamic roles that drive organizational growth, innovation, and sustainability. In the wake of emerging technological innovations and shifting workforce demographics, HR must rethink its function to create sustainable transformation within the enterprise.

This paper explores the interplay between technology, sustainability, and human-centric practices in future-proofing HR. By analyzing workforce data, leveraging case studies, and consulting expert literature, this study aims to provide actionable insights for creating sustainable HR strategies. Organizations are no longer looking at HR as merely a support function, but as a central pillar that can help organizations adapt and thrive in the face of future challenges.

As global challenges such as climate change, social inequality, and economic volatility intensify, HR strategies must shift focus toward ensuring resilience, inclusivity, and sustainability. Future-proofing HR is no longer an optional upgrade but a necessity for any organization aspiring to lead in the future of work. The challenge lies in reimagining HR as a forward-thinking function that meets the ever-evolving needs of a global, diversified, and tech-driven workforce.

Methodology

This study adopts a mixed-methods approach, combining qualitative and quantitative data to provide a comprehensive understanding of the state of future-proof HR. Surveys were conducted among HR leaders across industries, complemented by case studies from organizations known for their innovative HR practices. The data analysis process included statistical tools to identify key trends and thematic analysis to understand the broader implications of emerging HR practices.

In addition to the survey, interviews were conducted with HR professionals, technology experts, and organizational leaders to gain qualitative insights into the challenges and opportunities associated with future-proofing HR. The combination of both qualitative and quantitative data provides a rich, multi-dimensional perspective on the evolving role of HR in the future enterprise.

Literature Review

The Changing Landscape of Work

The workplace is undergoing a seismic shift, fueled by advances in automation and artificial intelligence (AI). According to McKinsey (2023), automation and AI could reshape up to 30% of jobs globally by 2030, creating new opportunities while also displacing existing roles. This transformation calls for a proactive response from HR departments, which must focus on reskilling and upskilling initiatives to ensure their workforce remains agile and future-ready. Additionally, while automation has the potential to increase efficiency and productivity, it also raises concerns about workforce displacement. HR's role in this context is to balance the benefits of technology with the need for human capital development.

The growing prominence of artificial intelligence and machine learning in various HR functions, such as recruitment, talent management, and employee experience, further underscores the transformation within the sector. AI-driven tools are enabling HR to predict workforce trends, optimize talent acquisition processes, and create personalized employee experiences. However, the integration of these technologies also necessitates an organizational culture shift, with HR playing a key role in driving the adoption of new technologies.

Ethical Challenges in AI-Driven HR Practices

The adoption of AI in HR has introduced ethical challenges, including:

- **Data Privacy:** Ensuring the confidentiality of employee information in AI-driven systems.
- **Bias:** Addressing algorithmic bias to ensure fairness in recruitment and performance evaluations.
- **Transparency:** Making AI decision-making processes understandable to employees and stakeholders.
- **Fairness:** Implementing governance mechanisms to ensure equitable outcomes for all demographic groups.

Gender Issues in Future-Proofing HR

Gender issues in the workplace have gained increased attention as organizations strive to create equitable and inclusive environments. Future-proofing HR involves addressing these issues proactively, with a special focus on reproductive wellness, work-life balance, and career advancement opportunities for all genders. Workplace gender equity extends beyond equal pay to include:

- **Reproductive Wellness:** Incorporating policies that support maternity, paternity, and fertility care.
- **Leadership Representation:** Bridging the gap in gender diversity at leadership levels.
- **Inclusive Policies:** Ensuring flexible work arrangements for caregiving responsibilities.

Promoting Gender Equality: Future-ready organizations recognize that gender diversity is not just a moral imperative but also a driver of innovation and performance. Companies like Unilever have demonstrated how achieving gender parity in leadership roles can enhance decision-making and organizational outcomes. Policies promoting equal pay, mentorship programs for women, and anti-harassment training are critical components of future-proof HR strategies.

Reproductive Wellness and Workplace Support: Reproductive wellness is an often overlooked aspect of workplace well-being. To future-proof HR, organizations must address issues such as maternity and paternity leave, access to healthcare, and support for employees undergoing fertility treatments. Progressive companies are introducing benefits like extended parental leave, childcare support, and flexible work arrangements to accommodate the needs of employees with caregiving responsibilities.

For example, Microsoft's parental leave policy offers generous time off for both mothers and fathers, encouraging shared responsibilities and work-life balance. Similarly, TCS provides comprehensive healthcare benefits that include coverage for reproductive health and wellness, ensuring employees feel supported in their personal and professional lives.

Challenging Gender Bias: AI-driven HR tools offer significant opportunities for eliminating gender bias in recruitment and performance evaluations. However, organizations must ensure that these technologies are designed and implemented ethically. Training algorithms on diverse datasets and auditing AI tools for fairness are essential steps in minimizing bias.

Creating Safe Work Environments: Safety and inclusivity are fundamental to gender equity in the workplace. Future-proof HR involves fostering a culture of respect and accountability

through robust grievance redressal mechanisms and regular sensitivity training. Initiatives like Unilever's "Unstereotype" campaign demonstrate how organizations can challenge harmful stereotypes and promote inclusivity.

Career Advancement and Leadership Development: To address the underrepresentation of women and other genders in leadership roles, organizations must invest in targeted development programs. These initiatives should focus on building skills, confidence, and networks to enable career progression. Leadership development programs, such as Unilever's "Lead in a Purposeful World," are exemplary in nurturing diverse talent pipelines.

Sustainability in HR Practices

Sustainability has moved beyond a buzzword to become a strategic imperative for businesses across industries. The World Economic Forum (2022) indicates that organizations integrating environmental, social, and governance (ESG) factors into their business models consistently outperform their peers. In the realm of human capital management, sustainability is no longer an isolated function but has become intertwined with talent acquisition, employee engagement, and organizational culture. HR plays a pivotal role in embedding sustainability into the organization's DNA, aligning employee objectives with the company's long-term environmental and social goals.

Sustainability is also a key driver for employee engagement. Today's workforce, particularly Millennials and Gen Z, is increasingly focused on purpose-driven roles and organizations that align with their values. As a result, HR must adopt practices that not only meet organizational goals but also address broader societal and environmental responsibilities.

Workforce Analytics

Data-driven decision-making is now a cornerstone of modern HR practices. According to Gartner (2023), 72% of HR leaders now rely on workforce analytics to drive decisions ranging from talent acquisition to employee engagement. Workforce analytics provides insights into employee performance, skill gaps, and attrition trends, enabling organizations to make informed, data-backed decisions. HR professionals are leveraging these insights to enhance talent management, improve retention strategies, and design personalized development plans for employees.

The rise of workforce analytics also highlights the need for HR professionals to acquire new competencies in data analysis and interpretation. As HR evolves from a traditionally

administrative role to a strategic business partner, HR leaders must be equipped with the skills to analyze complex workforce data, identify trends, and translate them into actionable strategies.

Special Challenges in Skill Upgradation in India vis-à-vis the Demographic Dividend

India, with its large and youthful population, is often referred to as a nation with a significant “demographic dividend.” This demographic advantage has the potential to drive the country’s economic growth for decades, provided it is harnessed effectively through skill development and upgradation. However, without addressing the emerging challenges in this area, this demographic advantage could become a liability rather than an asset. Here are some of the special challenges related to skill upgradation that India faces, and the risks if not properly addressed:

1. Mismatch between Education and Market Demand

India’s education system has been slow to adapt to the rapidly changing needs of the global job market. There is often a significant gap between the skills imparted through formal education and the practical skills required by industries. As a result, many graduates struggle to find employment in sectors where their skills are in demand. This mismatch risks leaving a large portion of the youth underemployed or unemployed.

Risk: If this gap is not addressed, the demographic dividend could be lost as young people become disillusioned, leading to higher unemployment rates and underutilization of human capital.

2. Regional Disparities

India’s demographic dividend is not evenly distributed across the country. Urban areas tend to have better access to quality education, skill training programs, and employment opportunities, while rural areas face significant challenges. With a large portion of India’s youth living in rural regions, this disparity in skill development exacerbates inequality and limits the country’s growth potential.

Risk: The failure to address regional skill gaps could lead to growing socio-economic divides, creating pockets of unemployment and unrest, and turning the demographic advantage into a source of social strain.

3. Inadequate Infrastructure and Resources for Skill Training

While there are numerous skill development programs in India, their reach and quality remain limited. Many skill training centres lack proper infrastructure, trained instructors, and industry-aligned curriculum. Additionally, the scalability of these programs is often constrained by limited funding and administrative inefficiencies.

Risk: Without significant investment in skill development infrastructure, India could face an increasingly large pool of young people who are ill-prepared to meet the demands of a modern economy, stunting economic progress and innovation.

4. Technological Advancements and Automation

The global economy is undergoing a rapid transformation due to automation and technological advancements such as AI, machine learning, and robotics. While these technologies present opportunities, they also pose a challenge for India's youth, many of whom are trained in outdated skill sets. The inability to keep pace with these developments could render millions of young workers obsolete in the job market.

Risk: If India fails to equip its workforce with relevant digital and technical skills, it risks creating a large population of unemployed or under-skilled workers, ultimately reducing the potential of its demographic dividend.

5. Cultural and Gender Barriers

In India, cultural attitudes towards certain types of work, particularly in sectors like manufacturing, IT, and service industries, can create barriers to skill development. Additionally, gender bias limits the participation of women in many high-skill fields, further reducing the productive potential of the workforce.

Risk: Not addressing these cultural and gender-based barriers could leave a large portion of the population underutilized, restricting economic growth and perpetuating inequalities.

6. Policy and Governance Challenges

While the Indian government has launched several initiatives like Skill India, Pradhan Mantri Kaushal Vikas Yojana (PMKVY), and others, there is a lack of coherent policy implementation at the grassroots level. A fragmented approach and coordination gaps between various stakeholders – including government bodies, industry, and educational institutions – can hinder effective skill development.

Risk: Without better coordination and governance in policy implementation, India may struggle to align skill development efforts with its economic goals, turning the potential demographic dividend into a liability.

7. Youth Unemployment and Lack of Entrepreneurship Skills

A large number of India's youth are not equipped with the entrepreneurial mindset or the skills needed to create their own employment opportunities. The traditional focus on securing white-collar jobs, combined with insufficient support for entrepreneurship training, creates an oversupply of job seekers and an undersupply of job creators.

Risk: Failing to promote entrepreneurial skills among the youth could result in a growing unemployed population, leading to economic stagnation and a shift in the demographic dividend to a liability.

Special Challenges of Manufacturing Sector in India:

The manufacturing sector in India, like in many parts of the world, faces certain challenges and characteristics that influence job creation, especially in the context of the digital era. Here's a breakdown of these characteristics, alongside the phenomenon of jobless growth:

Key Characteristics of the Manufacturing Sector:

1. **Shift Towards Automation:** The use of robots, AI, IoT (Internet of Things), and other digital technologies have drastically reduced the need for human labour in repetitive tasks. Manufacturing processes are becoming more automated, leading to higher productivity but fewer jobs.
2. **Skill Gaps:** While automation and digital technologies have created new job categories, there is a significant skill gap in the workforce. Workers need to be trained in advanced technologies, but the pace of skill development has been slow compared to the speed of technological change.
3. **Global Competition:** India's manufacturing sector faces intense competition from countries like China, South Korea, and Vietnam, where labour costs are lower and technology adoption is more advanced. This competition has sometimes led to closures or downsizing of manufacturing plants in India.
4. **Increased Focus on Sustainability:** With growing environmental concerns, the manufacturing sector has been pushed towards sustainable practices. The implementation of green technologies and circular economy principles, though beneficial in the long run, requires significant upfront investment and new expertise.

5. **Rise of Industry 4.0:** The fourth industrial revolution is reshaping manufacturing through interconnected systems, big data, and AI. While this boosts efficiency and innovation, it also requires fewer workers in traditional roles, further contributing to jobless growth.
6. **Labor-intensive Industries Struggling:** Sectors like textiles, leather, and small-scale industries, which were traditionally labour-intensive, face significant challenges from automation and changing global supply chains. While some areas still create jobs, the overall trend is toward fewer opportunities.

Jobless Growth in the Digital Era:

“Jobless growth” refers to economic growth that does not result in a corresponding increase in jobs, and this is becoming increasingly common in the digital era. Several factors contribute to this phenomenon in the context of the manufacturing sector:

1. **Technology Substitution:** With advancements in AI, machine learning, and automation, machines are replacing human workers in many manufacturing tasks. Even as productivity rises, fewer employees are needed to manage production lines or operations, which results in economic growth without new job creation.
2. **Increased Productivity:** Digital tools allow manufacturing units to operate more efficiently, increasing output without the need for a proportional increase in labour. This has led to high GDP growth rates in the manufacturing sector without a corresponding rise in employment.
3. **Decline in Labor-Intensive Jobs:** As manufacturing becomes more technology-driven, traditional, labour-intensive jobs (such as assembly line work) are being replaced by roles in programming, systems management, and other technical fields. While these jobs may require higher qualifications, they are often fewer in number.
4. **Globalization and Outsourcing:** Even though India’s manufacturing sector is growing, it is often outsized by global giants that can leverage cheaper labour and advanced technologies. Outsourcing of jobs to countries with cheaper labour forces also contributes to the lack of job growth in certain manufacturing sectors.
5. **Demand for Skilled Workers:** As industries adopt more sophisticated technologies, the demand for skilled labour in digital manufacturing and tech-oriented roles has increased. However, the supply of workers with the requisite skills is low, leading to higher wages for those who are skilled but not enough employment for the broader population.

Addressing the Challenge:

1. **Upskilling and Reskilling:** To ensure the workforce benefits from technological advancements, there needs to be a robust effort in upskilling and reskilling workers, particularly in the fields of AI, automation, and digital manufacturing.
2. **Focus on Entrepreneurship:** Supporting innovation and entrepreneurship can provide an alternative route for employment, especially as the manufacturing sector shifts towards high-tech and services-based models. Startups can generate new jobs in design, product development, and digital services.
3. **Government Policies and Incentives:** Policy measures such as Make in India, Production-Linked Incentive (PLI) schemes, and MSME (Micro, Small, and Medium Enterprises) support can encourage the growth of both traditional and digital manufacturing sectors while also focusing on creating jobs.

Emerging Trends in Human Capital Management

1. Technological Disruption

Artificial intelligence (AI) and machine learning (ML) are in charge of transforming HR functions. From automating recruitment processes to evaluating employee performance, these technologies are revolutionizing the way HR departments operate. Predictive analytics is helping HR professionals forecast workforce trends, identify potential talent gaps, and proactively manage workforce attrition. However, as automation becomes more widespread, HR departments must also address the potential for workforce displacement, ensuring that reskilling and upskilling initiatives are in place to help employees transition to new roles.

2. Changing Workforce Demographics

The workforce is becoming increasingly diverse, with Millennials and Gen Z accounting for a large portion of the global workforce. These generations place a high value on flexibility, purpose-driven work, and work-life balance. In response, HR departments are adopting more flexible work arrangements, such as remote and hybrid work policies, and prioritizing employee well-being. Furthermore, as the global population ages, organizations are faced with the challenge of knowledge retention and intergenerational collaboration. HR must develop strategies to ensure that older workers can transfer their knowledge and expertise to younger generations.

3. Sustainability and DEI

Diversity, equity, and inclusion (DEI) are no longer optional; they are essential for fostering innovation, improving employee engagement, and driving organizational performance. HR departments are increasingly aligning their strategies with environmental, social, and governance (ESG) goals. DEI initiatives play a critical role in creating an inclusive workplace culture where all employees feel valued and empowered. Organizations that embrace DEI are better positioned to attract top talent, foster innovation, and improve employee morale.

4. Remote and Hybrid Work Models

The COVID-19 pandemic accelerated the adoption of remote work, pushing organizations to invest in digital infrastructure and reimagine their leadership models. Hybrid work models, which combine remote and in-office work, have become the norm for many organizations. While hybrid work offers flexibility and improved employee satisfaction, it also presents challenges in terms of maintaining organizational culture and ensuring effective communication. HR leaders must develop strategies to foster collaboration, maintain employee engagement, and sustain a strong corporate culture in a hybrid work environment.

Framework for Future-Proofing HR

1. Agility and Resilience

The future of HR lies in its ability to be agile and resilient. As market dynamics change rapidly, organizations must develop a culture that can adapt to new challenges. HR processes must be flexible, enabling organizations to quickly pivot when necessary. By adopting agile practices, HR departments can better respond to the evolving needs of the business, ensuring that the workforce remains aligned with organizational goals.

2. Workforce Reskilling and Upskilling

As technology continues to disrupt industries, there is an increasing need for workforce reskilling and upskilling. HR departments must invest in lifelong learning initiatives, ensuring that employees have the skills they need to thrive in the future economy. Collaborations with educational institutions and online learning platforms can provide employees with access to micro-credentials and certifications that enhance their employability.

3. Digital Transformation

HR departments must leverage digital tools to streamline processes, enhance the employee experience, and improve operational efficiency. Human Capital Management (HCM)

software platforms are at the forefront of this digital transformation, enabling organizations to automate administrative tasks, track employee performance, and manage talent more effectively. AI-driven tools, such as chatbots and personalized learning platforms, can help HR departments provide more tailored experiences for employees, improving engagement and satisfaction.

4. Leadership Development

Effective leadership is critical to navigating the complexities of the modern workplace. HR must invest in leadership development programs that emphasize emotional intelligence, decision-making under uncertainty, and digital fluency. Leaders must be equipped with the skills to manage hybrid teams, drive innovation, and foster a culture of continuous learning. Leadership development should focus on building resilience, adaptability, and inclusivity, ensuring that leaders can navigate change effectively.

Data Analysis: The State of Future-Proofing HR

A global survey conducted among 500 HR leaders across industries revealed key insights into the readiness of organizations in future-proofing HR. The data highlights the importance of digital transformation, reskilling efforts, and diversity and inclusion initiatives.

Primary Data Insights

A survey involving 500 HR leaders revealed:

- **Digital Transformation Readiness:** 62% of organizations have adopted AI-driven HR tools, but only 38% have integrated predictive analytics.
- **Reskilling Efforts:** 54% of companies have formal reskilling programs; however, participation rates among employees remain at 40%.
- **Diversity Metrics:** Organizations with advanced DEI strategies reported a 25% higher innovation index.
- **Employee Engagement:** Hybrid work models have led to a 15% increase in engagement but pose challenges in maintaining organizational culture.

Digital Transformation Readiness:

- 62% of organizations have adopted AI-driven HR tools, but only 38% have integrated predictive analytics into their HR processes. This indicates that while many organizations are embracing technology, there is still room for improvement in leveraging data to drive HR decision-making.

Reskilling Efforts:

- 54% of companies have formal reskilling programs in place, but participation rates among employees remain low at 40%. This highlights the need for organizations to invest in promoting these initiatives and ensuring that employees are actively engaged in their development.

Diversity Metrics:

- Organizations with advanced DEI strategies reported a 25% higher innovation index compared to those with basic DEI practices. This demonstrates the link between diversity and innovation, with diverse teams driving creative solutions and improved business outcomes.

Employee Engagement:

- Hybrid work models have led to a 15% increase in employee engagement, but organizations are still facing challenges in maintaining organizational culture and fostering a sense of community among remote workers.

Case Studies: Best Practices in Future-Proofing HR**1. Microsoft:**

Microsoft's Skills Initiative has reskilled over 30 million people globally, focusing on AI and digital literacy. By integrating AI into its HR processes, Microsoft has streamlined talent acquisition and retention, ensuring that its workforce remains agile and future-ready. Microsoft has emerged as a global leader in future-proofing its HR practices by leveraging technology and focusing on skill development. The company's ambitious Skills Initiative has reskilled over 30 million people globally, emphasizing AI and digital literacy to prepare both its workforce and the broader community for the demands of the digital era. This initiative includes partnerships with governments, educational institutions, and non-profit organizations to deliver accessible learning resources and certifications.

In its HR operations, Microsoft has integrated AI to streamline talent acquisition and retention. For instance, AI-driven tools are used to identify candidates with high potential, match them with roles, and predict employee attrition. This approach has resulted in a more efficient recruitment process and a 25% improvement in employee retention rates. Microsoft also emphasizes a growth mindset culture, encouraging employees to embrace continuous learning and adaptability. Its investment in employee experience platforms, such as Viva, ensures personalized learning, career development, and well-being support for its workforce.

2. Unilever:

Unilever's DEI strategy emphasizes gender parity and inclusive leadership. The company's sustainability-linked HR practices align employee goals with ESG objectives, enhancing employee satisfaction and improving its brand reputation.

Unilever has set a benchmark in embedding sustainability and diversity into its HR practices. Its Diversity, Equity, and Inclusion (DEI) strategy prioritizes gender parity, inclusive leadership, and the creation of a supportive workplace environment. As part of its "Unstereotype" initiative, Unilever actively challenges gender stereotypes and promotes inclusive advertising and internal communication. The company has achieved significant milestones, including a nearly 50-50 gender balance in managerial roles.

Unilever's HR practices are tightly aligned with its Environmental, Social, and Governance (ESG) objectives. Through its Sustainable Living Plan, the company integrates employee goals with broader environmental and social initiatives, such as reducing carbon emissions and promoting sustainable sourcing. Employees are encouraged to contribute to these objectives through role-specific targets and training programs. This alignment has not only improved employee satisfaction but also enhanced Unilever's brand reputation as a purpose-driven organization. The company's innovative leadership development programs, such as "Lead in a Purposeful World," further ensure that leaders are equipped to drive sustainability and inclusivity.

3. Tata Consultancy Services (TCS):

TCS's Anytime Learning platform empowers employees with self-paced upskilling opportunities. The company's hybrid work strategy balances flexibility with productivity, enabling employees to work in ways that align with their needs while ensuring business objectives are met.

TCS exemplifies how technology and flexibility can be harmonized to future-proof HR. The company's "Anytime Learning" platform empowers employees to pursue self-paced upskilling opportunities across a wide range of domains, from cloud computing to design thinking. This platform has facilitated the completion of over 100 million learning hours annually, enabling employees to stay relevant in a fast-changing technological landscape.

TCS's hybrid work strategy balances employee flexibility with business productivity. Its "25 by 25" vision aims to have only 25% of employees working from TCS facilities by 2025, with employees spending just 25% of their time in physical offices. This model leverages robust digital infrastructure and collaborative tools to ensure seamless operations.

Additionally, TCS prioritizes employee well-being through initiatives like health check-ups, counselling services, and ergonomic support for home offices.

TCS also focuses on fostering innovation and collaboration through its HR practices. The company's "Innovation Labs" provide employees with opportunities to work on cutting-edge projects and co-create solutions with clients. This approach not only enhances employee engagement but also strengthens TCS's position as a leader in IT services and consulting.

Findings and Discussion

The Role of Technology in HR Transformation

Technology is at the heart of HR transformation. AI-driven platforms streamline recruitment processes, while employee experience platforms enhance engagement and retention. For example, IBM's use of AI has enabled the company to predict employee attrition, leading to a 25% reduction in turnover rates. This demonstrates the potential for technology to drive efficiency and improve outcomes in HR.

Sustainability as a Strategic Imperative

Organizations like Unilever have successfully integrated sustainability into their HR practices. By aligning employee objectives with broader environmental goals, these companies have not only enhanced employee satisfaction but also strengthened their brand reputation, positioning themselves as leaders in corporate responsibility.

Workforce Analytics for Strategic Decisions

Workforce analytics allows HR departments to make data-driven decisions that enhance employee performance, reduce attrition, and improve talent management. Google's use of predictive analytics in talent management has significantly improved recruitment efficiency, while also enabling the company to proactively address skill gaps.

Agile Leadership and Organizational Culture

Agile leadership is crucial for organizations seeking to thrive in an ever-changing environment. Leaders must embrace inclusivity, flexibility, and continuous learning to navigate the complexities of the modern workplace. The transformation at Microsoft under Satya Nadella exemplifies how agile leadership can drive cultural change and organizational success.

Challenges in Implementing Future-Proof HR Strategies

1. **Resistance to Change:** Organizational inertia and legacy systems hinder transformation. Addressing employee concerns about automation and job security remains critical.
2. **Data Privacy and Security:** Increasing reliance on digital tools necessitates robust data protection measures.
3. **Measurement and Metrics:** Quantifying the impact of HR initiatives on sustainability and business outcomes is complex.

Recommendations for Sustainable Transformation

1. **Adopt a Holistic Approach:** Integrate HR strategies with organizational goals, focusing on both people and the planet.
2. **Prioritize Employee Well-being:** Develop comprehensive wellness programs addressing physical, mental, and financial health.
3. **Foster Innovation and Collaboration:** Encourage cross-functional collaboration to drive creativity and problem-solving.
4. **Measure Impact:** Implement robust metrics to evaluate the effectiveness of HR strategies.

Conclusion

Future-proofing HR is no longer a choice but a necessity for organizations aiming to thrive in an era of rapid change. By embracing agility, investing in workforce development, leveraging technology, and aligning with sustainability goals, HR leaders can drive meaningful transformation. The insights from this research provide a roadmap for reimagining human capital management to create future-ready enterprises.

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CHALLENGES AND OPPORTUNITIES OF SOCIAL ENTREPRENEURSHIP DURING A PANDEMIC SITUATION

Monalisha Chakraborty, Prof. Prasanta Parida

1. Introduction

Social entrepreneurship is an important process to identify potential resources and opportunities to create social values. Social entrepreneurship became an increasingly important International cultural phenomenon some decades ago (Dey2006). The historical evolution of social entrepreneurship can be divided into the past few decades. In 1970 in France the ‘Social economy’ concept was introduced which is mentioned in the book titled “The Emergence of Social Enterprise” written by two European authors Borzaga and Defourny. Some scholars suggested that social entrepreneurship started in the 1980s after Bill Drayton founded Ashoka, a grant-making organisation that supported innovators and gave solutions to social problems in the United States. On introduction of the concept of social innovation by Peter Drucker gave rise to academic recognition of social entrepreneurship. Gradually social entrepreneurship emerged as a field in the early 1990s. The first journal article by Dacin et.al (2010) on social entrepreneurship was published in 1991.

In recent decades entrepreneurial activities have been on the rise with exclusive social missions leading to the emergence of the term “social entrepreneurship”. Since the year 2000, social entrepreneurship has gained acceptance as a separate discipline of academic research. In recent years India has witnessed an exponential growth of social entrepreneurship. It has genuinely inspired social upliftment. Social entrepreneurs now firmly believe in solving some impossible issues with possible and effective solutions. Poverty alleviation and eradication of socio-economic disparities are the two important aims of social entrepreneurship. Social entrepreneur Muhammad Yunus, founder and manager of Grameen Bank has led a new path in the development of social entrepreneurship in developing countries. He was awarded a Nobel Peace Prize in 2006 for his valuable contribution to social entrepreneurship (Daru, Gaur, 2013). Social entrepreneurs are innovative, resourceful, result result-oriented and are ready to tackle any kind of social and environmental issues.

Social entrepreneurship gives momentum for businesses to find their own success in lieu of helping others, especially during the pandemic period. Across the globe, the development sector has faced a critical time due to Covid 19 pandemic. Due to the lack of contingency plans in India, its impact is felt more. Organizations and projects are significantly impacted due to COVID-19. This has triggered financial challenges ahead in terms of running the organization, payment of staff salaries, early closure of projects, delay in starting new projects etc. Improper health operations, women and child abuse, domestic violence etc were some of the challenges. Social entrepreneurs are also worried about the safety of their staff to work in slums and high COVID-19 case areas. The tremendous economic decline or slowdown implies an impact on the grant aid, and support from the government as well as corporates. As the funds are getting distributed to COVID-19 relief and rehabilitation work, some organizations will have to redesign their business venture to diversify their income and for their sustainability.

Social entrepreneurship helps to achieve social change by incorporating entrepreneurial principles and operations with some kind of unpredictability. Social ventures are developed to look after the well-being of the community, environment, child care, health, child protection, education etc.

2. Objectives

The main objective of the paper is to study the topic “Challenges and opportunities of social entrepreneurship during Covid19 pandemic in India.” It is understood through the following objectives:

1. To find out various social entrepreneurial activities in India.
2. To study challenges and opportunities faced by social entrepreneurs during pandemic time.
3. To study the impact of COVID-19 in different emerging fields of social entrepreneurship.
4. To make pluralistic suggestions for sustainable social entrepreneurial activities in India.

3. Literature Review.

The developing economies of the world are common in their background in terms of socio-economic retardation and poverty. Enterprises and communities reap the benefit of economic value. Liberation from a particular condition for economic mobilisation of communities is achieved by using some innovative strategies to earn income (Roy and Karna 2015). Achieving economic sustainability is the way to successful social entrepreneurship without depending financially on external sources (Scheiber 2014). In developing nations, such a perspective of social entrepreneurship is very much prevalent as identified in past research of the Asia Pacific context (Sengupta and Sahay 2017). They reached a common observation about the hybrid nature of social enterprises with a double purpose to add social value and wealth.

A huge number of people across the world are devastated due to the economic implications of COVID-19. Researchers of entrepreneurship have never seen a harmful virus like Coronavirus. However, the welfare of the society is a significant aspect of social entrepreneurship. Roy and Karna (2015) stressed the fact that to avoid any adversity it is important to create a social fund for the success of social enterprises. The generation of rich social capital is one of the ingredients for the success of social enterprises (Goyal and Sergi 2015). For any type of enterprise social capital plays a vital role in the implementation of ideas. (Lehtimaki and Karintaus 2012).

Choi and Majumdar (2014) mentioned the need for further research on the differences of various social entrepreneurs. In India, many welfare activities are initiated along with the participation of women to provide basic services to the underserved people (Agarwal and Sahasranamam 2016). The concept of innovation for society is considered an important tool for social welfare (Bhatt and Altinay 2013). It is crystal clear that social welfare is a vital entity in the process of social development.

4. Background

In this critical pandemic time need for social entrepreneurship is strongly felt. The world has approached the third year of the COVID-19 pandemic. So, some new Individuals, businesses and non-profits are stepping to the front and trying for a conscious effort to bring about positive change in the world. It might be the result of the pandemic or other social causes. But the pandemic has shown a path when the world has an urgent need for social entrepreneurs. There are different types of entrepreneurs and entrepreneurship that come under social innovation. Some are related to community projects which mainly focus on social, environmental and economic issues. Some attributes like interest, creativity, tenacity and commitment are important to carry out a project. Some non-profit organizations exist to create an enterprise focused on a specific cause. However, they do not focus on generating revenue for shareholders and stakeholders.

Around the globe development sector is facing a challenging time due to the outbreak of Covid19 pandemic. In India, social enterprises lack a contingency plan so the impact would be felt more. About 83% of the organization's work has been significantly impacted. The lockdown has impacted their project operations. In return, they are very much liable to face financial challenges ahead. Due to the financial and operational risk burden, cash flows are critical at the time of crisis. Managing costs of running the organization, payment of staff salaries, early closure of projects, delays in starting new projects etc. are some of the problems.

Akhand Jyoti Eye Hospital's health operations were severely impacted as patients were unable to reach the hospital. Remote counselling of cases of child abuse and domestic violence was a big challenge for organizations like Arpan and the Child Aid Foundation. Srujna's livelihood support activities have been severely impacted and increased the economic vulnerability of poor women. Another important concern expressed by social enterprises like Awaaj, Eco exist enterprises, Green India Initiative Pvt Ltd etc. is related to business continuity and gaining market access. The spending patterns significantly differ due to the pandemic. The safety of staff in slums and high-risk areas is also a matter of great concern. Few organizations are now engaged in devising their service delivery strategy.

These social enterprises usually focus on basic needs like housing, groceries etc. A social-purpose business tries to maintain a balance between profit organisations and non-profit programs. They mainly generate profit and invest in need of a social cause. Such enterprises attract impact investors who follow a business model with a mission to bring positive change in society.

5. Methodology

Based on the above learning and understanding of the gap we devised a study among 50 social entrepreneurs. The objective of the research paper was to understand the challenges faced by them and to find all the new opportunities that motivated them to serve mankind. The study also observed the impact and contribution of social entrepreneurs during this pandemic. Various emerging opportunities were also examined which motivated the social entrepreneurs to serve humanity. A structured questionnaire was prepared for data collection. The collected data was used to understand the various aspects mainly focusing on delivery of work, changes in their services, challenges faced and expected positive outcomes. Quantitative descriptive single cross-sectional research was conducted. The study used primary and secondary data for comprehensive understanding.

Secondary data was collected from existing research papers, online news articles, government documents and various websites on social entrepreneurship to gain a comprehensive perspective. A small primary survey was conducted through online and telephonic mode. Focus group discussion was conducted with a very limited randomly selected group of participants. It was very challenging to connect to people in different places and gather correct information as many people were affected by COVID-19. The main purpose of the survey was to understand the challenges faced by social entrepreneurs and their impact during Covid19 pandemic. The study has also tried to highlight those new, emerging and dedicated social entrepreneurs developed especially during COVID-19. A focused group discussion (FGD) was conducted amongst the few respondents as per their availability through online mode. It was learnt that almost all enterprises are affected by the COVID-19 pandemic. It was very interesting to work on this paper which focused mainly towards the holistic approaches of social entrepreneurs and their benevolent work for society.

6. Analysis

Social entrepreneurship is popular and played an important role in India since the pandemic started. India has more than three million social enterprises. There are numerous and diverse opportunities in India's ecosystem of social entrepreneurship. Social entrepreneurs can connect with local partners to adopt innovative solutions to tackle various issues in the fields of healthcare, education, child protection, renewable energy, skill development etc.

There are some key issues which are creating hindrances in the path of the social entrepreneurship sector. According to the respondents, there are some important challenges which the social entrepreneurs face.

1. It is very difficult for social enterprises to get grant funding. Grant fundings are generally given by a public body, charitable foundation, or a specialised grant-making institution – to an individual or social enterprise for a purpose linked to public benefit. Unlike loans, grants do not have to be paid back. Difficulties in securing social venture funds are another issue that social enterprises have to deal with. The main issue with such funds is that they are solely restricted to investors who are high net-worth individuals. The minimum amount of investment that can be made to start is very high that is from Rs 1 crore. That's why most investors are not turning up.
2. Social enterprises are unable to attract the talent that is needed to develop products and services due to lower profit margins and longer revenue cycles. This leads to uncertainty and inconsistency in the quality of their output. Attraction of talent also depends on the pay scale that an organisation is offering. The salaries of social enterprises vary greatly and depend upon many factors. This obviously affects salary levels. Most of them are start-ups and in their emerging stages, hence the disparity in salaries. This directly impacts the process of attracting and retaining skilled manpower.
3. Finding investors is also one of the main challenges for social enterprises in India, especially in the initial phase. They often lack connectivity to the investors due to the lack of a network or platform to initiate and raise funds. Raising capital through loans may be sometimes a risky proposition.
4. Banking and financing firms lack awareness about social enterprises. There is certainly a lack of understanding about their purpose. The idea of the enterprise, its inception and finally its growth into an institution should be clearly understood. Many times, a lot of social enterprises are asked difficult questions about their strategy and model which they might not have prepared at that point in time. So, it is challenging to prove themselves.

It is found that during the Covid 19 crisis, there were many other challenges faced by social entrepreneurs in accumulating funds, convincing the beneficiaries, managing fear psychosis etc. The study also revealed many new opportunities in the implementation process. After analysis of the collected data, many interesting facts are figured out. It is observed that a maximum number of social enterprises in the education sector are older than ten years followed by other enterprises in different sectors. Since education is one of the key areas for the overall development of any nation. So, education has always been given foremost priority. This particular fact can be correlated with another finding which depicts that the average age of social entrepreneurs in the education sector is more than 30

years of age (figure 1). It shows their long association with the education sector. It is noted that the educational qualification of the majority of social entrepreneurs is at least graduate and many are postgraduates as well with professional qualification (figure 2).

Figure 1: Correlation between Age of enterprise and entrepreneur

A Focus Group Discussion (FGD) was conducted with the aim to develop an understanding of the impact of COVID-19 on social enterprises. The discussion on various issues took place ranging from availability of finance, disruption in supply chains, and losses incurred, to framing attitudes and perceptions towards recovery in the post-pandemic. Also it has been learnt that digital technology plays a vital role in strengthening entrepreneurial ecosystems.

Figure 2: Educational qualification of entrepreneurs

To start any business, capital is one of the most vital requirements. In the present survey, two categories are studied and those are self-financed and funded social enterprises. It can be inferred from the survey that social enterprises in the health sector have invested more than ten lakh rupees while in the skill development sectors less than ten lakh rupees. There are many self-financed enterprises in different sectors (figure 3). Initially, self-financed social enterprises were mainly higher in the renewable energy sector, child development, skill development etc. Many enterprises have also branched in different states. It helps in the smooth operation of activities in different places simultaneously.

Figure 3: Investment and funding pattern

Social innovators and entrepreneurs have once again shown their keenness to act as frontline workers to provide affordable healthcare, protect jobs and provide emergency relief swiftly. Many have done exemplary work as social entrepreneurs to fight with Covid 19 and help society. One such is Jan Sahas in India which has helped generously in the crisis. They have responded by supplying food to lakhs of migrants. They also provided PPE kits and emergency transportation to migrants and their families.

Social entrepreneurs negotiated with local financial institutions to restructure their respective working capital loans to help poor people. Also facilitated in increasing their credit periods from suppliers and provided crisis mentorship. Some entrepreneurs were deeply engaged with grassroots-based enterprises for livelihoods and to create appropriate safety nets to prevent them from collapsing. Restructured and created a Covid Taskforce to oversee all the operations. The crisis is at a much larger level than the previous one.

On top of the existing core task force, they have created a few more at regional levels. By considering the amount of work, it would have to be carried out in the current phase. The learnings from the 1st phase are very critical. But the rescue group is well aware of the magnitude of the catastrophe. Social entrepreneurs tried their level best to forward their generous hands to the underserved section of the society during pandemic Covid19.

7. Discussion and Suggestions

Social entrepreneurs are on the battlefield of this pandemic to serve the most vulnerable populations. Four decades of social entrepreneurship and models of sustainability to serve society are significant to the COVID-19 response and recovery period. With knowledge and experience, they have reactivated the sustainable development agenda. It has helped to build a more resilient, better and inclusive future. In recent years India has witnessed an exponential growth of social entrepreneurship. It has genuinely inspired an entrepreneurial mindset for social upliftment. Social entrepreneurs firmly believe in solving some impossible social issues with possible and effective solutions. Social entrepreneurs have a positive motive to tackle social problems caused by Covid 19. For the benefit of the poor people, some initiatives were started such as making plastic shields, ventilators, hand sanitisers etc. to earn livelihood. Apart from the human tragedy caused by the virus, it has also led to the most severe economic crisis in a century. The impact of COVID-19 is quite uneven across different nations, communities and economies. It is estimated that millions of people will be pushed into extreme poverty due to Covid 19. Informal lower-level workers who are the most vulnerable in the labour market have suffered massively to earn a living. Social enterprises have taken up the issues of the underserved and also highlighted other important issues. They have created viable and sustainable solutions. However, the impact of COVID-19 on social entrepreneurship is critical and already with certain challenges (Figure 6).

Figure 4: Key challenges of social entrepreneurship (Source: CII and KPMG)

Based on the survey of the scenario of social entrepreneurship in India and its various issues some policy suggestions are put forward for the improvement of this sector. Social enterprises across the country are expecting more from the government.

1. There is a need to lower the minimum amount of investment from Rs 1 crore to Rs 1 lakh. This would allow more people from varying financial backgrounds to invest in such funds. Lowering the costs of financing capital would then increase the flow of philanthropic money in the sector.

2. If the government or philanthropic organisations can provide support for overhead costs. It will help to build up a sort of ecosystem that provides basic infrastructure, and a cohesive environment for start-ups to thrive. Then it will be easier for social entrepreneurs to spend more on strategic needs such as hiring human resources, acquiring clients, etc.
3. Besides that, the promotion of social enterprise learning and the creation of incubation capabilities on the academic front can also support the growth of this sector.
4. There should be a national body for the development of social enterprise ventures and their ecosystem. This national body can connect with Indian and global agencies to implement the best global practices and recommendations.
5. Another vital demand is to create a fund for high-priority sectors such as healthcare of Tribal people. Also, the development of the market is beneficial for artisans. That could be a boost for start-ups in the early stages. This in turn will increase innovation in the field.

8. Stories of Some Successful Social Entrepreneurs of India in Different Sectors

Narayana Health: Health for all; All for Health

It is a humble effort of Dr Devi Shetty who founded Narayana Health in the year 2000 to provide quality health care services at an affordable rate. Narayana Health or Hrudayalaya is very popularly known as the world's one of the best and low-cost cardiac centre hospitals. Narayana Health has always come forward to lower the suffering of the underprivileged.

Around hundred-room quarantine facilities for poor COVID-19 patients are provided to the economically weaker section of society free of cost. Essential medications are supplied free of cost and Covid 19 patients are constantly monitored by nurses and doctors. People are made aware of the significance of hand washing with soap, using sanitisers, and face masks and undergoing immediate Covid tests in case of any symptoms arise. Regular talks, lectures, seminars, and camps are arranged to impart education on health, hygiene, nutrition etc. Covid positive patients with comorbidities are encouraged to come forward for treatment to avoid further risk. The patients in the isolation facility are monitored round the clock by the doctors and nurses. The underprivileged cannot afford proper treatment in case of any severity but it has become possible with the humble approach of Narayana Health. Underserved people of the society also get the facility of hygienic accommodation along with affordable treatment. A free COVID-19 vaccination drive has been started by

Narayana Healthcare with a mission to vaccinate a maximum number of underprivileged people to help alleviate the impact of the COVID-19 pandemic.

SELCO

With the meticulous efforts of Harish Hande, it has become possible to provide solar power technology to poor people. It is through a social enterprise known as SELCO (Solar Lighting Company). It is a pioneering rural enterprise based in Bengaluru, India since 1995.

SELCO got a new platform during the COVID-19 pandemic to work for the welfare of the community. SELCO has been at the frontline with its urgent response to the COVID-19 pandemic. They provided urgent healthcare needs of serious patients who require access to oxygen and ventilators. SELCO has made specific plans by setting up 60 COVID care hospitals, isolation centres, therapeutic care units and health staff quarters. Sustainable building materials, solar-powered solutions and efficient equipment are being extensively used during the second phase of the crisis. Also installed 500+ solar-powered swab collection centres in remote areas that provided basic rations and other essential supplies to numerous poor families during lockdown. This has infused capital in 30 last-mile clean energy and efficient technology social enterprises for meeting the salaries of technicians and administration staff.

Goonj: Famous For Turning Trash Into Useful Items

Goonj is a social enterprise founded by Anshu Gupta in 1999. The main purpose is to help poor people by recycling waste material into useful items. Goonj undertakes Disaster relief, Humanitarian aid, Community development and Rehabilitation work in various natural disasters to support underprivileged people.

In the COVID-19 pandemic as well Goonj has started one programme known as 'Rahat' which provides PPE Kits, Oximeters, Thermometers, Oxygen concentrators and Medicines to frontline workers, individuals and families. Health and hygiene-related lessons imparted which mainly include the use of sanitary pads, face masks etc. Ration bags and Covid relief materials were supplied to the most interior and remote parts of the country. 'Khichri dhabas' was launched and some ignored categories of people like physically handicapped, HIV+, transgenders, patients, sex workers etc. were also reached out to. Almost twelve crore thirty lakh kilograms of ration and other essentials were provided to local communities through different networks. More than three lakhs of ready-to-eat meals were supplied across urban and rural parts of the country. Nearly three lakh five thousand kilograms of vegetables and

fruits were directly transported from the farmer's field. Almost fifteen lakhs of people were reached out as part of Rahat Covid work. About twelve lakh Face masks and fifteen lakh sanitary pads were made and distributed which is a result of vocational training imparted to earn livelihood. So, Goonj works to the best of their abilities to understand and fulfil the needs of the people.

Childline India Foundation: Care and Protection of Children

Child protection and welfare are of utmost priority in any society. Jeroo Billimoria is an Indian social entrepreneur who initiated a noble approach to responding to the emergency needs of children. Relevant services are provided to children for their long-term care and rehabilitation. More than three million children are offered care and protection in India. She has founded many international NGOs and some recent initiatives are Aflatoun, Childline India Foundation and Child Helpline International. Her work has been featured in several books.

The COVID-19 pandemic has affected the lives of millions of people including children across the globe. There is socio-economic uncertainty due to the pandemic, children also face threats to their safety and well-being. During Covid19 crisis and the lockdown in India, Childline 1098, the emergency helpline has continued to receive calls in need of care and protection for children. They are always ready to prevent abuse, assist children in distress and provide emotional support. Since March 2020, Childline has answered over 53.09 lakh calls and assisted and rescued over 3.95 lakh children. They distributed hygiene kits, food, and medical supplies and extended emergency services. Childline also aid children and other vulnerable groups in distress during the COVID-19 crisis.

Kalinga Institute of Social Sciences

“Poverty creates illiteracy. Literacy eradicates poverty.” By Dr. Achyuta Samanta

Kalinga Institute of Social Sciences (KISS) is a home for around 60,000 indigenous children who get free of cost education, vocational and sports training from kindergarten to post-graduation and doctorate levels. The founder of KISS is Prof. Achyuta Samanta who believes in selfless service and endless learning. He is an Indian educationist, philanthropist, social worker and received many awards for his noble work.

Prof. Achyuta Samanta has rendered a significant contribution to Odisha's war against COVID-19. It included the distribution of food materials and other essentials to over three lakh pandemic-hit people, including the marginalised people living in various slums and

stranded migrant labourers. Also provided food to thousands of animals scattered over the city during the pandemic as all eateries were closed. They also reached to commonly overlooked people like transgender, sportspersons, physically challenged, sex workers and so on. KISS has provided study materials, dresses and generous amounts of dry food to the doorsteps every month. In one of its kind gestures include free education to the children of the COVID-19 deceased in Odisha for two academic years. The exemplary gesture of KISS has adopted about 100 such orphans and provided them with monthly allowance ranging from Rs 5,000 to Rs 10,000, depending upon the family size. When the academic institutions reopen, then they are provided with free education.

8. Conclusion

Social enterprises have a bright future. Social enterprises have always tried to drive interactions with markets, institutions and governments to make the world a better place. The Covid 19 pandemic has revealed shortfalls in education, healthcare, finance, housing, etc. It has aggravated the need for coordinated responses as social enterprises are a vital part of society. In India, there is a further need to invest more in the social sector. There are many opportunities for collective effort and also for bringing innovative solutions at the grassroots level. Government, industry and its stakeholders must work together to resolve the multiple challenges of social enterprises. So that enterprises can be agile in action and survive against all odds. Social enterprises are the catalyst for bringing about real and positive social changes in society.

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CORPORATE SOCIAL RESPONSIBILITY PRACTICES FOR AN INCLUSIVE AND SUSTAINABLE GROWTH: EVIDENCE FROM INDIA

Prayabrata Satapathy

I. Introduction:

Economic growth of a country is possible only through an efficient consumption of inputs available in the Business Environment. The utilization of natural resources has a direct impact on the economy, environment, and society at large. Social, Economic and environmental are the three pillars or dimensions of Sustainable development. The 2030 Agenda for Sustainable Development adopted by all United Nations Member states in 2015 provides a common blueprint and recognizes that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality and spur economic growth tackling climate change and working to preserve our oceans and forest achieving sustainable development goal (SDG).

The Business world is becoming environmentally and socially responsible. The success of a business organisation goes beyond profitability, growth rate, and brand recognition. Nowadays customers, employees and other stakeholders judge the company by how its activity impacts the environment, economy and society at large with its best practice in Governance on various sustainability and ethical issues. Sustainable development is grounded on three basic pillars i.e. social, economic and environmental. According to Brundtland Commission set up by the United Nations General Assembly in 1983 defined Sustainable development as that “meets the need of present generation without compromising the ability of future generation to meet their own needs”.

Corporate Social Responsibility (CSR) is not a new term, whether we talk about it globally or with respect to our country. CSR is a term which can be used as a synonym for charity, philanthropy, and donations, which have been an integral part of business activities for ages. With effect from April 1, 2014, CSR is a mandatory requirement for certain companies under section 135 of the Companies Act, 2013, which compels them to engage in activities that contribute to the social, environmental, and economic development of the country. India is the first country in the world where there is a mandatory requirement of a minimum of 2 per cent of net profit to be spent on CSR activities. Since India is facing multiple socio-economic challenges, India needs to make it mandatory for corporates if sustainable and inclusive growth is desired. We have experienced a shift in focus from charity and

philanthropy towards the direct engagement of corporates in the mainstream development of the country. There is no single definition which can give an overall view of what CSR implies. According to Lord Holme and Richard Watts, “Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large.”

CSR encompasses not only what companies do with their profits, but also how they make them. It goes beyond philanthropy and compliance and addresses how companies manage their economic, social and environmental impacts. As well as their relationships in all key spheres of influence: workplace, marketplace, supply chain, community and the public policy realm. (Harvard University)

According to the Ministry of Corporate Affairs, Government of India, Corporate Social Responsibility “urges business to embrace the ‘triple bottom line’ approach whereby its financial performance can be harmonized with the expectation of society, the environment and the many stakeholders it interfaces within a sustainable manner”.

II. Literature Review

The idea of CSR is based on the concept that corporations should manage their business in such a way that they maximize the profit along with their contribution to the resolution of social and economic problems in society. Corporations should contribute more than economic goods and services. They should emphasize creating a quality of life in society. There are various viewpoints of different researchers concerning the definition and adaptability of CSR. For many years, CSR has been a major area of concern for many researchers. In 1960, the idea of CSR originated with the conception that corporations have responsibilities beyond legal obligations (Bronn and Vrioni, 2001). According to Angelidis and Ibbrahim (1993), CSR is “Corporate social actions whose purpose is to satisfy social needs”.

In recent times, organisations have been more focused towards the stakeholder’s approach than shareholders. (Stubbs and Cocklin, 2007). As per the European Commission, 2002, CSR is a concept whereby corporations merge social and environmental concerns in their business operations and discuss social concerns with their stakeholders before making any decisions.

Mahabir Narval (2007), in his study, suggests that Indian banks are concentrating mainly on education, health, environment and customer satisfaction irrespective of the location of the bank. CSR in India has gone beyond merely ‘charity and donations’ and is approached

in a more organised fashion. It has become an integral part of corporate strategy (Das Gupta, 2010). Carroll (1979), identified the CSR pyramid, which comprises four stages of CSR development, namely economics, legal, ethical and philanthropic obligations.

It is expected from a company that since they have resources and capital, they should be given a chance to solve the problems our society is facing (Davis, 1973). Where there are supporters of CSR policy, there are a few critics also. Friedman (1970) communicated his thoughts against CSR and said that a profit-maximizing firm should not divert its funds to create social good at the cost of shareholder returns. According to him, it amounts to “theft” and it’s socially irresponsible of the firm to engage in CSR. He believed that CSR would lead to allocated inefficiencies and social losses.

It has been observed that inclusive growth cannot be achieved unless we all won’t contribute towards the development of society. A long time back, Kautilya’s ‘Arthashastra’ talked about merchants trading, while having responsibilities towards the betterment of society, though it was a voluntary act. Revival and inclusive growth cannot be achieved by the government alone. Corporations do have to play their role to help the country attain inclusive growth through fair practice of CSR policy. Anjan Kumar, M.J. (2016) speaks about CSR and its impact on inclusive growth. To him, the influx of funds by corporates (2 per cent of net profit) would multiply the reserves of the NGOs and make them liable to develop proper reporting mechanisms to trace the funds given by corporates.

Dash Ranjan et al. (2020) in their study discovered that the average CSR expenditures over the period of study done by private companies are significantly more than that of Govt. corporations. Satapathy & Paltasingh (2022) in their paper makes a modest attempt to explore the connections between CSR and (Sustainable development goal) SDGs in contemporary India and examines how CSR in India contributes to SDGs.

III. Objectives:

The objective of the paper is to provide a framework for the role of corporations in ensuring a sustainable tomorrow through inclusive growth. Given India’s diverse socio-economic landscape, CSR practices have become vital for addressing critical issues such as poverty, inequality, and access to basic services. The article explores key CSR practices implemented by Indian businesses and their impact on marginalized communities, education, healthcare, and employment. This Paper examines the alignment between CSR initiatives and inclusive growth objectives, offering insights into how CSR contributes to sustainable and equitable development in India.

IV. Data & Methodology:

This paper shares a conceptual framework based on the previous literature. The present study is analytical in nature based on secondary data collected from the Ministry of Corporate Affairs. To study the trend of CSR expenditure data was collected from the Ministry of Corporate Affairs for the year 2014-15 to 2021-22. The data collected is based on the Annual report filed by the companies for the year. To have an understanding of and study the objectives, the research design employed for the study is descriptive and conceptual in nature. Secondary data has been collected and analyzed from various journals, data are available on the Ministry of Corporate Affairs website, Wikipedia reports and data available on company websites, World Bank reports and magazine articles.

V. Discussion & Analysis:

Enactment of the Companies Act, 2013 by the Ministry of Corporate Affairs, Government of India was one of the world's largest experiments in introducing CSR as a mandatory provision by imposing a statutory obligation on Companies to take up CSR projects towards social welfare activities. This has made India the only country which has regulated and mandated CSR for some select categories of companies registered under the Act. This CSR Initiative will push the nation towards the achievement of sustainable development goals and public-private partnerships in transforming India.

India being an emerging developing economy, has to spend huge amounts on the well-being of its people. According to World Bank estimates of Growth forecast, India has achieved a growth rate of 7.2 per cent in 2023-24 which is now showing a sharp decline to 5.4 per cent in the last quarter of 2024. Despite rapid economic growth, India faces widespread poverty, inequality, and social exclusion. Inclusive growth aims to ensure that the benefits of growth are equitably distributed, particularly benefiting the marginalized sections of society, including women, lower-caste groups, rural populations, and economically disadvantaged communities.

So coming back to inclusive growth, the challenges that our country is facing are varied. It ranges from corruption, social limits of Indian democratic politics, slow growth rate in rural areas, need for urban transformation, women's safety, child labour, improper basic amenities, polluted water and environment, depletion of resources and so on. To cope with these challenges, inclusive growth has been projected as the strategic pillar of the 12th Five-Year Plan. The objective for the 12th Five Year Plan is titled 'Faster, more inclusive and sustainable growth'. To overcome the threat posed by the economy in its inclusive

growth, the government of India came up with 13 flagship programmes that work towards rural development, health and family welfare, women and child development, school education and literacy, urban development, water resources, power, drinking water supply and agriculture.

Businesses have the potential to promote inclusive growth through responsible and ethical practices that prioritize social welfare alongside profit. CSR activities such as skill development, infrastructure improvement, education, healthcare, and environmental sustainability can significantly contribute to inclusive development.

V.I Key Areas of CSR Initiatives for Inclusive Growth

Inclusive growth means broad-based growth, shared growth and pro-poor growth. The concept holds tremendous relevance in today's world of growing disparity. The growing disparity between shining 'India' and shrinking 'Bharat' has raised questions on government policy of inclusive growth. CSR is one such tool which can be considered as a mechanism towards sustainable inclusive growth. CSR programmes in areas like education, health, livelihood creation, skill development, and empowerment of disabled women are common practices adopted by companies in India. Almost all major companies in India have a CSR programme in areas like education, health, livelihood creation, skill development, and empowerment of the disabled and women. These include the Maharatna, Navratna and Miniratna public sector organizations along with private sectors such as Tata Group, Infosys, Mahindra and Mahindra, Bharti Enterprises, Coca-Cola India Pvt Ltd, Pepsico, ITC Welcome Group, Johnson & Johnson Ltd, NASSCOMM Foundation, Thermax Limited, Hero Honda and others.

To understand the role of corporate in sustainable inclusive growth through CSR, a framework is developed to map the inclusive growth parameters with CSR interventions.

- **Education and Skill Development:**
 - Investment in education and skill-building initiatives to empower marginalized communities.
 - Focus on creating employment opportunities through vocational training and capacity-building programs, especially in rural areas.
- **Healthcare Initiatives:**
 - CSR investments in healthcare infrastructure, medical research, and programs to provide healthcare to underserved populations.

- Public-private partnerships in areas such as maternal and child health, sanitation, and disease prevention.
- **Gender Equality and Empowerment:**
 - CSR programs aimed at empowering women through education, employment, entrepreneurship, and leadership programs.
 - Supporting women's health and safety programs, providing financial literacy and self-help groups.
- **Environment and Sustainability:**
 - Businesses have a critical role in promoting environmental sustainability by reducing their carbon footprint and investing in green technologies.
 - Protecting natural resources and contributing to climate action through sustainable agriculture, renewable energy, and conservation efforts.
- **Infrastructure Development:**
 - Building basic infrastructure such as roads, sanitation, drinking water, and affordable housing in underserved areas.
 - Creating models for sustainable rural development
- **Sustainable policies & Strategies:**
 - CSR policy in line with companies strategy
 - CSR practices benchmarking
- **Executive coaching and training:**
 - Leadership development
 - Team and Individual Coaching

V.II CSR Trend: Public Sector Undertaking Versus Non-Public Sector Undertaking in India

The business houses are earning profits by rendering their services to customers in society. In a way, they are also causing damage to the society and environment in several forms due to the inevitable nature of their business. The government alone cannot uplift the downtrodden people. Corporate houses and non-governmental organisations (NGOs) have to come forward to eradicate various social evils and play a vital role in societal development through activities such as providing quality education, extending healthcare facilities, reducing malnutrition, creating awareness on environment safety, drinking water facilities, sponsoring the sports events, participating in natural disaster management programmes,

ethical values promotion and enriching the Indian culture. The corporate houses have to come forward to play their part towards the development of the society. This contribution will be helpful to organisations to enhance their brand awareness and reputation in the market. Therefore, community development is a responsibility of the government, NGOs and business organisations as well.

Development Sector	Sector Wise-Year Wise Spending by Companies from 2024-15 to 2022-23								
	2014-15 (INR Cr.)	2015-16 (INR Cr.)	2016-17 (INR Cr.)	2017-18 (INR Cr.)	2018-19 (INR Cr.)	2019-20 (INR Cr.)	2020-21 (INR Cr.)	2021-22 (INR Cr.)	2022-23 (INR Cr.)
Education	2589.42	4057.45	4534.16	5763.45	6111.66	7179.51	6693.25	6557.13	10085.38
Environmental Sustainability	773.99	796.69	1082.63	1301.96	1368.27	1470.53	1030.16	2432.26	1959.96
Livelihood Enhancement Projects	280.17	393.38	518.49	832.4	907.98	1077.72	938.91	854.48	1654.39
Prime Minister's National Relief Fund	228.18	218.04	158.8	200.42	322.19	798.43	1698.38	1214.84	815.85
Conservation Of Natural Resources	44.6	49.85	119.09	228.14	173.55	160.6	92	273.82	580.37
Rural Development Projects	1059.35	1376.16	1572.87	1724.07	2434.17	2301.02	1850.71	1832.82	2005.37
Safe Drinking Water	103.95	180.16	160.12	220.87	228.23	253.4	203.13	182.54	246.36
Slum Area Development	101.14	14.1	51.49	39.16	51.06	42.94	88.95	58.29	93.84
Art And Culture	117.37	119.17	306.13	395.22	225.94	933.57	493.13	248.09	441.02
Socio-Economic Inequalities	39.04	77.97	148.01	155.95	167.92	214.88	149.81	164.85	154.01
Swachh Bharat Kosh	113.86	325.52	184.06	272.07	95.5	53.47	161.35	34.92	55.32
Training To Promote Sports	57.62	140.12	197	285.41	310.16	304	243.39	291.75	526.14
Women Empowerment	72.87	122.79	163.46	251.37	236.54	259.57	206	259.82	396.85
Armed Forces, Veterans, War Widows/ Dependants	4.76	11.14	37.86	29.09	90.18	62.06	84.05	47.21	62.27
Clean Ganga Fund	5.47	32.82	24.37	33.96	8.11	6.63	13.39	55.41	41.66
Gender Equality	55.21	73.85	72.6	24.01	51.86	82.93	43.83	104.63	119.83
Health Care	1847.74	2569.43	2503.91	2776.95	3617.15	4905.72	7325.83	7806.3	6830.41
Nec/ Not Mentioned	1338.4	1051.16	437.43	15.2	87.61	502.79	203.14	0.59	1.5
Agro-Forestry	18.12	57.85	45.48	66.79	64.75	67.38	20.9	34.27	65.07
Other Central Government Funds	277.1	334.35	419.99	292.73	731.06	932.16	1618.17	309.22	179.02
Poverty, Eradicating Hunger, Malnutrition	274.7	1252.08	614.65	811.2	1195.78	1159.71	1407.58	1894.08	1232.62
Sanitation	299.54	631.8	433.98	460.68	506.66	521.72	338.97	313.1	429.91
Senior Citizens Welfare	8.94	21.87	27.75	40.1	46.52	52.33	56.47	79.55	132.87
Setting Up Homes And Hostels For Women	8.74	29.28	62.22	70.58	57.01	48.5	44.52	100.81	48.53
Setting Up Orphanage	5.12	16.9	16.8	39.87	12.89	36.5	21.88	27.52	41.24
Special Education	41.43	125.84	165.33	140.01	186.13	196.88	209.24	190.51	305.57
Technology Incubators	4.74	26.34	25.4	16.94	32.1	53.5	62.62	8.57	1.38
Animal Welfare	17.29	66.67	78.71	63.52	98.33	106.12	193.55	168.59	315.98
Vocational Skills	277.07	344.4	379.7	546.46	798.36	1181.23	717.65	1033.84	1164.19

Source: Ministry of Corporate Affairs, Govt of India

The above table shows sector-wise and year-wise spending by companies on CSR practices. Sectors like Education, Health care, Environmental sustainability, Vocation skills, Prime Minister's National relief fund, Rural Development Projects, Poverty, Eradicating Hunger, Malnutrition and Livelihood Enhancement Projects have massive spending by companies from 2014-15 to 2022-23 as shown from the table. More particularly spending on Education and Health care has always been on the growth agenda for common people and businesses can contribute through their spending on these sectors. If we have to bring about inclusive growth in India, we need to focus on very basic issues like education, poverty, employment, health, agriculture and infrastructure. The government alone is not capable of achieving revival and inclusive growth. In 2014-15, a total 16055 number of Non-PSU spent Rs 7249.11 crore 493 PSU spent Rs 2816.82 crore and the total amount spent was Rs 10065.93 crore on CSR activities. In 2022-23, a total 24021 number of Non-PSU spent Rs 25891.15 crore 371 PSU spent Rs 4095.78 crore and the total amount spent was Rs 29986.93 crore on CSR activities.

It is clearly visible from line graph 1 that there is a continuous increase in spending by Private sector undertakings (NPSUs) over PSUs over the period from 2014 to 2022. From Graph-2 it is revealed that there is a continuous increase in in Education and Health care spending by companies over the period.

Source: Compiled by the authors

The following Table shows State wise expenditure as part of Corporate social responsibility by companies from 2014-15 to 2022-23. It is revealed from the table that in 2022-23 Maharashtra is the leading state when it comes to CSR spending, followed by Karnataka, Andhra Pradesh, Gujarat, Uttar Pradesh and Tamil Nadu. However states like Arunachal Pradesh, Goa, Bihar, and Punjab have spent very low amounts of expenditure on CSR initiatives for inclusive growth of the country.

State-wise CSR Expenditure from 2014-15 to 2022-23

States	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Andhra Pradesh	414.28	1276.73	745.24	575.07	665.97	710.23	719.81	656.05	954.65
Arunachal Pradesh	11.05	1.48	24.05	11.91	24.56	18.02	10.58	119.42	13.35
Assam	134.78	158.97	257.19	211.33	210	285	180.23	405.92	470.25
Bihar	36.69	123.8	100.84	106.17	137.95	110.48	89.89	165.97	235.37
Chhattisgarh	161.3	239.72	84.85	176.7	149.35	269.68	325.63	304.83	596.11
Delhi	237.44	455.17	460.71	579.37	750.85	830	724.59	1190.39	1483.72

Goa	27.11	28.15	36.25	53.77	46.77	43.91	41.92	45.43	58.16
Gujarat	313.41	547.94	865.81	967.97	1082.18	984.37	1461.6	1603.51	2008.41
Haryana	187.41	373.44	386.65	363.43	378.11	537.91	550.86	678.88	700.95
Himachal Pradesh	10.95	52.2	23.32	69.23	78.79	78.78	106.31	140.22	138.49
Jammu And Kashmir	38.48	107.8	42.97	50.77	36.44	25.27	35.56	50.36	71.22
Jharkhand	79.44	116.93	119.84	109.23	109.8	155.21	226.54	193.33	388.35
Karnataka	403.47	771.59	876.84	1145.79	1257.69	1448.16	1277.81	1836.86	1985.55
Kerala	68.23	145.03	133.84	219.73	354.78	298.56	290.67	239.5	351.6
Madhya Pradesh	141.85	171.58	161.39	163.92	243.55	220.46	375.51	426.9	656.42
Maharashtra	1445.92	2026.91	2420.35	2797.53	3147.72	3353.24	3464.81	5375.26	5497.3
Manipur	2.44	6.25	12.6	4.81	7.81	14.21	10.39	15.62	53.45
Meghalaya	3.53	5.59	9.88	11.18	16.54	17.65	17.63	19.63	21.73
Mizoram	1.03	1.07	0.46	1.28	0.11	0.25	0.97	6.94	10.99
Nagaland	1.11	0.95	0.53	1.81	2.12	5.1	3.57	12.46	13.57
Odisha	252.18	618.69	355.32	504.22	697.91	717.39	578.16	670.23	987.59
Punjab	55.61	69.14	75.05	112.36	166.85	189.44	158.46	184.48	247.57
Rajasthan	299.76	483.99	353.75	443.35	595.49	734.12	670	709.85	1102.37
Sikkim	1.19	1.45	6.71	7	5.87	10.99	17.28	28.24	36.18
Tamil Nadu	539.64	588.22	548.28	669.65	877.08	1072.26	1174.07	1428.84	1562.48
Telangana	101.96	263.6	256.39	380.57	428.06	445.8	627.71	681.46	1007.39
Tripura	1.33	1.39	1.25	1.88	23.06	9.4	9.29	15.91	19.26
Uttar Pradesh	148.9	416.99	321.63	435.21	521.32	577.98	907.32	1338.23	1152.57
Uttarakhand	74.79	73.11	102.37	85.79	172.31	124.7	160.58	228.08	301.11
West Bengal	194.86	412.14	276.59	338.32	382.23	423.85	471.48	566.83	762.29

Source: Ministry of Corporate Affairs, Govt of India

V.III Few Case Studies of CSR for Inclusive Growth in India:

A few cases have been discussed showing the private sector CSR initiatives of organizations bringing in inclusive growth.

- **Tata Group:**
 - Known for its long-standing commitment to CSR, Tata Group invests in education, healthcare, rural development, and sustainability initiatives.
 - Tata's rural health initiatives provide medical services to underserved areas, contributing significantly to health equity.
- **Reliance Industries:**
 - Initiatives like the Reliance Foundation focus on improving healthcare, education, rural development, and sustainable livelihoods.

- The company's skill development programs help empower rural youth and women with employable skills.
- **Infosys Foundation:**
 - Focuses on education, healthcare, rural development, and disaster relief.
 - The foundation's education initiatives reach underserved children, providing learning opportunities through digital literacy programs.
- **Mahindra Group:**
 - Mahindra's "Rise for Good" initiative promotes inclusive growth by investing in women's empowerment, sustainable agriculture, and education for underprivileged communities.
- **FabIndia:**
- A well-known retail brand that sells various handmade products through its stores across India and overseas.
- Best-known urban middle-class brand in India. Though they are best known for home linen and garments, they have expanded into organic food, personal care products, furniture and jewellery.
- This company started as an export house, exporting Indian hand-woven fabric to the developed markets in the West.
- **ITC e-Choupal:**
 - Introduced by ITC in June 2000 as an initiative to improve the supply chain by linking directly with farmers for procurement.
 - Designed to play the role of a social gathering place for the exchange of information as well as a place for e-commerce transactions.
 - Started initially as a way to modify the procurement process for crops like soy and wheat, has now turned into a lucrative distribution and product development channel for ITC.

V.IV Challenges in Implementing CSR for Inclusive Growth:

The main factor driving the country's rapid adoption of corporate social responsibility is the fact that India has one of the fastest-growing economies, and socioeconomic issues like poverty, illiteracy, a lack of access to healthcare, etc. are still widespread and the government has little resources to address these issues. This has made it possible for many companies to support the development of society. Here are some major challenges in implementing Corporate Social Responsibility (CSR) for inclusive growth:

❖ **Lack of Awareness and Understanding of CSR**

- Many companies, especially small and medium enterprises (SMEs), lack a clear understanding of CSR beyond philanthropy. This limits their ability to design effective, long-term CSR strategies aimed at inclusive growth.
- Businesses often view CSR as a regulatory burden rather than an opportunity to contribute to societal development.
- **Solution:**
- Promote CSR awareness programs and capacity-building initiatives to help companies align CSR with business goals and social impact.

❖ **Inadequate Legal and Policy Frameworks**

- CSR regulations in some countries are either too rigid or too vague, making it difficult for companies to comply effectively.
- Governments may lack robust mechanisms to monitor and evaluate the impact of CSR initiatives.
- **Solution:**
- Strengthen CSR policies with clear guidelines and measurable outcomes to ensure companies focus on inclusive growth.

❖ **Lack of Stakeholder Engagement**

- Companies often fail to engage key stakeholders, such as local communities, NGOs, and government bodies, in the planning and execution of CSR projects.
- This leads to misaligned CSR activities that do not address the real needs of marginalized communities.
- **Solution:**
- Adopt participatory approaches by involving stakeholders in the planning, implementation, and evaluation of CSR projects.

❖ **Inconsistent Commitment and Short-Term Focus**

- Many companies engage in CSR as a one-off activity, focusing on short-term gains rather than long-term societal benefits.
- Inconsistent CSR efforts reduce the overall impact on inclusive growth.
- **Solution:**
- Develop long-term CSR strategies that integrate sustainable development goals (SDGs) and focus on creating lasting social impact.

❖ **Resource Constraints**

- Limited financial, human, and technical resources can hinder companies, particularly SMEs, from implementing impactful CSR programs.
- Companies may also struggle to balance profit-making with investing in CSR for inclusive growth.
- **Solution:**
- Encourage partnerships with governments, NGOs, and other businesses to share resources and enhance the impact of CSR initiatives.

❖ **Lack of Measurement and Evaluation Mechanisms**

- Many companies lack the tools and frameworks to measure the social impact of their CSR activities.
- Without proper evaluation, it becomes difficult to gauge the effectiveness of CSR efforts in promoting inclusive growth.
- **Solution:**
- Implement impact assessment frameworks and key performance indicators (KPIs) to monitor progress and ensure accountability.

❖ **Corruption and Mismanagement**

- Corruption at various levels can divert CSR funds from reaching the intended beneficiaries.
- Mismanagement of CSR projects can result in poor outcomes and loss of trust among stakeholders.
- **Solution:**
- Ensure transparency and accountability through regular audits and public disclosure of CSR activities and outcomes.

❖ **Lack of Skilled Professionals**

- Implementing effective CSR programs requires professionals with expertise in social work, community engagement, and sustainable development.
- Many companies lack such expertise in-house.
- **Solution:**
- Invest in training programs and hire CSR specialists to design and implement impactful projects.

VII. Summary and Conclusion:

Corporate Social Responsibility (CSR) plays a pivotal role in promoting inclusive growth in India, where social disparities and developmental challenges persist. Indian companies are increasingly aligning their CSR initiatives with the country's development goals, contributing to improved education, healthcare, empowerment, and infrastructure. While challenges remain, effective CSR practices can significantly bridge the gap between economic growth and social equity, fostering a more inclusive and sustainable future for all segments of society. CSR in India is not a new concept; companies have been practising it in a voluntary spirit with a philanthropic approach. Not all companies were practising it in a structured manner with many practising it with the objectives of gaining publicity, tax benefits or goodwill generation. CSR in its current form is in its nascent stage and hence study like this will help organisations to understand and learn from the CSR practices of the leading companies of the country. The CSR analysis reflects on the trust areas of education being the most prominent area where all the companies are working, initiatives in the area of environment and water need more emphasis and the study highlights the need for innovative, sustainable and scalable projects.

During the study, it was found that companies design strategies to incorporate CSR in their operations. CSR has had a positive effect on education, infrastructure, health, livelihood and environmental development. However, CSR is a continuous and evolving process. Corporations have to work continuously in the long run to help in the development of the country. CSR has been adopted across the globe as a concept that determines the success and failure of a company. In India, since the companies are struggling to establish their base and earn profits, it is quite challenging for them to spend on CSR.

CSR should not be restricted to corporates alone. Even universities, institutes and other businesses which are outside the purview of CSR rules should do CSR. Every industry exploits resources and depends on stakeholders in one way or another, so it is the responsibility of all of us to repay our debts to society. This nation belongs to all and therefore it is the duty of all to contribute towards its development.

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THE ROLE OF DIGITAL LITERACY IN TRANSFORMING LIVELIHOODS AND SOCIAL EQUITY IN RURAL ODISHA: INSIGHTS FROM GLOBAL AND NATIONAL STUDIES

Mallha Tudu, Dr. Anita Pareek

Introduction

Global digital literacy plays an essential role in building equitable socioeconomic development and creating equal opportunities, along with technological development. Digital literacy transforms livelihoods for the development of the Indian socio-economic sector. With increased access to technology, people improve employability, acquire new skills, and access better educational material through digital literacy. This closes the gap between urban and rural regions, creating opportunities for marginalized groups to access knowledge. Digital literacy is described in the modern world as a critical set of skills a person needs. This, therefore, includes technical skills, media and information literacy,

and data literacy, among other skills. It also subsumes topics such as cybersecurity, online safety, and responsible communication. Developing digital literacy can encourage economic growth, innovation, and improvement in the standard of living for people. This is the path to inclusive growth, whereby everyone benefits from the digital revolution and the country's development. According to the "Digital Literacy Mission of India's Government," digital literacy refers to the ability and capacity of people and communities to understand and engage in digital technologies in sensible ways. It includes information fluency, media fluency, computing skills, and critical thinking (Reddy et al., 2020; Shabani and Keshavarz, 2022). It, thus goes in tandem with the focus of UNCTAD to stretch beyond possessing technical knowledge to facilitate other dimensions of existence and employment in a digital society. In addition, further empowerment of women equips them with tools to take charge of their lives, good choices, and have full involvement in societal, political, as well as economic factors (Mehra, 1997; Reshi and Sudha, 2022) Information and communication technology plays an important role in society. It has immensely contributed to changes for betterment in the socio-economic development of a state, including increased productivity, employment, and greater accessibility towards better standards of living, besides information creation, storage, processing, distribution, and exchange. In itself, the study articulates the fluid character of digital literacy for livelihoods. The study also addresses rather more fundamental rural social equity, exploring challenges and barriers prevalent now that emerge while trying to access developments on socio-economic technologies towards progress regarding inequalities amongst marginalised societies within rural Odisha.

Methodology

The databases used for this search were Emerald Insight, Google Scholar, Scopus, and Taylor & Francis. Using these keywords, "Digital literacy," "Rural livelihoods," and "Social equity," it only obtained articles between 2014-2024. Using the keyword, it got many relevant articles on digital literacy. However, narrowing down the topic to this selected relevant article has been done.

An article highly relevant to the major field of research from the Emerald Insight has been chosen. Thirteen articles have been selected strongly relevant to the area of study from Google Scholar. Two articles have been acquired from the Scopus database and one from Taylor & Francis, respectively, and no repetition of contents was seen. Finally, seventeen articles were finalized for close analyses in this review work. Table 1 summarizes the search conducted for the articles and Figure. 1 is a presentation of the review methodology. The redundant articles in the selected databases are removed. Articles on digital literacy in livelihoods and wide social equity in rural areas have been selected for this study.

Figure. 2 provides a year-wise analysis of the papers. This reveals that the concept has undergone significant growth in papers since 2020 concerning digital literacy to economic empowerment which depicts that it is catching up fast, especially over the last ten years. The pool of selected articles extracted is relevant to this study.

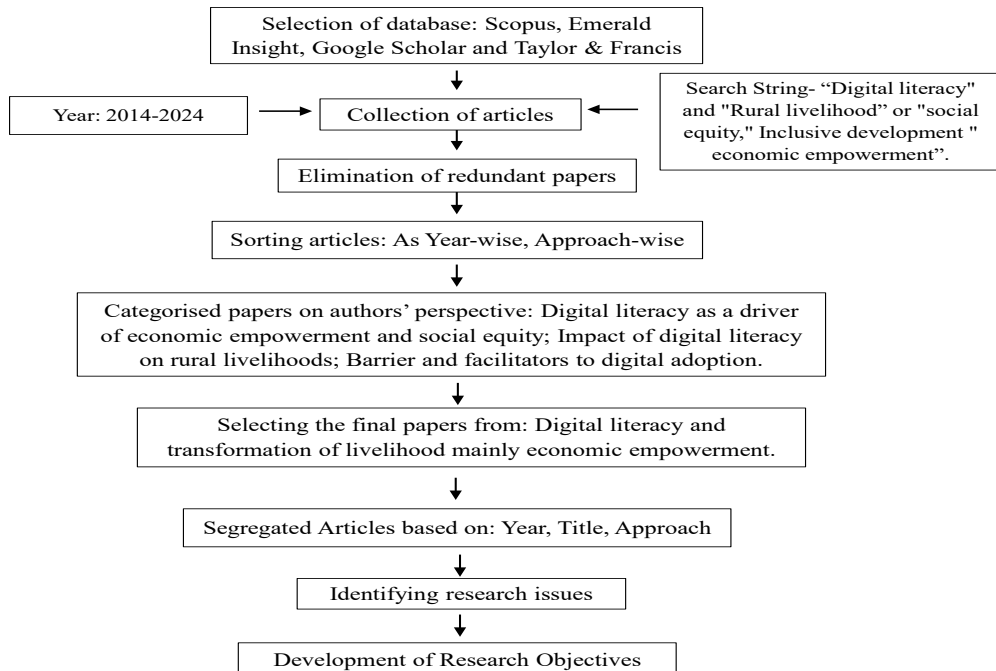
Table 1: Database used for Review of Literature

Selected Database	Number of articles reviewed	Frequency
Emerald Insight	1	6%
Google Scholar	13	76%
Scopus	2	12%
Taylor & Francis	1	6%
Total	17	100

Source: The above database was used for the Review of Literature compiled by the author.

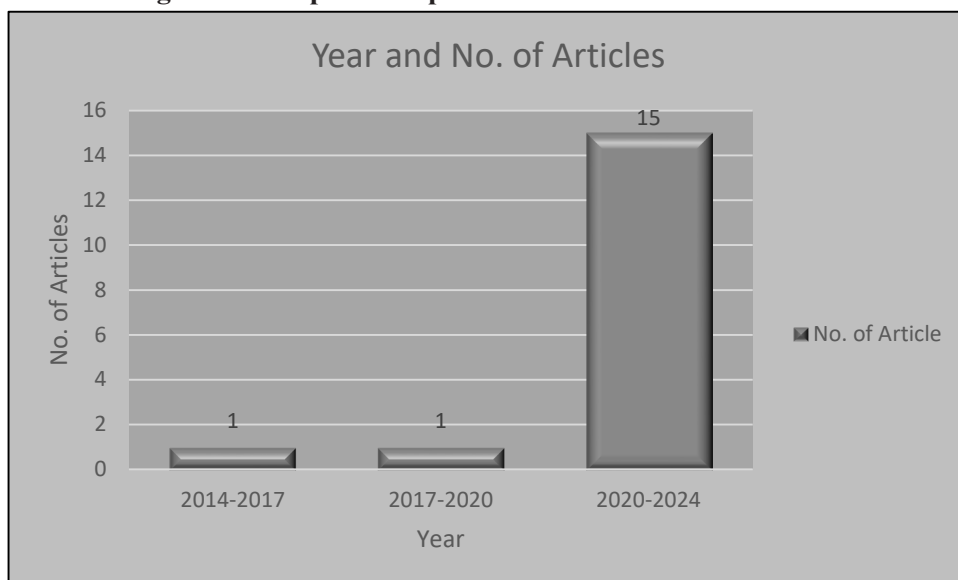
Decimal frequencies were rounded off to whole numbers. A few minor adjustments had to be made. The “Emerald Insight” and “Taylor & Francis” frequencies needed to be rounded from 5.88% up to 6% as such that the figures are very accurate and similar to one another. A minuscule decrease occurred when taking the “Google Scholar” frequency to 76% from 76.47% and 11.76% was rounded out to 12% of the Scopus database to sum up to 100%. Percentages are one of how it becomes possible to present the information without losing the essence of the whole data.

Figure 1: Research Methodology for Selection of Articles



The flow chart of the Article selection method adopted from (Pareek & Mangaraj, 2021)

Figure 2: Graphical Representation of Articles Year-wise



Source: Graphical Representation of Articles Year-wise compiled by author

Table 2: Type and Focus of Research Papers

Sl. No.	Authors	Title of the Articles	Approach			Focus		
			F/T	S	R	1	2	3
1	Correa & Pavez, 2016)	“Digital inclusion in rural areas: a qualitative exploration of challenges faced by people from isolated communities”		↑		↑	↑	↑
2	(Vij, 2018)	“Digital India: A vision to empower rural India”		↑		↑	↑	↑
3	(Pandey, 2023)	“Empowering rural communities through digital literacy initiatives in India”		↑		↑		
4	(Singh Bajwa, 2023)	“Challenges and opportunities of promoting digital media literacy in rural India”		↑			↑	
5	(Judijanto et al., 2024)	“A cross-cultural analysis of the socioeconomic impacts of digital literacy initiatives in primary education: a comparative study of Indonesia, Malaysia, and Singapore”		↑		↑		
6	(Asmayawati et al., 2024)	“Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context”		↑			↑	

7	(Puspita,2024)	“Impact of digital literacy programs on information access in rural African communities in Indonesia”		↑			↑	
8	(Chima Abimbola Eden et al., 2024)	“Promoting digital literacy and social equity in education: lessons from successful initiatives.”			↑	↑		
9	(Tripathi et al.,2024)	“Impact of digital literacy programs on empowerment of rural communities: case studies from developing regions”		↑			↑	
10	(Zhou et al., 2024)	“Does digital literacy reduce the risk of returning to poverty? Evidence from China”		↑			↑	
11	(Bansal & Choudhary, 2024)	“Fostering digital equity: evaluating impact of digital literacy training on internet outcomes in rural marginalised communities in India”		↑		↑	↑	↑
12	(Prasastiningtyas et al., 2024)	“Digital literacy initiatives empowering marginalized communities through technology integration”		↑				↑
13	Mosobalaje et al., (2024)	“Digital literacy: a catalyst for inclusive economic empowerment of marginalized communities”		↑		↑		
14	(Debbarma & Chinnadurai, 2023)	“Empowering women through digital literacy and access to ICT in Tripura”		↑			↑	↑
15	(Aslam & Abidi, 2024)	“Digital literacy and women’s empowerment: bridging the gender gap in technology for achieving sustainable development goals (SDGs)”		↑		↑		
16	(Kumar et al., 2024)	“Digital literacy: a pathway toward empowering rural women”		↑		↑		↑
17	(Arif et al., 2024)	“Digital literacy and inclusive growth: examining digital empowerment of female students in Lahore”		↑		↑		

List of Abbreviations which used:

F / T - Framework

S - Survey / Empirical study

R - Review Paper / Comprehensive summary of article w. r. t. Author, Title, Approach

Focus: 1 Digital literacy as a driver of economic empowerment and social equity.

Focus: 2 Impact of digital literacy on rural livelihoods.

Focus: 3 Barriers and facilitators to digital adoption.

Source: The above tables compiled by the author

Table 3: Issues of Research and Questions

Phase	Representative Paper	Issue of Research	Research question
Digital literacy as a driver of economic empowerment and social equity (focus 1)	Correa & Pavez, 2016); (Vij, 2018); (Pandey, 2023); (Chima Abimbola Eden et al., 2024); Mosobalaje et al., (2024); (Aslam & Abidi, 2024); (Arif et al., 2024); (Judijanto et al.,2024) ;(Kumar et al., 2024);	R11: There is a limited analysis comparing urban and rural communities to determine how digital literacy initiatives differ in impact and outcomes.	RQ1: Are there any impacts of digital literacy initiatives that differ between urban and rural communities?
Impact of digital literacy on rural livelihoods (Focus 2)	Correa & Pavez, 2016); (Vij, 2018); (Singh Bajwa, 2023) ;(Tripathi et al.,2024); (Zhou et al., 2024); (Puspita,2024); (Asmayawati et al., 2024);	R12: lack of focus on specific sectors such as agriculture, small-scale industries, or traditional crafts and how digital literacy enhances these livelihoods.	RQ2: Does digital literacy enhance productivity and growth in specific sectors such as agriculture, small-scale industries, or traditional crafts?
Barriers and facilitators to digital adoption (focus 3)	Correa & Pavez, 2016); (Vij, 2018); (Bansal & Choudhary, 2024) ;(Debbarma & Chinnadurai, 2023); (Prasastiningtyas et al., 2024); (Kumar et al., 2024);	There is a lack of focus on the cultural and behavioural barriers that prevent communities from adopting digital literacy despite available resources.	RQ3: Is there are cultural and behavioural barriers hindering digital literacy adoption despite available resources?

Source: Issues of Research and Questions Compiled by author

Table 4: Objectives of Research

Sl. No	Research Question	Objectives of the Research
1	QR1	Digital literacy as a driver of economic empowerment and social equity.
2	QR2	Impact of digital literacy on rural livelihoods.
3	QR3	Barriers and facilitators to digital adoption.

Source: Objective of research table compiled by author

Review of Literature

The review is divided into three phases namely:

Digital Literacy as a Driver of Economic Empowerment and Social Equity Between Urban and Rural.

Digital literacy is one of the most important facilitators of economic empowerment and social equity, especially in redressing imbalances between urban and rural populations. Thus, improvements in access to information and technology could significantly enhance economic prospects and promote greater social inclusion for disadvantaged groups. According to Correa and Pavez (2016), many individual and contextual factors impact digital inclusion. Such as geographically remote areas that shape views about technology; the elderly population, which restricts access to social interactions; and economic activities, that determine the direction of Internet usage. In rural environments, the absence of youth is a significant factor that affects the uptake of technologies; whereas interacting with technology is associated with work-related requirements. They argue that effective policies and training should focus on the community's issues rather than focusing narrowly on the technology itself. As highlighted by Vij (2028), since India gained its independence, the country has achieved very modest progress on the rural fronts. The author indicates that Digital India launched on July 1, 2015, was meant to address this factor of the narrow digital divide by the existing gap between city and town. The goal is achieved in the sense it will bridge the gap where improvements will be made and promoted by internet access combined with creating digital literacy at rural fronts.

As noted by (Lewis, 1954; Todaro, 1996), developing countries are characterized by an urban-rural dual structure and income gap between the urban and rural population. The high-income gap between the urban and rural sectors threatens long-term social cohesion and sustainable growth of the national economy, according to (Kibriya, Bessler, & Price, 2019). The urban-rural income gap mitigation is a global concern. Governments in developing countries seek answers in areas such as organizations, technology, education, finance, and institutions (Shin, 2012). Over the last three decades since the reform and opening up, the largest developing nation in the world, China has made incredible economic growth. However, this growth is born with many structural distortions, among them, between urban and rural development (Jiang et al., 2011; Shin, 2016). By such outstanding rural e-commerce practice by Zhejiang, one can study the relation of correlation that exists between the growth of e-commerce and income inequality between the urban and rural regions. Also, a lack of rural e-commerce development can serve as guidance and innovative ideas to develop

e-commerce for the developing countries' backward regions (Zeng, Guo, Yao, & Huang, 2019). This has been even more evident in developing nations, showing clear disparities between urban and rural areas regarding Internet penetration. This should raise the gap between urban and rural employment, income, and other economic factors, mainly between low-income families in urban and rural areas (Prieger, 2013). As Gao, Zang, and Sun (2018) stated, the Internet facilitates resource sharing between urban and rural areas; it reduces the gap in income between regions. As (Dimaggio, Hargittai, Celeste, and Shafer, 2004) "the first-level digital divide" is "the gap of information technology between urban and rural areas has increased". The Internet and other digital tools in agriculture have been proven to enhance positive significant impacts on market sales of agricultural products, their price, and farmer welfare (Burga & Barreto, 2014; Khanal & Mishra, 2016; Shimamoto, Yamada, & Gummert, 2015). There is a huge demand for sustained investment in digital literacy and training programs to increase access of rural populations to ICTs (Nedungadi et al., 2018; Saleminink et al., 2017).

Digital Literacy's Role in Sector-Specific Productivity Growth.

Digital literacy contributes a lot to the growth in productivity in those sectors with new technologies. The greater the reliance on digital instruments, the greater need employees have to optimize their usage of these technologies to enhance productivity. In the modern information economy, digital literacy has huge potential to enhance worker capabilities, competencies, and overall performance (Abdulkareem & Ramli, 2021a). Integrating digital skills in education systems will be necessary for preparing the youth for work as they acquire the needed competencies to perform and succeed in a digital economy (Khan et al., 2022). The writers emphasise how workers with technological abilities can access employment opportunities and workflows within the digital economy that are more productive. Van Deursen and Van Dijk (2016) conducted a survey study of office workers. Productive mindsets were associated with proficient digital skills. Digital literacy was also found to be a significant deterrent of increased workforce engagement in OECD member nations by Chetty et al. (2017). providing more evidence of how ICT-led innovation affects productivity development (Gruen, 2001). Despite the development of several novel measurement techniques in these fields (Triplett and Bosworth, 2000), Investment in advanced assets, overall productive efficiency increases through reconstruction and technology adoption and efficiency improvements in the industry-generating technology are the three ways that ICT might impact economic growth, according to Qiang et al. (2003). A study in Nigeria revealed that digital literacy is positive for productivity among employees in the local government, thus necessitating structured digital skills development

programs (Oladimeji et al., 2024). Research studies on PT Telkom Indonesia showed that the workers' proficiency in digital communication tools greatly improves the productivity of their work. This is very essential for any digital transformation endeavour (Pertiwi & Lestari, 2024). Moreover, librarians who possess digital literacy can successfully navigate new technologies. This will be very useful for access to digital resources and enhancing digital inclusion (Diseiye et al., 2023). In the Netherlands, research has shown that firms with a higher intensity of digital skills exhibit productivity growth, especially in the service sector Borowiecki et al., 2021). Digital literacy is now more and more seen as becoming a necessity for employment, such as in the competitive fabric industry, where it is directly correlated with job readiness and successful performance (Pila et al., 2024).

Cultural and Behavioural Barriers to Digital Literacy Adoption.

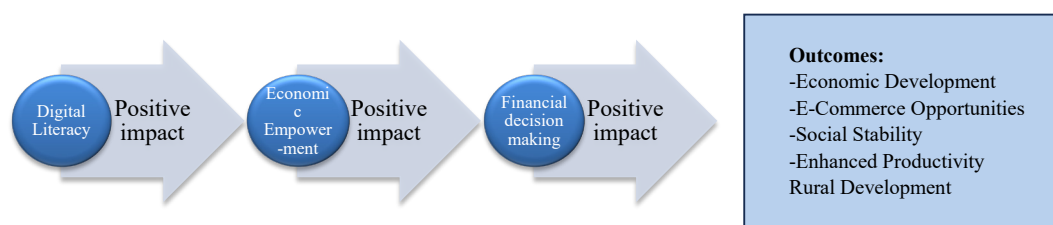
There are many cultural and behavioural barriers that make digital literacy hard for different groups to use technology well. In most cases, these barriers have a close association with social norms, accessibility of resources, and feelings concerning the utilization of technology. Understanding these barriers is necessary when developing ways of enhancing digital literacy. In rural Odisha, many have low reading and writing skills, which affects how they use digital technology (Dutta & Das, 2016).

A study revealed that more than 50% of the population in the Mayurbhanj district lacks digital financial ability. This is part of a broader trend of lacking digital engagement skills (Mohakud & Biswal, 2024). Often people are exposed to common languages such as Hindi and English, which restricts access to digital content and services. In such a scenario, rural communities are excluded from participating in digital literacy programs (Dutta & Das, 2016). This very significantly calls for adapting local content and communication plans to bridge the language gap. Money problems lead to difficulty in affording the necessary important technology and internet tools for digital skills (Nedungadi et al., 2018) (Sahu & Kalet, 2024). Social and economic inequalities in deprived communities increase digital inequality while making equal access to digital resources and opportunities infeasible (Sahu & Kalet, 2024). Regional differences in gender norms, community structures, and attitudes toward technology can all have a significant impact on the cultural elements driving ICT adoption (Gefen & Straub, 1997; Mumtaz, 2000). The efficient use of ICT for more complex uses, such as e-learning or e-government services, might be hampered by the absence of digital literacy training programs and instructional materials in local languages (Chohan & Hu, 2022; Nawafleh, 2018; Nengomasha & Shuumbili, 2022). However, access, cost, and digital skills barriers may prevent these services from providing their full potential (Eshet,

2004; Jones & Flannigan, 2006; Martin, 2008). Multiple studies have shown that digital literacy and productivity outcomes are positively correlated in various settings. Studies conducted in educational contexts by Miller and Bartlett (2012). Quantifying output and productivity in many industries that heavily rely on ICT is challenging. These measuring issues could obscure Actual productivity improvements (Gullickson and Harper, 1999).

Theoretical Model

The model based on the reviews the authors have proposed with a theoretical model as follows:



Source: Compiled by authors based on literature reviews

Findings

- Digital literacy decreases urban-rural disparities by closing the digital divide and increasing opportunities for social inclusion among underserved groups.
- Digital literacy programs are important in increasing rural access to ICTs and improving economic opportunities.
- Digital tools in agriculture improve market access and incomes, foster farmer welfare, and reduce urban-rural income inequalities.
- Digital literacy is very important in preparation for work in a digital economy; it creates new jobs and increases the capabilities of the workforce.

Conclusion

This study highlights that digital knowledge serves a major function in furthering the advancement toward economic empowerment of people, betterment in living standards, and social equity in the rural areas of Odisha. Digital literacy acts as a tool for reducing inequality, improving resource access, and enhancing further participation in socio-economic life. Providing the necessary skills for people in digital competence elevates individual as well as sector productivity by making the community resilient and able to withstand sustainable development. Despite the promises it holds in many areas, cultural and infrastructure barriers and limited accessibility hinder its more extensive use in

disadvantaged communities. Interventions of targeted programs, access to accessible technology, and culturally competent programs can bridge these cultural and infrastructure barriers and translate into more inclusive forms of development. Several benefits flow from the implementation of digital literacy integration with stakeholders – policymakers, educators, NGOs, and private sectors. For instance, policymakers can realize their objectives on sustainable development, a business can unlock new markets, educators can innovate in teaching, and NGOs can amplify impacts through digital tools. Such collaboration can only lead to a robust ecosystem that will drive economic transformation and social transformation. Focusing on rural Odisha, the study cannot be generalized to other regions where the socio-cultural and economic contexts are different. Moreover, there is very little elaboration on the long-term effects of digital literacy initiatives or changes like digital technologies over time. Such future studies should expand their area of consideration to include cross-regional comparative analysis, with a deeper analysis of how the interventions have long-term implications and influence the impact emerging technologies, such as AI and blockchain, have upon the evolution of digital literacy. This will also entail stakeholder-specific strategies to promote digital adoption and the development of equitable digital ecosystems, which will greatly contribute to policy and program development.

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THE IMPACT OF ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) FACTORS ON PORTFOLIO PERFORMANCE AND RISK

Rasmita Panda

1.0 Introduction

In today's financial landscape, investors face an increasingly complex decision-making process as they seek to balance profitability with societal and environmental considerations. The integration of Environmental, Social, and Governance (ESG) factors into investment strategies has emerged as a pivotal approach to aligning financial goals with broader social and environmental objectives. Understanding the nuanced relationship between ESG factors and portfolio performance and risk is paramount for investors navigating these interconnected realms.

1.1 Background of the study

Environmental Factors:

The environmental dimension encompasses factors such as carbon emissions, resource depletion, and climate change resilience. Investments in companies with robust environmental practices not only mitigate environmental risks but also position portfolios to capitalize on emerging opportunities in renewable energy, sustainable infrastructure, and efficient resource management. Assessing the environmental footprint of investments provides insights into long-term sustainability and resilience against regulatory changes and physical risks associated with climate-related events. Environmental factors refer to elements of the natural world and their interactions that affect human societies and ecosystems. These factors encompass a wide range of issues, including:

Climate Change: The alteration in global or regional climate patterns, attributed largely to human activities such as greenhouse gas emissions from burning fossil fuels and deforestation.

Biodiversity Loss: The decline in the variety and abundance of living species and ecosystems due to habitat destruction, pollution, invasive species, and climate change.

Air and Water Pollution: Contamination of air, water bodies, and soil by harmful substances poses risks to human health, ecosystem integrity, and biodiversity.

Resource Depletion: The unsustainable extraction and consumption of natural resources such as minerals, water, and forests, leading to depletion and degradation of ecosystems.

Agricultural Production:

The environment provides the natural resources necessary for agricultural production, including fertile soil, water, sunlight, and a stable climate. Changes in environmental conditions such as temperature fluctuations, precipitation patterns, and extreme weather events can significantly affect crop yields and livestock productivity. For instance, droughts, floods, and heatwaves can lead to crop failures, reduced livestock fodder availability, and decreased agricultural productivity, thereby compromising food security.

Biodiversity and Ecosystem Services:

Biodiversity and healthy ecosystems play a crucial role in supporting agricultural production and food security. Ecosystem services such as pollination, soil fertility, water purification, and pest control contribute directly or indirectly to agricultural productivity. Loss of biodiversity, habitat destruction, and degradation of ecosystems due to factors like deforestation, urbanization, and pollution can undermine these essential services, thereby reducing agricultural yields and exacerbating food insecurity.

Water Resources:

Access to clean water is vital for agricultural irrigation, livestock watering, and food processing, all of which are critical components of food production systems. However, water scarcity, pollution, and inefficient water management practices can threaten water availability for agricultural purposes, leading to reduced crop yields and compromised food security, particularly in water-stressed regions.

Climate Change:

Climate change poses significant challenges to global food security by altering temperature and precipitation patterns, increasing the frequency and intensity of extreme weather events, and exacerbating environmental stresses. Rising temperatures, changing rainfall patterns, and prolonged droughts can disrupt agricultural activities, decrease crop yields, and contribute to food shortages, especially in vulnerable regions already facing poverty and resource constraints.

Land Degradation:

Degradation of arable land through processes such as soil erosion, desertification, salinization, and deforestation poses a significant threat to agricultural productivity and food security. Land degradation reduces the availability of fertile soil for crop cultivation, compromises soil health and nutrient content, and diminishes the resilience of agricultural systems to environmental stresses, thereby jeopardizing food production and livelihoods.

Sustainable Agriculture:

Embracing sustainable agricultural practices that promote environmental stewardship, biodiversity conservation, and resource efficiency is essential for enhancing food security while safeguarding the environment. Sustainable agriculture approaches such as agroecology, conservation agriculture, and organic farming emphasize the use of ecological principles to optimize yields, improve resilience to environmental shocks, and minimize negative environmental impacts, thereby fostering long-term food security and environmental sustainability. The relationship between the environment and regulation is pivotal in ensuring the sustainable management of natural resources, pollution control, and the protection of ecosystems. Here's an exploration of how the environment and regulation intersect:

Environmental Protection:

Regulation plays a critical role in safeguarding the environment by establishing standards, guidelines, and policies aimed at preventing pollution, conserving natural resources, and mitigating environmental impacts. Environmental regulations cover various sectors, including industry, transportation, energy, agriculture, and waste management, to address diverse environmental issues such as air and water quality, biodiversity conservation, climate change mitigation, and land use planning.

Pollution Control:

Environmental regulations often focus on controlling and reducing pollution emissions from industrial activities, transportation, and other sources to minimize adverse impacts on air, water, and soil quality. Regulatory measures may include emission standards, pollution permits, waste management requirements, and pollution prevention strategies aimed at curbing pollutants such as greenhouse gases, particulate matter, toxic chemicals, and nutrient runoff.

Natural Resource Management:

Regulations governing natural resource management aim to sustainably manage and conserve renewable resources such as forests, fisheries, wildlife, and water bodies while minimizing degradation and depletion. Regulatory frameworks may include regulations for sustainable logging practices, fisheries management plans, protected area designations, and watershed management strategies to ensure the long-term viability of ecosystems and biodiversity.

Climate Change Mitigation:

Environmental regulations play a crucial role in addressing climate change by setting targets, incentives, and policies to reduce greenhouse gas emissions and transition to low-carbon energy sources. Regulatory mechanisms may include carbon pricing mechanisms (e.g., carbon taxes, cap-and-trade systems), renewable energy mandates, energy efficiency standards, and emissions reduction targets aimed at mitigating climate change impacts and promoting climate resilience.

Land Use Planning and Conservation:

Regulatory frameworks for land use planning and conservation aim to balance economic development with environmental conservation by guiding land use decisions, zoning regulations, and development permits to minimize habitat destruction, urban sprawl, and ecosystem fragmentation. Land use regulations may include conservation easements, protected area designations, zoning ordinances, and environmental impact assessments to preserve ecologically sensitive areas and biodiversity hotspots.

Compliance and Enforcement:

Effective environmental regulation relies on robust compliance monitoring and enforcement mechanisms to ensure that regulatory requirements are adhered to and violations are addressed promptly. Regulatory agencies, such as environmental protection agencies and regulatory commissions, are tasked with overseeing compliance, conducting inspections, issuing permits, and imposing penalties or corrective measures for non-compliance to deter environmental violations and promote accountability. Environmental regulation plays a critical role in protecting the environment, promoting sustainable development, and addressing environmental challenges such as pollution, natural resource depletion, climate change, and habitat destruction. By establishing clear standards, incentives, and enforcement mechanisms, regulations help to guide human activities towards more sustainable practices, safeguarding the health and integrity of ecosystems and ensuring the well-being of present and future generations.

Environmental Risks:

Environmental risks encompass a range of factors, including climate change, resource depletion, pollution, and regulatory changes, which can pose challenges to businesses and industries. Companies operating in sectors vulnerable to environmental risks, such as fossil fuels, mining, agriculture, and manufacturing, may face increased scrutiny, regulatory compliance costs, reputational damage, and operational disruptions. Environmental risks

can impact financial performance through reduced profitability, increased costs, impaired assets, and legal liabilities, thereby affecting the value of investments in affected companies.

Regulatory Changes:

Environmental regulations and policies aimed at mitigating environmental impacts, promoting sustainability, and addressing climate change can have profound implications for businesses and industries. Regulatory changes, such as carbon pricing mechanisms, emission standards, renewable energy mandates, and environmental taxes, can create opportunities for companies that embrace clean technologies, energy efficiency, and sustainable practices while posing challenges for those reliant on carbon-intensive or environmentally harmful activities. Anticipating and adapting to regulatory changes is crucial for investors to mitigate regulatory risks and capitalize on emerging opportunities in environmentally sustainable sectors.

Transition Risks:

Transition risks refer to the financial risks associated with the transition to a low-carbon economy and the shift towards sustainable practices. Companies that fail to adapt to changing market dynamics, consumer preferences, and regulatory requirements may face stranded assets, impaired investments, and declining competitiveness in the transition to a greener economy. Transition risks can manifest through changes in market demand, technological innovation, resource scarcity, and shifts in investor sentiment towards sustainable investing, impacting portfolio performance and risk.

Physical Risks:

Physical risks stem from the direct impacts of climate change, extreme weather events, natural disasters, and environmental degradation on businesses, infrastructure, and supply chains. Companies with exposure to physical risks, such as coastal properties, agricultural assets, and critical infrastructure, may experience property damage, supply chain disruptions, production losses, and increased insurance costs, affecting financial performance and investment returns. Assessing and managing physical risks is essential for investors to protect portfolios from climate-related shocks and build resilience against environmental hazards.

1.2 SDGs (Sustainable Development Goals):

The Sustainable Development Goals (SDGs) are a set of 17 global goals adopted by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development. These goals provide a universal framework for addressing pressing global challenges while promoting

sustainable development across economic, social, and environmental dimensions. The SDGs encompass a broad spectrum of objectives, including:

- **No Poverty**
- **Zero Hunger**
- **Good Health and Well-being**
- **Quality Education**
- **Gender Equality**
- **Clean Water and Sanitation**
- **Affordable and Clean Energy**
- **Decent Work and Economic Growth**
- **Industry, Innovation, and Infrastructure**
- **Reduced Inequality**
- **Sustainable Cities and Communities**
- **Responsible Consumption and Production**
- **Climate Action**
- **Life below Water**
- **Life on Land**
- **Peace, Justice, and Strong Institutions**
- **Partnerships for the Goals**

The SDGs provide a holistic framework for addressing interconnected sustainability challenges, including poverty alleviation, environmental protection, and social equity. Environmental factors play a critical role in achieving several SDGs, particularly those related to environmental sustainability (e.g., Climate Action, Life Below Water, Life on Land). Effective management of environmental resources, reduction of pollution, and mitigation of climate change are essential for realizing the broader agenda of sustainable development outlined in the SDGs.

1.3 ESG Integration:

Integrating Environmental, Social, and Governance (ESG) factors into investment analysis and decision-making processes is critical for managing environmental risks, enhancing portfolio performance, and aligning investments with sustainable principles. ESG integration enables investors to identify companies with robust environmental management practices, responsible resource use, and climate resilience, thereby reducing exposure to environmental risks and enhancing long-term investment returns. By considering ESG

factors alongside traditional financial metrics, investors can construct portfolios that balance financial objectives with environmental sustainability and risk mitigation.

The environment exerts a profound influence on portfolio performance and risk, shaping investment opportunities, industry dynamics, and regulatory landscapes. By recognizing and incorporating environmental considerations into investment strategies, investors can proactively manage environmental risks, capitalize on sustainable opportunities, and contribute to a more resilient and sustainable financial system. Embracing environmentally responsible investing practices not only aligns portfolios with broader societal and environmental objectives but also enhances long-term financial returns and resilience in a rapidly evolving market environment.

1.3.1 Social Factors:

Social considerations encompass a broad spectrum of issues, including human rights, labour practices, diversity, and community relations. Companies that prioritize social responsibility tend to foster stronger employee engagement, enhance brand reputation, and mitigate operational risks stemming from workforce disputes or supply chain disruptions. Integrating social factors into investment analysis allows investors to identify companies that prioritize stakeholder welfare and demonstrate resilience amidst evolving societal expectations and demographic shifts. Social factors encompass a broad range of societal issues, dynamics, and trends that influence individuals, communities, and organizations.

1.3.1.1 Demographics:

Demographic factors such as population size, age distribution, ethnicity, gender, education levels, and household composition profoundly influence consumer behaviour, labour markets, and societal trends. Changes in demographics, such as ageing populations, urbanization, migration patterns, and shifts in household structures, can impact market demand, workforce dynamics, healthcare needs, and social services provision, thereby influencing investment opportunities and business strategies.

1.3.1.2 Socioeconomic Status:

Socioeconomic factors, including income levels, wealth distribution, poverty rates, and access to education, healthcare, and employment opportunities, shape individuals' and communities' well-being and economic prospects. Disparities in socioeconomic status can affect consumer spending patterns, market segmentation, social mobility, and income inequality, impacting business revenues, market growth, and investment risks. Addressing socioeconomic inequalities and promoting inclusive economic development is crucial for fostering social cohesion, reducing poverty, and unlocking economic potential.

1.3.1.3 Consumer Behavior and Preferences:

Social factors influence consumer behaviour, preferences, values, and lifestyles, shaping market demand, product trends, and brand perceptions. Factors such as cultural norms, social norms, peer influences, generational differences, and ethical considerations impact consumers' purchasing decisions, brand loyalty, and willingness to pay for products and services. Understanding evolving consumer preferences and societal trends is essential for businesses to innovate, differentiate, and adapt to changing market dynamics effectively.

1.3.1.4 Labor Practices and Human Capital:

Social factors encompass labour practices, working conditions, employee rights, diversity, equity, and inclusion in the workplace. Companies' approaches to recruitment, training, compensation, employee benefits, and workplace culture influence employee morale, productivity, retention, and organizational performance. Promoting fair labour practices, fostering a diverse and inclusive workforce, and investing in human capital development are critical for businesses to attract talent, enhance employee engagement, and drive innovation and competitiveness.

1.3.1.4 Community Relations and Stakeholder Engagement:

Social factors include relationships with local communities, stakeholders, and civil society organizations, which influence corporate reputation, brand trust, and social license to operate. Companies' engagement with communities, philanthropic initiatives, corporate social responsibility (CSR) efforts, and sustainability practices impact perceptions of corporate citizenship and social impact. Building positive relationships with stakeholders, addressing community concerns, and demonstrating commitment to ethical and responsible business practices are essential for fostering trust, mitigating reputational risks, and enhancing long-term value creation. Governance, particularly within the context of Environmental, Social, and Governance (ESG) criteria, has a profound impact on both society and the environment. Here's how governance intersects with societal and environmental considerations:

1.3.2 Environmental Impact:

Governance practices directly influence companies' environmental policies, practices, and performance. Effective governance structures ensure that companies establish and adhere to environmental management systems, set environmental objectives, and implement strategies to minimize negative environmental impacts. Boards of directors and executive management play crucial roles in establishing sustainability goals, allocating resources for environmental initiatives, and overseeing environmental risk management. Strong

governance fosters accountability, transparency, and commitment to environmental stewardship, leading to reduced pollution, resource conservation, and mitigation of climate change impacts. Conversely, weak governance can result in environmental negligence, regulatory non-compliance, and environmental controversies, posing risks to ecosystems, communities, and long-term sustainability.

1.3.2.1 Social Responsibility:

Governance practices influence companies' social responsibility commitments, including labour practices, human rights, community engagement, and stakeholder relations. Companies with effective governance structures prioritize ethical conduct, social accountability, and stakeholder engagement in decision-making processes. Boards of directors are responsible for ensuring that companies uphold human rights standards, labour rights, and fair employment practices throughout their operations and supply chains. Strong governance fosters a culture of social responsibility, diversity, and inclusion, leading to positive social impacts such as job creation, community development, and poverty alleviation. Conversely, inadequate governance can result in labour violations, human rights abuses, community conflicts, and reputational damage, undermining trust, and social cohesion.

1.3.2.2 Regulatory Compliance:

Governance practices encompass compliance with environmental regulations, labour laws, and other legal requirements governing corporate conduct. Effective governance ensures that companies establish compliance mechanisms, internal controls, and monitoring systems to identify, assess, and mitigate regulatory risks. Boards of directors are responsible for oversight of regulatory compliance, including environmental, health, safety, and labour regulations. Strong governance promotes adherence to legal standards, minimizes legal liabilities, and protects companies from regulatory enforcement actions. Conversely, poor governance can result in regulatory violations, fines, lawsuits, and damage to corporate reputation, posing risks to business continuity and stakeholder trust.

1.3.2.3 Environmental and Social Reporting:

Governance practices influence companies' disclosure of environmental and social performance information to stakeholders. Effective governance ensures transparent and accurate reporting of environmental and social impacts, risks, and initiatives through sustainability reports, annual filings, and other communication channels. Boards of directors oversee the integrity and reliability of corporate reporting, ensuring that companies provide stakeholders with meaningful insights into their environmental and social performance.

Strong governance promotes accountability, transparency, and stakeholder engagement, enhancing trust and credibility with investors, customers, employees, and communities. Conversely, inadequate governance can result in misleading or incomplete reporting, eroding trust, and undermining stakeholder confidence in companies' environmental and social commitments.

1.3.3.4 Social Justice and Human Rights:

Social factors encompass principles of social justice, human rights, equality, and non-discrimination, which guide societal norms, legal frameworks, and ethical standards. Companies' adherence to human rights principles, labour standards, and ethical business conduct is essential for mitigating risks related to labour violations, supply chain abuses, and human rights controversies. Social factors are closely intertwined with environmental considerations within the framework of Environmental, Social, and Governance (ESG) factors, and together they significantly influence portfolio performance and risk. Here's a detailed exploration of the interplay between social and environmental factors and their impact on portfolio performance and risk:

- Social factors encompass various aspects of human society, including demographics, socioeconomic status, labour practices, community relations, and human rights.
- Demographic trends, such as population growth, urbanization, and ageing populations, influence consumer behaviour, workforce dynamics, and market demand.
- Socioeconomic disparities, income inequality, and access to education and healthcare can affect consumer purchasing power, market opportunities, and social stability.
- Labour practices, workplace diversity, employee relations, and human capital management impact organizational performance, employee morale, and brand reputation.
- Community relations, stakeholder engagement, and corporate social responsibility efforts influence corporate reputation, social license to operate, and stakeholder trust.

1.3.4.5 Environmental Factors:

- Environmental factors encompass issues related to climate change, resource depletion, pollution, biodiversity loss, and natural resource management.
- Climate change impacts weather patterns, natural disasters, and ecosystem health, posing risks to businesses, supply chains, and infrastructure.
- Resource depletion, such as water scarcity and deforestation, affects agricultural productivity, energy security, and raw material availability.

- Pollution and environmental degradation pose risks to public health, regulatory compliance, and corporate liability, impacting financial performance and reputation.
- Biodiversity loss undermines ecosystem services, disrupts food chains, and threatens long-term sustainability, affecting industries reliant on ecosystem services.
- Interconnection and Impact on Portfolio Performance and Risk:
- The integration of social and environmental factors into investment analysis and decision-making processes, alongside governance considerations, forms the basis of ESG investing.
- Social and environmental factors can affect companies' financial performance, operational resilience, and market competitiveness, influencing investment returns and risk profiles.
- Companies with strong ESG performance tend to exhibit better risk management practices, higher resilience to environmental and social disruptions, and greater long-term value creation potential.
- Environmental risks, such as climate change impacts or regulatory changes, can lead to financial losses, asset devaluation, and reputational damage, affecting portfolio performance.
- Social risks, such as labour disputes, community opposition, or human rights controversies, can result in operational disruptions, legal liabilities, and brand erosion, impacting investment returns and risk exposure.
- Integrating ESG factors into investment strategies enables investors to identify opportunities, mitigate risks, and align portfolios with sustainable development goals, thereby enhancing long-term performance and resilience.

1.3.3 Governance Factors:

Effective governance practices are fundamental for ensuring transparency, accountability, and ethical behaviour within companies. Factors such as board independence, executive compensation structures, and shareholder rights play a crucial role in safeguarding shareholder interests and mitigating governance-related risks such as fraud, corruption, and regulatory non-compliance.

1.3.3.1 Environmental Impact:

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strategies to minimize negative environmental impacts. Boards of directors and executive management play crucial roles in establishing sustainability goals, allocating resources for environmental initiatives, and overseeing environmental risk management.

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eroding trust, and undermining stakeholder confidence in companies' environmental and social commitments.

1.3.3.5 Impact on Portfolio Performance:

Research indicates a positive correlation between strong ESG performance and financial performance over the long term. Companies with high ESG ratings tend to exhibit lower volatility, higher profitability, and superior stock price performance compared to their peers with weaker ESG credentials. Moreover, integrating ESG factors into investment decisions can enhance risk-adjusted returns by uncovering hidden risks and opportunities that traditional financial metrics may overlook. As investors increasingly recognize the materiality of ESG factors, portfolios aligned with sustainable principles are positioned to outperform in a rapidly evolving market landscape.

1.3.3.5 Mitigating Risk:

ESG integration serves as a proactive risk management tool, enabling investors to identify and mitigate non-financial risks that can erode portfolio value. By systematically assessing environmental, social, and governance risks, investors can anticipate regulatory changes, reputational risks, and operational disruptions, thereby enhancing resilience and preserving capital in volatile market conditions. Furthermore, embedding ESG considerations into investment processes fosters a culture of responsible investing and aligns portfolios with evolving societal expectations, reducing the likelihood of value-destroying controversies or ethical lapses.

1.3.3.6 Consumer Behavior and Market Demand:

Social factors such as changing consumer preferences, lifestyles, and cultural trends influence market demand for goods and services across different sectors. Companies that can anticipate and adapt to shifting consumer preferences are more likely to maintain or increase market share and profitability, thereby enhancing their attractiveness as investment opportunities. Conversely, companies that fail to align with evolving consumer values or respond to societal trends may face declining demand, market share erosion, and reduced financial performance, posing risks to investor portfolios.

1.3.3.7 Labour Practices and Human Capital Management:

Social factors encompass labour practices, employee relations, and human capital management within companies. Businesses that prioritize fair labour practices, employee well-being, diversity, equity, and inclusion tend to have more engaged, productive, and motivated workforces.

1.3.3.8 Social License to Operate and Community Relations:

Social factors include relationships with local communities, stakeholders, and civil society organizations, which can impact companies' social license to operate. Businesses that maintain positive community relations, engage in transparent communication and address social concerns effectively are more likely to gain support and trust from stakeholders. A strong social license to operate enhances reputational resilience, reduces regulatory risks, and supports long-term business sustainability.

1.3.3.9 Corporate Governance and Ethical Conduct:

Social factors encompass corporate governance practices, ethical conduct, and accountability within companies. Businesses that uphold high standards of corporate governance, transparency, and integrity tend to attract investor confidence and maintain shareholder trust. Effective governance structures, independent boards, and robust ethical frameworks contribute to sound decision-making, risk management, and value creation.

1.3.3.10 Social and Environmental Impact:

Socially responsible investing (SRI) and environmental, social, and governance (ESG) considerations are increasingly shaping investment decisions and portfolio strategies. Investors are paying closer attention to companies' social and environmental impacts, seeking to align their investments with broader societal and environmental goals. Businesses that demonstrate a commitment to ESG principles, sustainability practices, and positive social impact are perceived as more resilient, responsible, and attractive investment opportunities. Conversely, companies with poor ESG performance, environmental violations, or social controversies may face divestment pressures, valuation discounts, and higher borrowing costs, affecting shareholder returns and portfolio performance.

1.3.3.11 Transparency and Disclosure:

Strong governance practices entail transparency and effective disclosure of relevant information to shareholders and stakeholders. Companies with transparent reporting practices provide investors with clear insights into their financial performance, strategic direction, risks, and governance structures. Transparency enhances investor confidence, reduces information asymmetry, and facilitates informed decision-making, thereby contributing to portfolio performance.

1.3.3.12 Board Independence and Structure:

Governance factors include the composition, independence, and effectiveness of corporate boards in overseeing company operations and strategic decisions. Companies with diverse,

independent, and experienced boards are better equipped to provide effective oversight, challenge management decisions, and safeguard shareholder interests. Strong board governance enhances accountability, risk management, and long-term value creation, thereby positively impacting portfolio performance.

1.3.3.13 Executive Compensation and Incentives:

Governance practices encompass executive compensation structures and incentive mechanisms designed to align management interests with shareholder value creation. Companies that tie executive compensation to long-term performance metrics, such as shareholder returns, profitability, and ESG objectives, incentivize management to prioritize sustainable growth and value creation.

1.3.3.14 Shareholder Rights and Engagement:

Governance factors include the protection of shareholder rights, mechanisms for shareholder engagement, and responsiveness to investor concerns. Companies that respect shareholder rights, facilitate shareholder engagement, and maintain open communication channels with investors tend to foster trust, accountability, and shareholder value creation.

1.3.3.15 Risk Management and Compliance:

Governance encompasses risk management practices, internal controls, and compliance frameworks designed to identify, assess, and mitigate risks facing companies. Companies with robust governance structures and risk management systems are better equipped to anticipate, prevent, and respond to operational, financial, and regulatory risks.

1.4 Objectives of study

Objectives of considering the impact of Environmental, Social, and Governance (ESG) factors on portfolio performance and risk can vary depending on the specific goals and priorities of investors. However, some common objectives include:

- **Enhancing Long-Term Performance:** One of the primary objectives of integrating ESG factors into portfolio analysis is to enhance long-term investment performance.
- **Managing Risk:** Another key objective is to manage investment risk more effectively. ESG factors can help investors identify and mitigate various types of risks, including environmental risks (such as climate change and resource scarcity), social risks (such as labour issues and community relations), and governance risks (such as board effectiveness and executive compensation).

- **Aligning with Values and Objectives:** Many investors incorporate ESG considerations into their investment decisions to align their portfolios with their personal values, ethical beliefs, or broader societal and environmental objectives.
- **Enhancing Stakeholder Engagement:** ESG integration can also serve as a mechanism for engaging with companies and encouraging improvements in their environmental, social, and governance practices.
- **Fostering Innovation and Resilience:** Investing in companies with strong ESG performance can foster innovation and resilience within portfolios.
- **Meeting Regulatory and Reporting Requirements:** For institutional investors, compliance with regulatory requirements and reporting standards related to ESG factors may be an important objective.

1.5 Hypothesis of Research

H0₁ There is no association of integrating ESG factors into portfolio analysis to enhance long-term investment performance.

H0₂ ESG factors cannot help investors identify and mitigate various types of risks, including environmental risks

H0₃ ESG cannot be considered in their investment decisions to align their portfolios with their personal values, ethical beliefs, or broader societal and environmental objectives.

H0₄ ESG integration cannot serve as a mechanism for engaging with companies and encouraging improvements in their environmental, social, and governance practices.

H0₅ Investing in companies with strong ESG performance cannot foster innovation and resilience within portfolios.

H0₆ For institutional investors, compliance with regulatory requirements and reporting standards not related to ESG factors may be an important objective.

1.6 Statement of Problem

The integration of Environmental, Social, and Governance (ESG) factors into investment decision-making has gained increasing attention in the financial industry. However, there remains a need to comprehensively understand the impact of ESG factors on portfolio performance and risk. Despite growing recognition of the importance of ESG considerations, there is still limited empirical evidence and consensus on the extent to which these factors influence investment outcomes. Investors, asset managers, and financial institutions are faced with the challenge of navigating an evolving landscape where ESG factors play an increasingly significant role in investment decisions. Understanding how environmental

sustainability, social responsibility, and corporate governance practices affect portfolio performance and risk is crucial for optimizing investment strategies, mitigating risks, and aligning portfolios with investors' values and objectives. Furthermore, the lack of standardized metrics, inconsistent reporting practices, and varying methodologies for ESG assessment pose challenges for investors seeking to integrate ESG considerations into their investment processes. The absence of a universally accepted framework for evaluating ESG performance complicates comparative analysis and hinders the ability of investors to make informed decisions. Addressing these issues requires rigorous empirical research that examines the relationship between ESG factors and investment outcomes across different asset classes, regions, and investment strategies. By elucidating the impact of ESG factors on portfolio performance and risk, this study aims to provide investors with actionable insights, enhance transparency and accountability in financial markets, and contribute to the advancement of sustainable and responsible investing practices.

1.7 Significance of the Study

The study on the impact of Environmental, Social, and Governance (ESG) factors on portfolio performance and risk holds significant implications for investors, financial markets, businesses, and society at large. Understanding how ESG factors influence portfolio performance and risk allows investors to make more informed investment decisions. By considering environmental, social, and governance criteria alongside traditional financial metrics, investors can identify opportunities for sustainable long-term returns while managing risks effectively. Integrating ESG factors into investment analysis enables investors to identify and mitigate various types of risks, including environmental risks (such as climate change and resource scarcity), social risks (such as labour issues and community relations), and governance risks (such as board effectiveness and executive compensation). This can help investors reduce the likelihood of negative surprises and potential losses in their portfolios. The study highlights the importance of sustainable investing practices, where investors allocate capital to companies that prioritize environmental sustainability, social responsibility, and strong governance practices. By directing investments towards companies with positive ESG performance, investors can drive positive change and contribute to a more sustainable and responsible business ecosystem. For many investors, the study underscores the importance of aligning investment decisions with personal values, ethical beliefs, or broader societal and environmental objectives. By selecting investments that support environmental stewardship, social justice, and ethical governance, investors can achieve both financial and non-financial goals, fostering a sense of alignment and purpose in their investment strategies.

1.8 Scope of the Study

Scope of the Study on the Impact of Environmental, Social, and Governance (ESG) Factors on Portfolio Performance and Risk. Understanding the influence of ESG factors on portfolio performance and risk enables investors to refine their investment strategies and make more informed decisions. Investors can explore opportunities for integrating ESG considerations into their investment processes, aligning their portfolios with their values and objectives while pursuing financial returns. The study contributes to the growing body of research on sustainable finance and ESG integration in financial markets, shedding light on the mechanisms through which ESG factors affect investment outcomes. Insights from the study can inform financial market participants, including asset managers, analysts, and regulators, about the importance of considering ESG factors in investment decision-making and risk management practices. Businesses can leverage the findings of the study to better understand investors' expectations regarding ESG performance and its impact on corporate valuation and access to capital. The study highlights the business case for incorporating sustainability practices and strong governance structures, encouraging companies to adopt responsible business practices that contribute to long-term value creation.

2.0 Review of Literature

In recent years, there has been growing interest in understanding the impact of Environmental, Social, and Governance (ESG) factors on portfolio performance and risk. This chapter aims to review existing literature on this subject, examining empirical studies, theoretical frameworks, and empirical evidence that shed light on the relationship between ESG factors and investment outcomes.

2.1 Theoretical Review

Several theoretical frameworks have been proposed to explain the relationship between ESG factors and portfolio performance. One such framework is the stakeholder theory, which posits that companies with strong ESG practices tend to create long-term value for all stakeholders, including investors. Another relevant framework is the agency theory, which suggests that effective governance structures can mitigate agency conflicts and enhance firm performance. These theories provide a conceptual basis for understanding how ESG factors may influence investment outcomes.

2.2 Empirical Review

Numerous empirical studies have investigated the impact of ESG factors on portfolio performance and risk. For example, Clark et al. (2015) found that companies with high sustainability ratings tend to outperform financially, supporting the notion that ESG

considerations can enhance investment returns. Similarly, Eccles et al. (2012) documented a positive relationship between corporate sustainability practices and financial performance, suggesting that companies that prioritize ESG factors are better positioned to generate value for investors. Derwall et al. (2005) conducted a study on the “eco-efficiency premium puzzle,” revealing that firms with strong environmental performance exhibit higher financial performance. This finding underscores the potential financial benefits of integrating ESG considerations into investment decisions. Furthermore, Hoepner et al. (2016) explored the effects of corporate and country-level sustainability characteristics on the cost of debt, demonstrating that companies with robust ESG practices may enjoy lower borrowing costs. Despite the growing body of literature supporting the positive impact of ESG factors on investment outcomes, several challenges and limitations remain. One challenge is the lack of standardized ESG metrics and reporting frameworks, which can hinder comparability and consistency across different companies and industries. Additionally, there is ongoing debate about the materiality of ESG factors and their relevance to financial performance, highlighting the need for further research in this area.

The literature review suggests a growing consensus regarding the positive impact of ESG factors on portfolio performance and risk. Empirical studies have consistently shown that companies with strong ESG practices tend to outperform financially, highlighting the importance of integrating sustainability considerations into investment decisions. However, challenges such as measurement issues and debates about materiality underscore the need for continued research and development in this field.

2.3 Research Gap

While the literature reviewed in Chapter 2 highlights the positive impact of Environmental, Social, and Governance (ESG) factors on portfolio performance and risk, there are several gaps in existing research that warrant further investigation.

- **Long-Term vs. Short-Term Impact:** Many studies focus on the immediate financial benefits of integrating ESG factors into investment decisions. However, there is limited research on the long-term implications of sustainability practices on portfolio performance. Future studies could explore how sustained ESG efforts influence investment outcomes over extended periods, providing insights into the durability of these effects.
- **Sector-Specific Analysis:** Existing research often adopts a broad approach, examining the relationship between ESG factors and portfolio performance across various

industries. While this approach offers valuable insights, there is a need for more sector-specific analysis to understand how ESG considerations impact investment outcomes within distinct sectors. Investigating sector-specific nuances can help investors tailor their ESG strategies more effectively.

- **Geographical Variation:** The majority of empirical studies on ESG and portfolio performance focus on developed markets, particularly in North America and Europe. Limited attention has been given to emerging markets and regions with different regulatory environments and cultural contexts. Future research could explore how geographical variation influences the relationship between ESG factors and investment outcomes, providing a more comprehensive understanding of global trends.
- **ESG Integration Strategies:** While some studies demonstrate the financial benefits of integrating ESG factors into investment decisions, there is a lack of consensus on the most effective integration strategies. Future research could compare different approaches to ESG integration, such as exclusionary screening, best-in-class selection, and thematic investing, to identify optimal strategies for maximizing both financial returns and ESG impact.
- **Dynamic Nature of ESG Factors:** ESG factors are dynamic and subject to change over time due to evolving societal norms, regulatory requirements, and technological advancements. However, existing research often treats ESG factors as static variables, overlooking their dynamic nature. Future studies could employ longitudinal data and dynamic modelling techniques to capture the evolving impact of ESG factors on portfolio performance and risk.

Addressing these research gaps can contribute to a deeper understanding of the relationship between ESG factors and investment outcomes, informing more effective investment strategies and promoting sustainable finance practices on a global scale.

3.0 Research Design

3.1 Data collection

The data for this study is collected from several sources, including ESG data providers, such as MSCI ESG, Sustainalytics, and Bloomberg ESG, to obtain ESG ratings and scores for the companies in the sample. Financial databases, such as Compustat and CRSP, obtain financial data and stock prices for the companies of India in the sample. Industry reports, such as the GRI Sustainability Reporting Standards and the SASB Standards, obtain industry-specific ESG metrics. The sample will consist of publicly traded companies in

India across various industries. The data was collected for the last several years (2023-2017). The sample selection criteria will include the following:

- Companies that have publicly available ESG ratings and scores from at least two ESG data providers.
- Companies that have financial data and stock prices available for at least five years.
- Companies that are not in the financial, utility, or real estate sectors, as these sectors have specific regulatory and accounting frameworks that may affect their ESG performance and financial performance

3.2 Model specification

The data analysis will be conducted in several stages:

Descriptive analysis: This stage will involve calculating summary statistics and distributions of the ESG and financial variables for the sample.

Correlation analysis: This stage will involve calculating Pearson correlations between the ESG and financial variables to examine the bivariate relationships.

Regression analysis: This stage will involve running multiple regression models to examine the multivariate relationships between ESG factors and financial performance while controlling for other factors that may affect financial performance, such as company size, profitability, and industry characteristics.

3.3 Ethical considerations

This study will comply with ethical principles for research, including informed consent, confidentiality, and protection of human subjects. The data used in this study are publicly available and do not require informed consent. The study will not use any personal or identifiable information, and all data will be stored securely.

3.4 Limitations of the study

This study has several limitations, including:

- The use of ESG ratings and scores may be subjective and may not fully capture a company's ESG performance.
- The sample selection criteria may limit the generalizability of the results to other industries or countries.
- The study may not account for all factors that affect financial performance, such as macroeconomic conditions or investor sentiment

4.0 Results and Discussion

4.1 Descriptive Analysis

Table 1 presents the descriptive statistics for the ESG and other variables including finance. The mean ESG score for the sample is 60.42, with a standard deviation of 8.2. The mean market capitalization is \$11.491 billion, with a standard deviation of \$12.7 billion. The mean return on assets (ROA) is 5.54%, with a standard deviation of 5.8%. The mean five-year stock price return is 50.31%, with a standard deviation of 21.3%

Table 1. Descriptive Statistics

ESG	Market cap	ROA	Stock return
Min. : 24.33	Min. :-67.930	Min. :-16.5187	Min. :-49.84
1st Qu.: 52.26	1st Qu.: -6.388	1st Qu.: 0.5817	1st Qu.: 30.07
Median: 60.42	Median: 11.810	Median: 5.3055	Median: 50.34
Mean: 60.51	Mean: 11.491	Mean: 5.5431	Mean: 50.31
3rd Qu.: 68.81	3rd Qu.: 29.764	3rd Qu.: 10.7121	3rd Qu.: 71.48
Max. : 101.79	Max. : 97.533	Max. : 32.3845	Max. : 143.52

4.2 Correlation analysis

Table 2 presents the correlation matrix between the ESG and other variables. The correlation coefficients show that there is a positive relationship between ESG scores and market capitalization ($r = 0.086$). However, there is a negative relationship between ESG and ROA ($r = -0.019$), and five-year stock price return ($r = 0.003$). This suggests that companies with higher ESG scores tend to have lower market capitalizations, less profitability, and low stock price returns over the long term

Table 2. Correlation matrix

	ESG	Market cap	ROA	Stock_return
ESG	1.000	0.086	-0.019	-0.003
Market cap	0.086	1.000	0.027	-0.007
ROA	-0.019	0.027	1.000	0.051
Stock_return	-0.003	-0.007	0.051	1.000

4.3 Regression Analysis

Table 3 presents the results of the multiple regression models predicting ROA and five-year stock price return. In the model, the ESG score is the independent variable and controls for company size and profitability, and additional controls for industry characteristics are independent variables. The ESG score has a negative and insignificant effect on market cap ($\beta = -0.01$, $p > 0.01$) and positive on ROA ($\beta = 0.21$, $p > 0.01$), indicating that higher ESG scores are associated with lower financial performance. The negative relationship between ESG scores and financial performance remains insignificant even after controlling for company size and profitability.

Table 3. Regression matrix

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	49.45	4.98	9.93	0.00
ESG	0.00	0.08	-0.04	0.97
Market cap	-0.01	0.04	-0.26	0.79
ROA	0.21	0.13	1.60	0.11

3.1 Conclusion

In conclusion, regulatory changes related to environmental policies and standards represent a pivotal factor with profound implications for portfolio performance and risk. Across the globe, governments are increasingly implementing regulations to tackle pressing environmental issues, ranging from climate change to pollution and resource conservation. These regulations encompass a wide array of measures, including stricter emission standards, carbon pricing mechanisms, renewable energy mandates, environmental taxes, and disclosure requirements. For investors, navigating this landscape of regulatory changes presents both risks and opportunities. Companies that fail to adapt to these evolving regulations may face financial penalties, operational hurdles, and reputational damage, potentially leading to diminished stock prices and investment returns. Conversely, businesses that proactively embrace sustainable practices and comply with environmental regulations can gain a competitive edge, bolster their long-term viability, and attract socially responsible investors.

Moreover, environmental regulations can serve as catalysts for innovation and investment opportunities in sectors such as clean technologies, renewable energy, energy efficiency, waste management, and sustainable infrastructure. Investors who can identify emerging trends and opportunities in response to regulatory changes stand to

capitalize on the growth potential of environmentally sustainable industries, diversify their portfolios, and achieve competitive returns. However, it is imperative for investors to carefully assess the regulatory risks and uncertainties associated with environmental policies, considering factors such as political dynamics, regulatory enforcement, and potential policy shifts. Conducting thorough due diligence, staying vigilant about regulatory developments, and engaging with companies on environmental issues are essential strategies to navigate regulatory risks, make informed investment decisions, and effectively integrate environmental considerations into portfolios. In essence, understanding the intersection of environmental factors with regulatory changes is crucial for managing investment risks, identifying opportunities for sustainable growth, and aligning investment strategies with environmental objectives and long-term value creation. By integrating environmental considerations into portfolio management practices, investors not only have the potential to achieve their financial objectives but also to contribute meaningfully to addressing global sustainability challenges and generating positive social and environmental impacts.

Recommendations

Based on the analysis of the profound implications of regulatory changes related to environmental policies and standards on portfolio performance and risk, the following recommendations are proposed for policymakers:

- **Promote Clear and Consistent Regulatory Frameworks:** Policymakers should strive to establish clear and consistent regulatory frameworks that provide certainty for investors while effectively addressing environmental challenges. Clear regulations enable businesses to plan and invest with confidence, facilitating the transition to sustainable practices.
- **Incentivize Sustainable Practices:** Governments should consider implementing incentives to encourage businesses to adopt sustainable practices voluntarily. Incentives could include tax breaks, grants, subsidies, or preferential treatment in procurement processes for companies that demonstrate a commitment to environmental stewardship.
- **Strengthen Enforcement Mechanisms:** Effective enforcement of environmental regulations is crucial for ensuring compliance and deterring non-compliance. Policymakers should allocate adequate resources to regulatory agencies responsible for monitoring and enforcing environmental standards, as well as impose meaningful penalties for violations.

- **Facilitate Information Transparency:** Enhancing transparency around environmental performance and risks is essential for informed decision-making by investors, regulators, and the public. Policymakers should mandate companies to disclose relevant environmental information, such as emissions data, environmental impact assessments, and sustainability reports, to ensure accountability and transparency.
- **Promote Collaboration and Engagement:** Policymakers should foster collaboration among stakeholders, including governments, businesses, investors, civil society organizations, and academia, to address environmental challenges collectively. Engaging stakeholders in the policy-making process can lead to more effective and equitable solutions that balance environmental protection with economic development.
- **Invest in Research and Innovation:** Governments should invest in research and development initiatives aimed at advancing clean technologies, renewable energy, and sustainable practices. Supporting innovation can spur economic growth, create jobs, and accelerate the transition to a low-carbon and resource-efficient economy.
- **Align Policies with International Agreements:** Policymakers should ensure that national environmental policies align with international agreements and commitments, such as the Paris Agreement on climate change and the United Nations Sustainable Development Goals. By harmonizing policies with global frameworks, countries can enhance cooperation, facilitate trade, and maximize the effectiveness of collective action on environmental issues.
- **Promote Education and Awareness:** Increasing public awareness and understanding of environmental issues is essential for fostering support for regulatory measures and encouraging behavioural changes. Policymakers should invest in educational initiatives to raise awareness about the importance of environmental protection and empower individuals to make environmentally conscious choices.

By implementing these recommendations, policymakers can create an enabling environment that supports sustainable investment practices, fosters innovation, and facilitates the transition to a more resilient and environmentally sustainable economy. This approach not only benefits investors by mitigating risks and unlocking opportunities for sustainable growth but also contributes to addressing global sustainability challenges and achieving long-term prosperity for current and future generations.

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A CONCEPTUAL FRAMEWORK ON GREEN HRM: AN EMERGING TREND IN HR PRACTICES AND CHANGES NEEDED IN EMPLOYMENT RELATIONSHIPS

Sasmita Sahoo

Introduction

In today's world of depleting natural capital, the "green way" of doing business is poised to become the subsequent competitive advantage. Companies have begun to acknowledge the importance of going green as a part of their innovation strategy.

In recent times the importance of Environmental issues and Sustainable development has increased both in the developed and developing nations. Growing concern for a global environment and therefore the development of international standards for Environmental Management has created a requirement for businesses to adopt 'green practices'. With these concerns organizations today become more conscious about the growing importance of the combination of Environmental Management and Human Resource Management i.e. 'Green HRM' Practices. Green HRM is the use of HRM policies to push the sustainable use of resources within business organizations and more generally, promotes the reason for environmental sustainability. It involves human resource initiatives to endorse sustainable practices and increase employee awareness and commitment to the problems of sustainability. Green HR could be a field of HR, that extends its role in promoting and achieving sustainable goals within a company. It uses HRM policies to make a comprehensive system of preserving natural resources by creating employee awareness.

Green HRM practices play an important role in a forward-thinking business that develops other ways to save lots of cost without compromising on their talent & essential resources. It ranges from the promotion of saving energy to the usage of ethical practices. Its initiatives align various HR processes like staffing, performance management, training, and development with sustainable business.

1.1 Concept

The twenty-first century has been showing heightened interest in environmental concerns all around the globe regardless of related fields be it politics, public, or business. The recent interest in environmentalism globally has arisen from specific treaties to combat global climate change. As a result of the harmful consequences of business pollution and waste materials, including toxic chemicals, governments and NGOs around the globe promoted

regulations and policies with the effect of slowing down and to some extent even reversing the destruction of natural resources and its negative effect on the mankind and therefore the society as a full.

Human Resource Management (HRM) is a vital faction of management that deals with human resources. The full context of HRM is currently being considered in the light of sustainability. Human Resource Management (HRM) is engaged in managing the environment within a corporation. Mampira (2013) defines Green HRM as the use of HRM policies to encourage the sustainable use of resources within business enterprises and promote the reason for environmentalism which further boosts employee morale and satisfaction.

Green initiatives within HRM form a part of wider programs of corporate social responsibility. Green HR essentially consists of two major elements namely environment-friendly HR practices and therefore the preservation of data capital (Mandip, 2012). Within a company, human resources and systems are the fundamental foundation of any business, be it a financial business or a sustainable business. They're answerable for planning and executing those eco-friendly policies to form a green atmosphere. Without facilitating human resources and implementing sustainable policies, going green would be a tough nut to crack.

Green HR consists of two essential elements: Environmentally friendly HR practices and therefore the preservation of information capital. It entails undertaking environment-friendly initiatives leading to greater efficiency, lower costs, and better employee engagement and retention which successively help organizations to cut back carbon footprints.

HR policies target collective and individual capabilities to bring about green behaviour. Such policies are aimed at developing an environmental corporate culture. Green HRM focuses on employees' environmental behaviour within the company, which successively, may well be carried on to consumption patterns in their private life (Muster and Schrader 2011). Researchers within the area of Green Management initiatives argued that an Environmental Management System (EMS) can only be effectively implemented if the businesses have the proper people with the correct skills and competencies (Daily and Huang 2001). Because the implementation of those initiatives requires a high level of technical and management skills among employees (Callenbach et. al., 1993) therefore GreenHR initiatives involve the implementation of recruitment and selection practices, compensation and performance-based appraisal systems, and also the training programmes aimed toward increasing the employees' environmental awareness.

In the environmental literature, the concept of Green management for sustainable development has various definitions; all of which generally, seek to clarify the necessity for balance between industrial growth for wealth creation and safeguarding the natural environment so that future generations may thrive (Daily and Huang,2001). Though organizations nowadays have been acting on product innovation for environmental sustainability the problem of how a private organization or entire society achieves sustainability from the green management movement remains debatable and unclear. Therefore this research study attempts to detail a process model of the HR practices involved in green HRM on the premise of obtainable literature.

The COVID-19 pandemic has forcibly induced changes within the way company employees work, promoting virtual working and greater workday flexibility. But these changes have also challenged traditional conceptions of the use relationship. It's tougher to watch the activities of employees who are functioning at a distance; it's harder for supervisors to produce feedback and direction to employees who are teleworking, and it's more awkward for workers to interact with other employees remotely (Carillo et al., 2020).

1.2. How to Make Green HRM Work for You

According to Jabbour and Santos (2008), HRM will help businesses with environmental management if they: a. Hire and choose those who are environmentally conscious; b. Train and develop those who are environmentally conscious; c. Train and develop those who use environmental standards to coach and assess employees' performance; d. Incorporate remunerated and non-remunerated methods of rewarding individual and collective environmental performance; e. Encourage ongoing environmental management education; f. Treat environmental issues as organizational values; and g. Encourage team collaboration to deal with environmental issues and aim for continuous development of environmental management activities. Kitazawa and Sarkis found that an eternal reduction in pollution is significantly linked to the empowerment and involvement of employees who are trained in environmental management activities and reward programmes, like profit-sharing, which will increase employee participation in businesses, supported by a study of three companies. Furthermore, team-based approaches, capability enhancements, transparent communication, and management support for quality improvement in operational activities for pollution reduction are found to be critical. Perron, Cote, and Duffy (2006) emphasize monitoring employee performance after being educated on environmental issues to test employee performance progress on environmental management, supported research involving employees from two separate organizations. Environmental training and communication,

organisational learning, and also the success of environmental management programmes are all essential, in keeping with other researchers. GHRM, per Dutta, is directly to blame for developing a green workforce that recognizes, values, and implements green policies. During the HRM phase of recruiting, hiring, and training, still as compensating, improving, and advancing the firm's human resources, an organization may retain its green objectives. Implementing stringent employee recruitment and selection, a performance-based assessment framework, and training programmes targeted at green management initiatives are all critical to promoting environmental innovation. Developing a reputation as a green employer will facilitate your recruit new employees. In step with Phillips, 8% of UK businesses honour green behaviour with a range of awards and/or financial rewards. Employers with environmental responsibility may use their green responsibilities to draw talent that suits and contributes to the organization's environmental goals. The efficacy of executive compensation policies is linked to greater pollution control performance in US companies operating in high-polluting industries, in keeping with Baron and Gomez-Mejia. Recognition services, like those run daily, are another common component of corporate environmental initiatives.

1.3. Objectives

The main purpose of this study is to:

- Provide a basic understanding of green HRM to the readers,
- Highlight different significant works on green HRM by other workers, and
- Elaborate on various green practices that may be incorporated for building a Green workplace.
- Attempts to suggest some green initiatives for HR.

1.4. Methodology

The study is based on the secondary data. For this extant literature associated with the subject from different databases, websites and other available sources was collected. A scientific review of collected literature was exhausted in detail.

1.5. What is Green HRM?

The term Green HRM has become the thrill word within the business field at this time and its significance is increasing manifold with time. This term has also secured a position as a hot topic in recent research works since the attention on environmental management and sustainable development has been increasingly rising day by day all around the globe.

Today the subject of Green HRM not only includes awareness of environmental affairs but also stands for the social similarly as economic well-being of both the organization and the employees within a broader prospect.

1.6. Needs for GHRM

The last 20 years of this century have witnessed a unanimous consensus for the necessity of a practical environmental management drive everywhere around the globe. This effort was undertaken since the damaging effects of various pollutants among which the economic wastes being the most important culprit that has been deteriorating and depleting our natural resources in no time has been evident. The “Magna Carta” on Human Environment was declared within the first United Nations (International) Conference on Human Environment held in June 1972 in Stockholm declared that defending and improving the human environment for present and future generations became an essential goal for mankind.

1.7. Literature Review

The extant literature within the HR field on the subject of sustainability suggests that more and more HR executives are keen to modulate their corporation per se to become exclusive environmental champions. An excellent extent of inquiry highlights the impact of environment management practices on the performance of the organization using different parameters (Iraldo, Testa, & Frey, 2009; Yang, Lin, Chan, & Sheu, 2010).

Literature has given importance to the adoption of environmental practices as a key objective of organizational functioning making it important to spot with the support of human resource management practices. (Cherian & Jacob, 2012, p. 25). Haden, Oyler, and Humphrey (2009) comprehend that the combination of environmental objectives and methods together with the strategic development goals of a corporation ends up in an efficient environment management system. Daily and Huang (2001) proposed that organizations essentially must balance commercial growth similarly to the preservation of the environment because it's been confirmed that by endorsing green practices, the businesses may profit over before (Murari & Bhandari, 2011).

1.8. GHRM Functions Future Direction

GHRM could be a manifesto which helps to make a green workforce that may understand and appreciate green culture in a company. Such green initiative can maintain its green objectives all throughout the HRM process of recruiting, hiring and training, compensating,

developing, and advancing the firm's human capital (Dutta, 2012). The Human Resource Department of a corporation is capable of playing a major role in the creation of a sustainability culture within the corporation (Harmon et al., 2010).

2. Aspects of Green HRM from a Strategic Perspective

HR is critical in ensuring that the organization's environmental responsibilities are incorporated into the company mission statement. The HR manager's job is to lift awareness about Green HRM, the Green movement, and therefore the use of natural resources within the workplace, assisting the corporation in maintaining a healthy environment and preserving natural resources for future generations. A green job involves working directly with environmental policies, information, materials, and technology and wishes specific knowledge, expertise, training, or experience in these fields.

Green HRM focuses on employee environmental attitudes within the workplace, which workers can then replicate in their personal lives.

The following are samples of green HR policies:

- Human resource sourcing and procurement.
- Green hiring and selection.
- Orientation; Learning and Growth.
- Management of green results.
- Compensation and reward management that's environmentally friendly.

2.1. Human resource sourcing and procurement:

Green goals should be included within the management verbal description so higher-level executives are well-versed in green initiatives. Environmental awareness should be included within the organization's competency model as a prerequisite for workers. Recruitment and selection practices that are environmentally friendly Green hiring may be a system that emphasizes the importance of the community as a serious component of the corporate. Additionally, the hires are excited and, to a point, obsessed with working for a "green" organization that's environmentally friendly. Companies will easily induct practitioners who are knowledgeable of sustainable processes and are already aware of basics like recycling, conservation, and creating a more rational environment by recruiting applicants with a green bent of mind. In their research on the effect of a company's environmental standards on employee recruitment, Grolleau et al. (2012) discovered that a company's environmental commitment contributes to its profile. In their initial study,

they found that professionals were more worried about a company's environmental policy. Companies may use their websites to ask people to use them for open positions. To attenuate the waste of printed papers, a resume is submitted online. Web portals may be used for onboarding documents like bid letters, certificates, and testimonials about skills and experiences, as well as acceptance letters from selected applicants. Companies that are environmentally conscious attract more skilled and motivated employees. Some job seekers tend to forego a better salary to figure for environmentally conscious organizations. Some job descriptions for advertised positions, additionally as other company details, are often posted on the company's website, which aids in the orientation of recent employees. Several environmental considerations may be listed within the verbal description at another time. The duty description should include a piece on environmental issues. Environmental reporting functions, health and safety assignments, and dangerous elements/probable radiations for workers are all included during this sort of description, which is then matched to worker characteristics supported by environmental competencies. Green consciousness is also used as a preferential criterion when hiring workers. Employers hunt for environmentally conscious workers.

Green recruiting could be a system where the main focus is given to the importance of the environment and making it a serious element within the organization. Complementing this, the recruits also are enthusiastic, and to some extent, hooked into working for an environment-friendly "green" company. Recruiting candidates with a green bend of mind makes it easy for firms to induct professionals who are aware of sustainable processes and are already conversant in basics like recycling, conservation, and creating a more logical world.

2.2. Orientation:

The employee induction programme should be designed in such a way that new hires are introduced to a green-conscious community. Within the orientation programme, employers should emphasize their concern for green concerns like employee health, protection, and green working conditions.

2.3. Growth and Green Training and Development

Training and development could be a practice that focuses on the development of employees' skills, knowledge, and attitudes, preventing deterioration of EM-related knowledge, skills, and attitudes. Green training and development educate employees about the worth of EM, train them in working methods that conserve energy, reduce waste, diffuse environmental

awareness within the organization, and supply opportunity to interact employees in environmental problem-solving. Green T&D activities make employees attentive to different aspects and values of environment management. It helps them to embrace different methods of conservation including waste management within a corporation..

Training and growth may be a process that focuses on improving workers' abilities, expertise, and attitudes to avoid the loss of EM-related knowledge, skills, and attitudes (Zoogah, 2011, p. 17). Employees are made aware of various aspects and therefore the importance of environmental sustainability through green T&D activities. It enables them to adopt various recycling practices, like waste management within a company. It also improves an employee's ability to house a spread of environmental concerns. In a survey of managers on best management practices, Ramus (2002) found that environmental training and education, additionally as creating a positive environmental culture for workers where they want they're a component of environmental outcomes, are the foremost critical HRM processes for achieving environmental goals. Employees may enjoy learning, training, and growth policies like programmes, seminars, and sessions that help them improve and acquire expertise in environmental management, green skills, and attitudes. Job rotation within the green assignment should become an integral aspect of the career growth strategy for potentially talented green managers. The content of coaching should be determined to enhance employee competencies and skills in green management. Environmental management training may make extensive use of online and web-based training courses, further as interactive media. Health, energy conservation, waste management, and recycling are all environmental concerns which will be addressed by green training. Training managers can rely more on the web course material and case studies instead of on printed handouts, thereby further reducing the utilization of paper.

2.4. Green Performance Management:

Performance management (PM) is the method of encouraging workers to enhance their technical skills to assist the corporation in accomplishing its goals and objectives more effectively. For every risk area in environmental awareness and guidance will help to successfully launch a green PM framework. Green initiatives must be communicated in the slightest degree levels of the organization. Green goals and responsibilities are also set by managers and employees.

Performance management (PM) is the process by which employees are prompted to boost their professional skills that help to attain the organizational goals and objectives in a very better way. The popularity of the company strategy culminates in the PM. With the EM

affecting global business strategy, PM is additionally being influenced by the green wave in an exceedingly possible positive manner. Green performance management consists of issues associated with environmental concerns and policies of the corporation. Today some firms house the difficulty of PM by installing corporate-wide environmental performance standards, and Green information systems/audits to realize useful data on environmental performance (Marcus & Fremeth, 2009).

The PM is the culmination of the appreciation of the business strategy. With the EM influencing global business strategy, the green wave is probably going to have a positive impact on PM. Green performance management is concerned with the company's environmental concerns and policies. It also focuses on the application of environmental obligations. In their research, Epstein and Roy (1997) found that when HR managers incorporate environmental performance into PM systems, they protect environmental management from damage. The goal of the performance management (PM) system in green management is to live ecological performance standards across the organization's departments and acquire useful information on managers' green performance. The PM system should include green performance indicators. The event of performance metrics for every risk area in environmental awareness and guidance will help to successfully launch a green PM framework. Green initiatives must be communicated in the slightest degree levels of the organization. Green goals and responsibilities could also be set by managers and employees.

2.5. Green Compensation and Rewards Management:

Rewards and compensation are the most important HRM processes through which employees are rewarded for his or her performance. These HR practices are the foremost powerful method which links together an individual's interest to the organization's. We also assert that incentives and rewards can influence employees' attention to the utmost at work and motivate them to exert maximum effort on their part to attain organizational goals.

Rewards and compensation could also be thought of as possible mechanisms for promoting sustainable programmes in organisations within the sense of Green HRM. Modern companies are designing incentive programmes to push eco-friendly activities undertaken by their workers, in line with a strategic approach to reward and management. Employees' compensation packages should be adjusted to reward the training and achievement of green skills. Monthly managerial incentives and monetary, nonmonetary, and recognition-related environmental compensation programmes could also be offered to support performance

outcomes in environmental balance. The first considerations for executive compensation as an award for green activities are carbon emission standards and renewable energy sources. Employees who achieve green objectives are compensated.

2.6. Green Employee Relations:

Employee relations are that aspect of HRM which is anxious with establishing amicable employer-employee relationship. The connection facilitates the motivation and morale of the workers further and increases productivity. Other benefits of employee involvement are improvement in employee and organizational health and safety, similar to the development of eco-friendly staff. We propose that by keeping the policies in situ, long-term trust among the management and employees is built which can provide a chance for the workers to precise their personal ideas at workplace and help to form climate conducive to green management practices and systems.

Employee relations are part of human resources management that deals with establishing a positive employer-employee relationship. Employee motivation and morale are improved as a result of the partnership, as is efficiency. Employee relations are essential practices that include employee engagement and empowerment. It also aids in the prevention and backbone of workplace issues that might have control on the duty. Positive employee relations are, in reality, an intangible and long-lasting asset and a source of competitive advantage for any business. Employee involvement in green initiatives improves green management by aligning employees' priorities, skills, motivations, and perceptions with green management policies and systems. Employee involvement in EM has been identified to boost EM systems like resource efficiency (Florida & Davison, 2001); waste reduction and occupational emissions reduction (Florida & Davison, 2001). Individual empowerment, in keeping with several researchers, features a positive impact on efficiency and success, moreover as facilitating self-control, individual thought, and problem-solving skills (Renwick, 2008; Wee & Quazi, 2005). Employee interactions should be broadened by instituting a suggestion scheme within the corporation, within which every employee, from the highest to the underside, is given the chance to participate. This practice would aid in raising awareness of environmental issues, as well as generating new ideas for environmentally sustainable practices from various sources.

3. Green Initiatives for HR

Organizations across the planet are incorporating and dealing with implementing GHRM practices to achieve competitive advantages in the company world. Complete adoption

and integration of GHRM in business isn't impossible but requires a changed approach toward the present HR practices on the part of both the management also as employees simultaneously. There are numerous issues associated with GHRM that have to be taken into consideration by the HR department before implementing green initiatives and, all of them may be not contained within one document. Due to the space limit the subsequent section of the paper briefly focuses upon a number of the most important green initiatives for HR departments.

3.1. Buildings that are Environmentally Friendly:

Organizations everywhere on the planet are increasingly choosing green buildings as their workplaces and offices over conventional offices. Green buildings meet some criteria for reducing the exploitation of natural resources utilized in their construction, making the phenomenon very trend-setting. Green buildings even have several additional features associated with green practices including energy conservation, renewable energy, and stormwater management. In recent years, there has been a rapid increase in the adoption of green buildings by businesses. The importance of green buildings in managing environmental issues has become increasingly apparent within the business world. Due to their low cost of construction and engineering, green buildings also function as a forum for financial savings for businesses. Business behemoths like Ford and PepsiCo are committed to sustainability and have incorporated green building design concepts into their structures.

3.2. Paperless Office

Most of the office is managed on paper but, with the introduction of IT, the consumption of paper has been reduced. Today E-business and learning have changed the methods and procedures at offices converting them into paperless offices. A paperless office could be a workplace where the employment of paper is either restricted or eliminated by converting important official documents and other papers into automated workflows. Finally, we assert that by reducing the employment of paper, we will directly conserve natural resources, prevent pollution, and reduce the wastage of water and energy.

3.3. Power Conservation:

Energy conservation within the workplace has the potential to have a major environmental effect. Offices around the world have adopted many energy-saving programmes to cut back their environmental effects to produce simpler and environmentally sustainable services. Organizations are now encouraging the widespread use of energy star-rated light bulbs and fixtures, which use a minimum of two-thirds, less energy than standard bulbs and fixtures.

Conservation of energy within the office has the potential for a good environmental impact. In an endeavour to produce more efficient and eco-friendly services, offices around the world have implemented several energy conservation initiatives to cut back the environmental impact. The HR department at the United Kingdom arm of Sky has started a campaign where the staff are asked to show off PCs, TVs, and lights when leaving, to use 100% renewable energy, and introduce solar lighting (Davies & Smith, 2007). Whereas the HR department of other British organizations is emphasizing upon their travel policy which promotes car sharing and therefore the increased use of conveyance (Simms, 2007). additionally, HR systems like e-HR are seen to be able to help management and employees track their own carbon emissions (Beechinor, 2007). Organizations also are promoting the extensive use of energy star-rated light bulbs and fixtures which undoubtedly consume a minimum of two-thirds less energy than regular ones.

3.4. Waste Disposal and Recycling:

Recycling is the process of converting discarded materials (waste) into fresh and usable products. Recycling is the methodology of processing exhausted materials (waste) into new and useful products. Recycling reduces the utilization of raw materials that will otherwise be used to produce new products. Consequently, this practice saves energy and reduces the number of waste that's thrown into the dustbins, thereby making the environment cleaner and therefore the air fresher. As an element of their green initiatives, several organizations are implementing recycling programs to extend the number of recycled products and reduce the number of waste. Recycling helps to avoid wasting raw materials that might preferably be went to create new goods. As a result, this method saves electricity and reduces the number of waste dumped into landfills, leading to a safer atmosphere and cleaner air. Several organizations are introducing recycling programmes as a part of their sustainability initiatives to extend the quantity of recycled materials and reduce waste. Resource experts are tasked with developing company recycling systems and tracking workplace thermostats since the businesses adopted the thought of saving money while still concentrating on the environment and sustainability. Many HR practitioners concluded as a result of this process that green initiatives were a crucial part of overall corporate social responsibility. To avoid wasting the world, the entire business world is reciting the old motto of the three R—Reduce, Reuse, and Recycle.

4. Aspects of Green HRM

HR plays a significant role in making the environmental responsibility of the organization a component of the company's mission statement. The responsibility of the HR managers is to

make awareness about the Green HRM, the Green movement, and therefore the utilization of natural resources, helping the company to take care of the right environment and retain natural resources for future generations among young and dealing people.

A green job is employment that directly works with strategies, information, materials, and technologies that contribute to minimizing environmental impact and requires specialized knowledge, skills, training, or experience in these areas.

According to Zoogah, D. (2010), five major platforms where sustainability principles will be applied within the transforming a company to a wholly sustainable enterprise are as follows:

“The Green products/services Portfolio” includes waste and pollution management, resource replacement, sustainable design, and adaptive reuse.”

“The Green Workforce” includes Human Resource strategies, culture, recruiting and retention, training, career path development, and variety.”

“The Green Workplace,” including global locations, physical plants, ergonomics, virtual workplaces, green buildings, environmental discharge, waste and energy, use, and source.”

“The Green Function/Process Model,” including sustainability applied to traditional functions, enterprise-wide green process modeling to include green practices and sustainable-management.”

“Green Management and Governance Principles,” including board and management accountability, sustainability test, compliance, incentives, ethics, reporting, and assurance.”

“Green HR policies emphasise group and individual capabilities to convey green behaviour.”

The goal or objective of such policies is to make a company an environmental culture. The focus of Green HRM concentrates on employees’ environmental behaviour within the workplace, which successively, employees can practice such quiet behaviour in their private lives.

5. HRM Practices

1. Encouraging workers to search out ways to scale back the employment of environmentally harmful chemicals in their goods through training and rewards.
2. Assisting workers in locating ways to recycle materials which will be wont to build playgrounds for kids that don’t have access to safe places to play.

3. The HRM structure of a company should represent wealth, growth, and well-being, resulting in the long-term health and sustainability of both internal (employees) and external (communities).
4. Emphasizing long-term job stability helps workers, their families, and their neighbourhoods escape disruption.
5. The employment of company job sites for recruiting, likewise because of the tradition of phone, internet, and video interviews, which may reduce the candidate's travel requirements while also reducing paperwork.
6. Businesses can give green incentives to workers by arranging for a nature-friendly workplace and lifestyle benefits like carbon credit equalizers, free bicycles, and so on.
7. Talented, professional, and seasoned workers are increasingly concerned about the environment, and that they seek self-actualization to stay committed to their employment. By adhering to green values and practices, green HR can foster this commitment.
8. Within the areas of recruiting, training and advancement, and performance assessment, green actions may be accomplished with the smallest amount of paper and written materials.
9. By minimizing the employment of printed products, increasing recycling, using eco-friendly grocery and lunch bags, and banning the utilization of drinking water and plastic within the workplace, a corporation can create a green business climate.
10. Within the office, fluorescent light bulbs and other energy-saving green technologies are also used.
11. Companies may encourage workers to boost their travel and commuting habits by minimizing official car trips, using public transportation for business travel, carpooling, offering interest-free loans for motorcar purchases, and inspiring employees to bike or walk to figure.
12. Whenever possible, conduct business meetings and conferences through the net, telephone, or video conferencing to save lots of time and money.
13. Workers, their families, and also the general public should participate in wellness programmes that emphasize workouts, good nutrition, and a balanced lifestyle. Environmental sustainability should be included within the company's mission statement as a component of their corporate responsibility as a good green goal.
14. Encourage the worker to avoid wasting electricity by turning off lights, monitors, and printers during work hours and on weekends. 16. Encourage staff to show off computers and printers after they are going out for an extended period of time.

A concept requires a strategic framework for its implementation. For example, individual tacit knowledge may contribute its functions to an organizational business plan when it is managed properly. Knowledge management (KM), a main topic of KBV, aims to provide learning organization to compete and challenge the growing economic change. In this case, KM serves the organization a strategic framework to exploit its resources, especially internal resources: tacit knowledge and IC.

6. Advantages of Green HRM

The following are a number of the benefits of GHRM as defined by experts:

1. Assisting businesses in reducing expenses without sacrificing talent.
2. Being green and developing a brand new friendly world provide massive growth opportunities for businesses, furthermore as huge operational savings by lowering their carbon footprint.
3. It contributes to increased employee work satisfaction and loyalty, which results in increased productivity and long-term viability.
4. Foster a community of caring for one's coworkers' well-being and health.
5. A rise in the employee's retention rate.
6. An improved public profile. When an organization implements a green programme within the workplace, the incidents are often used to generate positive publicity. Organizations may use press releases to advertise their environmental contributions to the media to attract the eye of potential buyers and generate new revenue.
7. Work to spice up employee morale.
8. The company's environmental impact is reduced.
9. Improved average efficiency and increased competition.
10. Substantial reduction in utility costs. And little businesses can save cash on utilities by implementing energy-efficient and waste-reduction technologies.
11. Tax breaks and rebates. Governments, local municipalities, water system authorities, and electric utilities all provide tax incentives and rebates, making it easier to travel green.
12. Expanded market possibilities only companies that meet clear green criteria are allowed to bid on contracts with certain government agencies, commercial businesses, and charitable organizations. Some businesses often require their buying departments to only purchase green groceries or to use products and services from companies that meet certain environmental criteria.

13. Lessening the impact on the climate. Encourage workers to seek out ways to scale back the employment of environmentally harmful products through training and compensation.
14. Consumers today, especially the foremost educated and affluent, hunt down businesses that adhere to environmental regulations. Organizations that pursue environmentally sustainable human resource practices will profit greatly.
15. This could aid in the development of greener goods and also the reduction of waste. Consumer satisfaction is often improved indirectly by promoting such principles.

7. HRM Practices in Companies

Businesses are under heightened economic, regulatory, and societal pressures in today's global business world. Additionally, there's a demand for environmental protection, which necessitates the implementation of policies to cut back the environmental impacts of the products and services provided. Going green, consistent with Clem (2008), represents a social consciousness about sustaining and maintaining the Earth's natural resources for the sake of civilization. The marketplace for food is increasing as consumers become more tuned in to environmental issues. This increased sensitivity to and understanding of environmental issues puts some demands on business functions to become more environmentally friendly. Smith (2003) and Friend (2009) describe 'green businesses' as businesses and activities that are perceived as environmentally sustainable, like the utilization of organic and natural resources to make factories, stricter pollution controls, and environmentally friendly material sourcing. In keeping with Gilbert (2007), a green business operation is any activity that has either a coffee negative ecological effect or directly benefits the natural environment in any way. A green company, per Morebusiness.com (2009), uses less natural resources to finish tasks and uses sustainable methods and materials, like recycling (paper, plastic, appliances, glass, and aluminium) and utilizing sustainable goods (recycled, plant-based or organically grown). With environmental issues at the forefront of all business decisions, HR's position is about to vary dramatically, and Green HR is anticipated to dominate the longer term of all businesses, large and small. Some researchers have attempted to classify the literature on the idea of entry-to-exit processes in HRM (from recruitment to exit), revealing the role that HR processes play in translating Green HR policy into practice, given the growing need for the combination of environmental management into Human Resource Management (HRM) – Green HRM – research practice. Green HR could be a technique that focuses on lowering each employee's carbon footprint and retaining talent. The traditional CSR definition is combined with a longer-term renewable approach to business practices during this term. Electronic filing,

carsharing, job-sharing, teleconferencing and virtual interviews, recycling, telecommuting, and online training are samples of environmentally friendly HR programmes that lead to greater efficiencies, lower costs, and better employee engagement and, as a result, help companies reduce employee carbon footprints.

- IBM:** Over the last ten years, IBM has undergone a dramatic and well-publicized transition, transforming itself from a robust multinational corporation to a globally integrated corporation. Such businesses combine development and value distribution around the globe by locating business functions where they're most cost-effective and qualified. IBM's human resources (HR) department analyzed its operations and procedures to remain in keeping with this approach and serve other business needs, distinguishing key HR responsibilities like policy creation and internal business consulting from non-core back-office administrative tasks. "We were wasting lots of your time on processing and logistical aspects, running technology, and plenty of other foundational items that weren't contributing anything to the underside line. IBM recognizes the necessity to draw on talent globally, with quite 170 countries and 62 per cent of our company services located there. HR has moved to a globally oriented, process-driven model to accomplish this. IBM's five building blocks provide you with the resources you wish to save lots of money and develop your company. They've learned that going green has a control on both the wallet and also the environment. Reduce maintenance costs by 40-50 per cent energy savings \$1.3 million a year Positive environmental effect 1,300 fewer vehicles or 3.5 million pounds of coal saved Diagnose Get the facts to grasp the energy usage and potential for change Develop Plan, build, and upgrade to energy efficient data centres Cool Virtualize Implement etc. IBM's Big Green Use initiative has pioneered creative cooling technologies and takes a holistic Green IT approach.
- ONGC:** within the 'Mining, rock oil Production' group of Fortune's Most Admired List 2012, ONGC is the only Indian energy major. Supported sales (US\$ 26.3 billion), profits (US\$ 5 billion), assets (US\$ 51 billion), and capitalisation (US\$ 46.6 billion), it's ranked 171st in Forbes Global 2000 list of the world's largest companies for 2012. Transparency International has ranked ONGC 39th among the world's 105 largest listed companies in terms of 'transparency in corporate reporting,' making it India's most transparent business. Landscaping, garden design, and area greening projects have begun on the Jollygrant Airport campus in Dehradun. ONGC encompasses a range of green HRM initiatives. Another is the Vadodara Movement, which is operated by Indian Express.

- GAIL** (Gas Authority of India Limited) is one of India's premier Navratna Public Sector Undertakings, having consistently retained its Navratna status since 1997. The business uses the simplest Human Resource Management techniques that are widely used and practised in top-tier multinational companies. TEAM GAIL, the name given to GAIL India Limited's staff, is to blame for the company's growth. It's an oversized growth opportunity within the coming years because it expands its base in India to extend the utilization of green energy. It's been ready to significantly reduce the country's environmental emissions. The preservation of the Taj Mahal from pollution, additionally as reformative measures in the capital of India, Surat, Mumbai, and a bunch of other towns, live samples of its excellence. It's one of the safest public-sector organisations, with no recorded cases of business hazards or injuries in any of its facilities for several years. It's thanks to the human resources' high degree of dedication to figure. It donates 2% of its Profit after Tax (PAT) to charitable organizations. It's an enormous support to lakhs of India's poor and vulnerable people. In keeping with Hewitt International, an internationally recognized survey firm, it's ranked jointly of the most effective employers within the country. The corporation is one of the world's biggest corporate citizens. For several years, the simplest management systems are in use. It's a really honest and open business. It's a high degree of customer satisfaction. Due to its strong Human Resource Management practices, its workers are among the very best paying and most happy.
- Walmart:** Walmart's big-picture strategic aim of being powered entirely by renewable energy, producing zero waste, and selling goods that benefit consumers and therefore the environment is attracting lots of attention. Much has been written about its plans to green its supply chain and improve organic product scores so as to realize a 20 million weight unit reduction in greenhouse emission emissions. Via a volunteer associate sustainability initiative, Walmart is enlisting the assistance of a lot of associates spread across four continents to assist in transforming its declared initiatives into reality. Walmart employees everywhere around the globe are focused on their health, their communities, and also the environment. Walmart also has a policy of recognizing employees and their accomplishments on a daily basis. Walmart has been effective in green sales, earnings, and environmental improvements by encouraging collective management/associate thinking.
- ITC:** It could be a leading private sector company in India with a deep commitment to the triple bottom line. It's been a forerunner in implementing environmentally friendly processes, well before regulations, setting industry standards. With a

diversified presence in cigarettes, hotels, paper boards and speciality papers, packaging, agribusiness, processed goods, and a spread of other services, it has a capitalization of over US \$ 22 billion and a turnover of over US \$ 5 billion. Premium Business Paper is one of ITC Ltd.'s sustainable initiatives at ITC Green Products. For the first time in India, ITC has introduced Paper Kraft Premium Business Paper, an environmentally friendly multipurpose paper for office and residential use, employing a new technology called 'Ozone Treated Elemental Chlorine Free Technology,' which replaces Elemental Chlorine, which was previously employed in the bleaching process during paper manufacturing. As a responsible corporate citizen, ITC engages in an exceeding type of activities that benefit society, including environmental, health, and safety (EHS) programmes, outreach to the general public, preservation of national heritage, and support for sustainable growth. It's dedicated to environmental protection within the areas where it works. The HR role of their department makes a major contribution to the company's green management practices. A good, clean, and green work environment is extremely important to the corporate. ITC is devoted to providing healthy physical working conditions also as encouraging high hygiene and housekeeping standards. The corporate considers commitment to sustainable development to be a critical component of responsible corporate citizenship and so gives it a top priority. As a result, the corporation is devoted to Best Practices in environmental matters resulting from its business operations, and every business is anticipated to completely demonstrate this dedication.

HCL Technologies-

HCL Technologies Limited is an Indian global IT services company. It offers services including Software Consulting, Enterprise Transformation, Remote Infrastructure Management, Engineering and R&D services, and Business Process Outsourcing. HCL has offices in 31 countries to supply services across industry verticals, including aerospace & defence, energy & utilities, independent software vendors, manufacturing, professional services, servers & storage, automotive, financial services, industrial manufacturing, media & entertainment, retail & consumer, telecom, consumer electronics, government, life sciences & healthcare, medical devices, semiconductors, and travel, transportation & logistics. In the year 2013, HCL won the Asia-Pacific Enterprise Leadership Award (APELA). This award recognizes and honours the achievements of companies within the areas of sustainable development and company responsibility. HCL runs a multi-layered corporate program "Go Green" to drive its sustainability initiatives. It's green processes across facilities & within the areas of travel, IT and events. The company commits to

compliance with ISO14001 standards .It runs campaigns to initiate individual action towards environmental issues. HCL views Green initiatives enterprise wide and understands that Green goals can be set at a corporation strategy level so top-down approach may be adopted for its implementation, which might create green business processes and Green work place for employees. Recently HCL has been honored with the ‘Global Sustainability Leadership Awards 2014’ under the category ‘Best Community Action’ at the globe CSR Congress. The award recognizes Best Practices & Outstanding Individuals Engaged in Corporate & Social Responsibility.

Conclusion:

Green Human Resources Management is targeted at the green movement, which is anxious with environmental conservation and therefore the preservation of the world Earth from potential disasters. As a result, protecting and improving the human environment for current and future generations has become a critical task for humanity. In reality, not only in these firms, but increasingly in other businesses furthermore, Green HRM is poised to play a big role within the industry by incorporating it into management theory, HR policies and practices, employee training, and also the implementation of environmental laws. It'll also raise awareness among workers and community members about the way to use natural resources more efficiently and promote the employment of environmentally friendly goods. Green HRM is the buzzword of the long run. The GHRM activities mentioned in this section can help the organization improve both its environmental and financial performance. GHRM practices reviews like this also are likely to enhance employee health within the workplace, not least by enhancing the working climate and meeting the wants of an increasingly environmentally conscious workforce. To summarize, we assume that GHRM has the power to extend employee well-being as well as organizational success. Green HR aids in process improvement and price reduction by reducing and removing environmental waste and refurbishing HR materials, equipment, and procedures.

Though the green movement and Green HR are still in the stages of infancy, growing awareness within organizations of the importance of green issues has compelled them to embrace environment-friendly HR practices with a selected specialise in waste management, recycling, reducing the carbon footprint, and using and producing green products.

The future of Green HRM appears promising for all the stakeholders of HRM, be it the employers, employees, practitioners, or academicians. Studies that observe the general impact of GHRM systems instead of individual practices would be particularly helpful in this respect. Such studies can help organizations to cut back degradation of the environment

become healthier both physically and financially and, make the globe a cleaner and safer place to measure. On a concluding note, we might prefer to add that HR is the major role player in implementing GHRM practices and policies. But this, they need a vital role to play in the recruitment of recent employees who are more established toward green business practices thus, indirectly saving the planet. Last, but not the smallest amount, HR has a significant opportunity to contribute to the organization's green movement and plays an important role in enthusing, facilitating, and motivating employees to absorb green practices for greener business.

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WOMEN ENTREPRENEURSHIP AND SUSTAINABILITY IN INDIA

Subhasmita Parida

Introduction

As India works towards achieving its sustainability goals, the collective efforts of various stakeholders play a vital role in driving progress and bringing the nation closer to its objectives. At the same time, the ongoing impacts of climate change on the environment call for immediate action from individuals, nations, and the global ecosystem as a whole. To build a sustainable future, it's crucial to advance both economic and sustainability goals together. India, as the fastest-growing startup ecosystem globally, adds 80 new startups daily, significantly contributing to employment, business, and economic growth. This transformation influences how businesses operate and adapt to current trends. Many stakeholders are aligning their business strategies to create long-term value for the ecosystem, with women playing a crucial role in keeping sustainability at the core of their ventures. Today, we'll explore how women entrepreneurs are driving positive change and fostering more responsible economic growth.

The entrepreneurial landscape for women in India has seen a rapid evolution. In 2017, 29.5% of all startups registered with the Department for Promotion of Industry and Internal Trade (DPIIT) had at least one female director. By November 7, 2022, this percentage had surged to 47%. Furthermore, women entrepreneurs are now more prominent across diverse sectors, such as healthcare, lifestyle, food and beverages, IT services, and education. Amid growing awareness of environmental concerns, highlighted by events like COP26 and COP27, and increased government emphasis on sustainability and Corporate Social Responsibility (CSR) disclosures via the Securities and Exchange Board of India (SEBI) and the Companies Act of 2013, businesses are increasingly incorporating Environmental, Social, and Governance (ESG) principles into their Business Responsibility and Sustainability Reporting (BRSR). There's a clear shift towards viewing ESG as a vital component rather than just a regulatory requirement. Investors are also seeking impactful ventures to support, and women entrepreneurs are leading the way in making meaningful changes. A key focus of women-led startups is sustainability, evident across various industries offering innovative products, services, and practices. Today, women are increasingly integrated into the corporate world, contributing significantly to the advancement of sustainability-focused changes. Beyond boosting the economy, female entrepreneurs also promote gender

equality and empower communities. However, women face certain challenges in pursuing entrepreneurial ambitions, such as limited access to capital, education, and institutional support. To empower women entrepreneurs, it's essential to provide equal opportunities, mentorship, resource access, and capacity-building initiatives. Addressing the unique needs and barriers that women encounter is crucial for achieving gender equality and harnessing their potential as drivers of sustainable development. Recognizing the vast potential of women's entrepreneurship is vital as society works together to tackle complex social and environmental challenges. This study highlights how women's entrepreneurship can contribute to achieving the Sustainable Development Goals (SDGs) and advancing more inclusive global sustainability efforts by acknowledging the interconnectedness of economic, social, and environmental factors.

Literature Review

Female entrepreneurship plays a crucial role not only in economic growth but also in driving social and environmental sustainability, as well as fostering economic diversity. Women are recognized as dedicated and resilient protectors of their families, communities, and cultures. However, in many countries, particularly in resource-rich and emerging economies, women still face limited opportunities and significant barriers to realizing their full entrepreneurial potential.

As the 21st century progresses, advancing the achievement of Sustainable Development Goals (SDGs) has become a critical global priority, addressing complex issues such as poverty eradication and environmental preservation. In this context, women entrepreneurs are making a transformative impact on both economic and environmental landscapes.

The connection between women's entrepreneurship and the SDGs represents a multifaceted approach to fostering inclusive growth, innovation, and community resilience. The creativity, resourcefulness, and determination of women entrepreneurs are not only driving economic progress but also promoting social justice and environmental conservation. Across the globe, women are embracing entrepreneurship to actively contribute to the realization of a more equitable, sustainable, and prosperous world.

This study explores how women-led businesses are advancing sustainable development goals by examining the dynamic relationship between women's entrepreneurship and the SDGs. The achievements of female entrepreneurs are vast, ranging from advocating for gender equality and supporting marginalized communities to pioneering innovative solutions for ecological protection and equitable economic development. The goal is

to highlight how women's entrepreneurship can significantly contribute to the global sustainable development agenda by analysing challenges, opportunities, and best practices.

The primary aim of this study is to educate and inspire stakeholders from all sectors to harness women's entrepreneurship as a powerful force for the SDGs. Through empirical findings, case studies, and policy analysis, the study seeks to encourage policymakers, business leaders, and civil society members to open new pathways for sustainable growth, fostering a more just, inclusive, and resilient world for future generations by supporting women's entrepreneurial endeavours in a nurturing environment.

Globally, Micro, Small, and Medium-sized Enterprises (MSMEs) are seen as hubs of innovation and entrepreneurship, and this is no different in India. MSMEs in India are widely distributed across the nation, producing a diverse range of goods and services. The SDGs established by the United Nations are seen as highly dependent on the dynamic and adaptable nature of MSMEs, which play a vital role in driving both economic and sustainable development.

To promote the Sustainable Development Goals (SDGs), this research reviews the literature on two key topics: female entrepreneurship and women-oriented sustainable entrepreneurial projects. The current area of research concentrates on woman-based enterprises, that are constrained by their under representation in the labour force and society. Through an examination of societal perceptions, responsiveness, and artistic blockades to females' entrepreneurial engagements, several underlying causes for the under-representation of women in the financial and society-based spheres were found. In addition, the assessment continues to look at women's educational and professional levels of awareness, as well as whether or not they have access to appropriate communities and mentors that support their business ventures. Additionally, we investigated whether women had equal access to financial possibilities, including incentives for successful entrepreneurship and readily inexpensive and accessible funding. The literature unequivocally demonstrates that women are actively contributing to the second part's efforts to achieve sustainable development objectives. For sustainable economic growth, several social and economic initiatives must be implemented, such as making women important players in the economy.

In the FMCG industry, for instance, women-founded unicorns such as NYKAA and Mama Earth are categorically manufacturing makeup products that are Cruelty-free/Chemical-free and vegan-friendly. Several startups, such as Zouk, exclusively manufacture products using vegan materials only, such as vegan leather. There has also been a rise in the demand for handmade products and accessories, (especially in the art, textile, and handicraft

sectors) and these significantly reduce emissions arising across the supply chain. Many women-led startups, with their customer base predominantly in metropolitan cities in India and abroad, outsource their raw materials and production from rural and semi-rural areas, employing traditional artists and restoring many traditional crafts in the process. These social enterprises are aligning traditional products to meet modern demands while also maintaining the original essence of the art form – Mithila led by Ruchi Jha is one such startup registered with DPIIT engaged in promoting Mithila or Madhubani painting, one of the oldest art forms of the world.

With post-millennials coming in the picture, the shift to the rental and the thrift shop industry – a market segment that essentially involves rotating second-hand or pre-used garments – has been quite prominent with such stores fast gaining momentum, both online and offline. Such stores, mostly run by women, sell products that are unique, relatively cheap and reduce environmental burden significantly – giving an alternate route to fast fashion. Startups such as Relove are working towards promoting a more circular economy by providing a platform for the resale or rental of already used or preloved goods. Sustainable fashion and responsible clothing brands, such as Edamamma and Sui, have also been fast gaining demand and momentum in India.

Further, the waste management and packaging industries have also seen a phenomenal shift towards sustainability in the past few years. With the Government of India pushing towards phasing out single-use plastic through the Plastic Waste Management Amendment Rules, 2021, and the draft regulations on the Extended Producer Responsibility (EPR) guidelines notified as of February 2022, many MNCs are switching towards more environmentally friendly alternatives. These sectors are particularly carpeted with innovations, from eatable utensils replacing plastic packaging to 100% biodegradable bottles giving competition to its plastic alternatives. Startups, such as Revy Environmental Solutions, with its core operations in green technology, are developing solutions to transform waste into reusable resources. The startup Happy Turtle works towards providing reusable alternatives to single-use plastic. Both are women-led and winners of the National Startup Awards (NSA) 2021.

With leading global economies heading towards an inclusive, ambitious, decisive, and action-oriented future under India's presidency, (as also highlighted in the recent 2022 G20 Summit at Bali), we must unite and come together to work with one of the most remarkable and valuable resources our nation has – our women workforce. As per a report by McKinsey, boosting women's representation and participation in employment can alone

potentially grow India's GDP (Gross Domestic Product) by approximately USD 700 billion by 2025. Therefore, in our aspiration to build a sustainable economy, we need to promote the work of the women workforce and especially entrepreneurs who are working to build not just a bigger but also a better India 2.0.

Objectives

1. To analyse the contribution of women entrepreneurs for the Sustainable development.
2. To measure the effective policy of the government for women entrepreneurs.

Research Methodology

This study relies on secondary data collected from national and international journals, census surveys, government publications, and media articles that focus on women entrepreneurship in India. The data is analysed to evaluate the role of female entrepreneurs in sustainable development and to understand the various government schemes that support them.

Analysis & findings

Women Entrepreneurship in India's Context

The Indian economy has seen numerous transformations since gaining independence, but these have come with a number of difficulties. In comparison to a few decades ago, the state of the Indian economy now presents a different picture. In terms of revenue, industries, international trade, the money market, and other economic areas, India has come a long way. India's percentage of the world GDP (PPP) has increased recently, according to data from the World Bank and the International Monetary Fund (IMF). After China and the United States, India is the third-largest economy in terms of purchasing power parity, with a projected 7.3% of the world GDP (PPP) as of 2023. Given India's expanding economic growth and growing significance in the global economy, this indicates a significant rise above the 5.83% figure you provided. India's percentage of the world GDP (PPP) has increased recently, according to data from the World Bank and the International Monetary Fund (IMF). With a predicted 7.3% of the world's gross domestic product (GDP) as of 2023, India ranks third in terms of purchasing power parity, after the United States and China. The key adaptations proposed by respondents are making it easier for women by means of expertise and ability advancement at 31.9% and improved recognition and support for women at 26.4%. Women entrepreneurs have a transformational impact on furthering sustainable concepts and making a difference in the accomplishment of the SDGs. Their

efforts reflect a comprehensive strategy that balances monetary stability, environmental care, and accountability to society. Women entrepreneurs frequently confront particular hurdles, such as inadequate possibilities for capital, marketplaces and supplies, as well as social and gender discrimination. Understanding these limitations, some groups have launched focused initiatives to help and develop female entrepreneurs.

Table 1- Labour force in India by gender, and rural and urban categories based on usual status and current weekly status (in millions): 2017–18 to 2020-21

Year	Approach	Rural +Urban		
		Male	Female	Person
2017-18	US	373.0	112.4	485.3
2018-19	US	376.7	120.7	497.4
2019-20	US	388.0	150.0	537.9
2020-21	US	397.4	166.6	563.7
2017-18	CWS	369.1	101.5	470.5
2018-19	CWS	372.8	106.2	479.0
2019-20	CWS	381.8	131.6	513.3
2020-21	CWS	390.5	140.7	531.2

Source: Niti Aayog, note: US (Usual status) includes principal and subsidiary status and CWS refers to the Current Weekly Status

The labour-force participation rate (LFPR), which rose from 36.9 per cent in 2017–18 to 40.1% in 2019–20 and 41.6 per cent during PLFS year 2020–21 based on Usual status, was significantly impacted by these labour force developments. The above table refers to the Usual status category unless otherwise noted. Although it continues to be lower than half of the male population, the female labour force participation rate is gradually decreasing as a result of the faster growth in the number of female workers. In comparison to metropolitan areas, the number of female workers is increasing considerably more quickly in rural areas. As a result, rural FLPR is now 50% greater than urban FLPR. The latest data reveals that 57.5% of men, 25.1% of women, and 41.6% of the total population in India are part of the labour force. This increase in the labour force participation rate (LFPR) highlights the demographic dividend that India is currently experiencing.

Table 2- Year-wise Women Entrepreneurs in India under PMEGP

2010-11	14658
2011-12	14299
2012-13	13612
2013-14	13448

2014-15	13394
2015-16	17508
2016-17	18780
2017-18	18821
2018-19	18924
2019-20	19104
2020-21	31,295
2021-22	34,682
2022-23	39,451

Source: Ministry of Micro, Small & Medium Enterprises 2023

The above table displays the annual count of female entrepreneurs in India participating in the Prime Minister's Employment Generation Programme (PMEGP). The trend shows a general rise in the number of female entrepreneurs over the years. From 2010-11 to 2014-15, there was a slight decline in the number of women entrepreneurs under the PMEGP program, from 14,658 in 2010-11 to 13,394 in 2014-15. This could be attributed to various factors, including regional differences, awareness of the scheme, or changes in implementation mechanisms. Beginning in 2015-16, there has been a significant rise in the number of female entrepreneurs. The figure increases notably from 17,508 in 2015-16 to 39,451 in 2022-23. The increase from 2020 onward is particularly noticeable, probably because of several government programs designed to assist MSMEs (Micro, Small, and Medium Enterprises) and the emphasis on entrepreneurship during and following the COVID-19 crisis. In 2020-21, the number of women entrepreneurs rose sharply to 31,295, likely due to government schemes introduced during the pandemic, including financial assistance, skill development, and incentives for women-led businesses. The growth continued in 2021-22 and 2022-23, with numbers reaching 34,682 and 39,451, reflecting the success of PMEGP and initiatives like "Stand Up India" and financial literacy programs.

Table 3- Government Measures to Support Women Entrepreneurs

Scheme Name	Objective	Target Group	Key Features	Time Period
Mahila Coir Yojana	To provide self-employment opportunities for women in the coir industry	Rural women in coir-producing areas	Financial assistance for setting up coir-making units; training and support for women to start coir-based businesses.	Ongoing (launched in 2017)

Stand Up India Scheme	To promote entrepreneurship among SC/ST and women entrepreneurs	Women from SC/ST and OBC categories	Loans between ₹10 lakh and ₹1 crore for setting up greenfield ventures in manufacturing, services, and trading sectors.	Launched in 2016
Pradhan Mantri Mudra Yojana (PMMY)	To provide micro-financing to small businesses and entrepreneurs	Women, particularly from disadvantaged groups	Loans up to ₹10 lakh for micro-enterprises; financial support for women entrepreneurs to start or expand businesses, especially in rural areas.	Launched in 2015
TREAD (Trade Related Entrepreneurship Assistance and Development)	To assist women in establishing their own businesses	Low-income women	Financial assistance and skill development for trade-related activities; helps women with business planning, market linkages, and training.	Ongoing
National Entrepreneurship Award Scheme	To promote entrepreneurial spirit among youth and women	Women entrepreneurs	Recognizes and rewards outstanding women entrepreneurs; provides financial support, recognition, and mentorship.	Launched in 2016
Women Entrepreneurship Platform (WEP)	To create a unified platform for women entrepreneurs	Women entrepreneurs across sectors	Platform for networking, mentoring, funding, and capacity building for women; includes resources, advice, and support to scale businesses.	Launched in 2018
Udyogini Scheme	To provide financial assistance to women entrepreneurs	Women in rural and semi-urban areas	Subsidized loans for setting up small businesses in agriculture, handicrafts, textiles, and related sectors.	Launched in 1991
Biotechnology Industry Research Assistance (BIRAC) – Women in Biotechnology	To promote women's participation in biotechnology entrepreneurship	Women in the biotechnology and innovation sectors	Financial support and resources for women in biotech sectors; funding, mentorship, and networking for women-led biotech startups.	Launched in 2015

Rajiv Gandhi Udyami Mitra Yojana	To support entrepreneurs in establishing small and medium-sized businesses	Women entrepreneurs	Offers mentoring, training, and financing to help women establish and grow small businesses.	Launched in 2007
Atal Innovation Mission (AIM)	To foster innovation and entrepreneurship across India	Women-led startups and innovators	Provides funding, mentoring, and incubation centres for women-led startups in technology and innovation sectors.	Launched in 2016
Credit Guarantee Fund Scheme for Micro and Small Enterprises (CGTMSE)	To provide collateral-free loans to small enterprises	Women-led small and medium enterprises	Collateral-free loans for women entrepreneurs in the MSME sector; help in business growth across various industries.	Launched in 2000

Findings

Government initiatives and programs have greatly raised the standing of women entrepreneurs in India by providing financial assistance, training, and networking possibilities. According to the report, strengthening the network of support for female entrepreneurs through networking opportunities, market contacts, and mentorship will be crucial to their long-term viability and success.

Conclusion

Entrepreneurial techniques must adhere to indigenous customs and patterns, while they think there is an additional requirement to raise realization and provide guidance to make beneficial contributions to society. Some female participants are eager to train as entrepreneurial financiers to support other business start-ups, collaborate with other women, offer their talents to society, and make improvements to the overall resilience of the area in which they live.

In broad terms, the enduring shortage of inspirational figures for woman entrepreneurs is fading, and there is a lot of skill in commercial pursuits. It is critical to leverage female qualities in order to establish enterprises that can be in accordance with the SDGs. The importance of women in the field of small-scale business units in achieving the Sustainable Development Goals (SDGs) cannot be emphasized. Their efforts range from supporting equal opportunities for women and financial independence to encouraging creative thinking and environmental sustainability. By allowing women to fully engage in entrepreneurship,

we liberate an abundant source of abilities, innovation, and perseverance, propelling advancement toward a happier, healthier, and more equitable future for everybody.

In our efforts to look towards achieving the SDGs, we must identify and promote female entrepreneurs by offering them the appropriate tools, chances for growth, and associations they require to prosper. Their governance not only promotes economic progress but also has advantageous social and environmental consequences, producing an upstream effect that helps communities throughout the world. Women entrepreneurs make major contributions to economic growth, social advancement, and environmental sustainability, playing a key part in reaching the SDGs.

Women's entrepreneurial endeavours nurture job opportunities, inspire creativity, and stimulate balanced economic growth. Furthermore, these enterprises frequently promote social and environmental goals, which closely match the key concepts of sustainability. Despite their enormous potential, women entrepreneurs continue to encounter several hurdles, including restricted access to financing, insufficient support systems, and cultural impediments. Addressing these difficulties would need collaborative efforts from governments, corporations, and civil society to establish an enabling climate that empowers women entrepreneurs and encourages their active engagement in sustainable development activities.

We may stimulate efforts concerning the SDGs by honouring and encouraging the achievements of women entrepreneurs, resulting in a more equal, successful, and long-term existence for everyone. By leveraging the potential of women entrepreneurs, we not only move toward the SDGs but also set the road for a more equal and affluent world. Let us move forward to support their efforts, celebrate their accomplishments, and envision a future in which women entrepreneurs lead a healthy environment of business operation.

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NAVIGATING THE FUTURE: BANK INVESTMENT STRATEGIES FOR SUSTAINABLE TRANSFORMATION

Sandhiya M, Dr Anli Suresh

Introduction

The banking future will be very different from today's. Banks have to adapt to changing investors' expectations and emerging sustainable transformation. Using technology to drive smarter decisions, accelerate operations, and scale progress in a sustainable environment. Bank investment needs to develop a principal approach to strategic planning and delivery to overcome future obstacles. This research is based on sustainable transformation impact on bank investors decisions towards bank investment options and to develop the future strategical approach to withstand the economical fluctuations. This study helps the banking institution to navigate the future based upon the current sustainable transformation and accordingly formulate for future revolution on the bank investors' decision-making towards bank investment options. Regulation, Digitalisation, Mobility and security, Workforce Shift, Future Beneficial plans, Transparency, Risk Analysis, Artificial Intelligence and Blockchain Technology are the nine sustainable transformation aspects of the banking sector.

Review Of Literature

According to **Abdul Samad Dahri (2024)**- The speedy growth usage of financial technology has transformed the banking corporate by providing added advanced results and execution of the purposes of outdated banking by digital resources over the usage of fintech applications. This study exposed that other than statistics safety, proficiency and usefulness, and opportuneness had noteworthy positive results on fintech progress over investor confidence. Thus, investor confidence is noteworthy for fintech progress.

According to **Johannes Gamel (2024)**- Socially responsible investment (SRI) is a savings plan fulfilled through moral, societal, conservational or commercial authority principles. Savings in renewable sources are usually observed as fulfilling SRI standards.

According to **Wikipedia (2024)**, the present Universal Sustainable Investment Cooperation analysis reports a 15% progress in sustainable investment, with robust ESG factors in two years. This signifies a worldwide market segment worth \$35.3 trillion is enticing billions of investment dollars. However, the UN's July 2022 SDG growth statement discloses that trillions of dollars are essential.

According to **Sadhana Ogale (2023)**- Financial literacy is a combination of Individual attitude towards money, financial behaviour towards money and financial knowledge. Preference for investment while doing financial planning varies according to the awareness and interest of the investor. Liquidity, Risk, Return, Past Investment experience and Safety about investment returns affect on financial planning and investment decisions of the working couple. Financial literacy leads to better financial planning.

According to **Syrus M. Islam (2023)**- The influence of investing has excessive latent to donate in attaining the Sustainable Development Goals by funding the development of public sector organisations. The impact investment decision-making has been divided into various streams such as evaluation, behavioural issues, and ecosystem investment.

Research Gap

There is various research relating to bank investment options and studies concerning bank Investment organizations and monetary organizations. There is no research associated towards navigating the future of bank investment strategies for Sustainable Transformation. This study has mainly focused on Sustainable transformation in the bank industry and its impact on Bank Investors.

Research Methods

Objectives

To navigate the most impacting factor in the bank investment industry towards sustainable transformation based on gender category.

Design and Sample Tool Framed

Evocative, Qualitative, Fact-finding and Easy-to-read research framework was used in the research framework. Non- The probability Sampling Method was used with one hundred and twelve respondents for the study sampling does not require a complete survey frame, however, the population from the sample and data were collected through the primary method and secondary data was also collected from bank websites and research articles. The study was conducted through a digitally framed questionnaire with a five-point Likert scale. The study was conducted from September to November 2024. The statistical tool used for analysis was correlation analysis.

Hypotheses Framed

Nine hypotheses were framed for this research based on gender category with regulation, digitalisation, mobility and security, workforce shift, future beneficial plan, transparency, risk analysis, artificial intelligence and Blockchain Technology.

Results and Analysis

Table No-1 : Socio-Demographic Details				
	Frequency	Per cent	Valid Percent	Cumulative Percent
Gender				
Female	64	57.1	57.1	57.1
Male	48	42.9	42.9	100.0
Total	112	100.0	100.0	
Age				
18-25	74	66.1	66.1	66.1
26-35	20	17.9	17.9	83.9
36-45	6	5.4	5.4	89.3
46-55	6	5.4	5.4	94.6
Above55	6	5.4	5.4	100.0
Monthly Income				
Rs10000-Rs20000	51	45.5	45.5	45.5
Rs21000-Rs30000	9	8.0	8.0	53.6
Rs31000-Rs40000	12	10.7	10.7	64.3
Rs41000-Rs50000	6	5.4	5.4	69.6
AboveRs50000	34	30.4	30.4	100.0
Total	112	100.0	100.0	
Qualification				
Below Graduation	10	8.9	8.9	8.9
Graduation	42	37.5	37.5	46.4
Post-Graduation	54	48.2	48.2	94.6
Other Qualification	6	5.4	5.4	100.0
Total	112	100.0	100.0	
Occupation				
Professional	44	39.3	39.3	39.3
Public sector	6	5.4	5.4	44.6
Private sector	52	46.4	46.4	91.1
Self-employed	10	8.9	8.9	100.0
Total	112	100.0	100.0	
Source: Primary Data				

Discussions- From the respondents out of one hundred twelve respondents sixty-six-point one per cent fall under the age group of eighteen to twenty-five years, whereas seventeen-point nine per cent fall under the age group of twenty-six to thirty-five years, there are five-point four per cent respondents from the age group of thirty-six to forty-five years and also forty-six to fifty-five years and five-point four per cent respondents from the age group of fifty-five years. There are forty-two-point nine per cent male respondents and fifty-seven-point-one per cent female respondents. Monthly income earned between rupees ten thousand to twenty thousand is forty-five-point five per cent, rupees twenty-one thousand to thirty thousand is eight per cent, rupees thirty-one thousand to forty thousand is ten-point seven per cent, rupees forty-one to fifty thousand is five-point four percentage and above rupees fifty thousand is earned by thirty-point four per cent of respondents. Eight-point nine per cent of respondents are below graduates, thirty-seven-point five per cent of respondents have bachelor's qualification, and forty-eight-point two per cent of respondents have master's qualification. The job-related level is forty-six-point four per cent of respondents work in the private sector, five-point four per cent of respondents work in the public sector, eight point nine respondents are self-employed and thirty-nine- point three per cent of respondents belong to the professional category.

Table No- 2 : Correlation Analysis		
		Gender
Gender	Pearson Value	1
	Significant Value	
Regulation	Pearson Value	0.583
	Significant Value	0.040*
Digitalisation	Pearson Value	0.521
	Significant Value	0.048*
Mobility and security	Pearson Value	0.480
	Significant Value	0.000**
Workforce Shift	Pearson Value	0.920
	Significant Value	0.011**
Future Beneficial plan	Pearson Value	0.743
	Significant Value	0.000**
Transparency	Pearson Value	0.791
	Significant Value	0.003**
Risk Analysis	Pearson Value	0.521
	Significant Value	0.007**

Artificial Intelligence	Pearson Value	0.651
	Significant Value	.041*
Blockchain Technology	Pearson Value	.931
	Significant Value	0.000**
	Total	112
Source - Primary Data Analysis		

H₀₁- There is no noteworthy relationship between Gender and Regulation: The Pearson value between gender and regulation is 58.3 percent which shows that there is a positive relationship between the variables and the significant value is 0.04 which is less than 0.05 and shows that there is noteworthy relationship between gender and regulation. Thus, the H₀₁ is rejected.

H₀₂- There is no noteworthy relationship between Gender and Digitalisation: The Pearson value between gender and digitalisation is 52.1 percent which shows that there is a positive relationship between the variables and the significant value is 0.048 which is less than 0.05 and shows that there is noteworthy relationship between gender and digitalisation. Thus, the H₀₂ is rejected.

H₀₃- There is no noteworthy relationship between Gender and Mobility and Security: The Pearson correlation value for the relationship between gender and mobility and security is 48 percent which shows that there is a positive relationship between the variables and the significant value is 0.000 which is less than 0.05 and shows that there is noteworthy relationship between gender and mobility and security. Thus, H₀₃ is rejected.

H₀₄- There is no noteworthy relationship between Gender and Workforce Shift: The Pearson correlation value for the relationship between gender and workforce shift is 92.9 percent which shows that there is a high positive relationship between the variables and the significant value is 0.011 which is less than 0.05 and shows that there is noteworthy relationship between gender and workforce shift. Thus, H₀₄ is rejected.

H₀₅- There is no noteworthy relationship between gender and Future beneficial Plan: The Pearson value is 74.3 percent which shows that the variables are highly correlated and the significant value is 0.000 which is less than 0.05 and thus the null hypothesis H₀₅ is rejected and shows that there is noteworthy relationship between gender and future beneficial plan.

H₀₆- There is no noteworthy relationship between gender and transparency: The Pearson value is 79.1 per cent which shows that the variables are highly correlated and the

significant value is 0.003 which is less than 0.05 and thus the null hypothesis H_{06} is rejected and shows that there is noteworthy relationship between gender and transparency.

H_{07} - There is no noteworthy relationship between Gender and Risk Analysis: The Pearson Correlation Value for the relationship is 52.1 per cent which shows that there is a positive correlation and the significant value is 0.007 which is less than 0.05 and that the null hypothesis is rejected and shows that there is noteworthy relationship between gender and risk analysis.

H_{08} - There is no noteworthy relationship between Gender and Artificial Intelligence: The Pearson Correlation Value for the relationship is 65.1 per cent which shows that there is a positive correlation the significant value is 0.041 which is less than 0.05 and that the null hypothesis is rejected and shows that there is noteworthy relationship between gender and artificial intelligence.

H_{09} - There is no noteworthy relationship between Gender and Blockchain Technology: The Pearson value between Gender and Block Chain Technology is 93.1 percent which shows that they are highly correlated and the significant value is 0.000 which is less than 0.05 the null hypothesis is rejected and hence there is noteworthy relationship between gender and blockchain technology.

Findings

The majority of the investors were from the age category of eighteen to twenty-five years are female investors and their qualification is post-graduation and with monthly earning income is rupees ten thousand to twenty thousand and they are private sector employees. From the correlation analysis, nine factors are extracted from the research gap and analysed by using correlation analysis with gender category. There is a noteworthy relationship between gender and regulatory system, mobility and security, transparency, risk analysis, digitalisation, workforce shift, future beneficial plans, artificial intelligence and blockchain technology.

Conclusion and Suggestions

From the nine sustainable transformations, all the factors have a key influence on gender category through correlation analysis. Out of nine sustainable transformation workforce shifts blockchain technology has highly impacted the bank investors in bank investment decision-making strategy, so the banks should undergo various operations to sustain these various external and internal features with suitable future developments.

Social Relevance

Banking Transformation has a massive social impact with various financial factors. The sustainable transformation leads to investors' inclination towards bank investment options and the upliftment of society. Many investors come forward to invest in the banking industry as it is considered to be a sustainable investment which helps the country to develop economically, sociologically and environmentally friendly investments.

Scope for Future Research

The research is restricted to one of the bank investment goals in sustainable transformation which is gender category and further, it can be developed by analysing banking investment platforms towards other goals and to the different dimensions and objectives of business strategy.

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A STUDY ON INCLUSIVE FINANCE AS A CATALYST FOR RURAL SUSTAINABLE DEVELOPMENT IN ANGUL DISTRICT OF ODISHA

Miss. Subhra Routray

1. Introduction:

India is currently one of the leading nations in this competitive era, lending economically as the seventh-largest nation globally and exhibiting a high rate of economic growth every day. Similar to China, the expansion of the Indian economy is reliant on domestic consumption. Since two-thirds of the country's population lives in rural and small towns, rural areas are essential to the country's economy. The Indian economy slowed in 2008–2009 in several sectors, including IT, real estate, autos, financial institutions, and other industries. However, in villages, things were different. After 2009, a significant shift occurred. Numerous factors affect rural purchasing power, including advanced technology, which can include TV, mobile phones, the internet, and more. One of the main factors influencing rural purchasing power is that it has made rural consumers more aware of and connected to their needs. They now have an up-to-date option for themselves and their families as a result of these reasons. In actuality, their goals are the same as those of urban customers, and as the urban market becomes more crowded and competitive every day, the rural market presents a chance for both expansion and sustainable growth.

One of the most important factors in overcoming social inequality and attaining equitable, robust, and well-developed economic growth is financial inclusion. The term “financial inclusion” was coined by the government in the 1950s, and its primary goal is to provide financial services to those who would otherwise not have access to them. The former Prime Minister, Indira Gandhi, nationalized 14 commercial banks in the middle of the 1950s and 1960s, which allowed the banking industry to expand into previously unreachable areas. Banks began to grow in rural areas following nationalization, which caused a significant shift in such areas and supported the expansion of credit for small businesses, agriculture, and the underserved rural population.

In order to more thoroughly guarantee that the rural areas' credit needs are satisfied, these banks have begun coordinating with one another and other lending organizations. In the context of the Indian national economy, the idea of financial inclusion was first presented in the early 2000s.

2. Literature Review

(Grohmann, 2018) Financial literacy has had a beneficial effect across revenue rates and across several subgroups across countries. (Mindra, 2017) The results indicate a powerful positive and substantial connection between FSE and FI. Furthermore, the findings indicate that other factors that have been monitored, such as age and gender, have had an important impact on the use of official financial services by an individual. (Xiao, 2016) The findings indicate that customer financial education programs should emphasize action and promote customers to prevent risky financial behaviour in order to improve consumer financial well-being. Three sets of factors, perceived economic capacity, financial literacy, and financial behaviour evaluated consumer economic capacity. Using information from the US State-by-State Financial Capability Survey in 2009, the findings showed a positive association between perceived economic capacity and economic satisfaction.

(Bagli, 2012) Using an extensive financial inclusion step for each country based on ten indices chosen, it was distinctively seen that the level of financial inclusion in West Bengal is smaller than that of the southern states. (Majumdar, 2013) in a comprehensive study conducted in West Bengal's Hooghly County, using bank account holding as an indicator of financial literacy, it was discovered that financially excluded families belong to socially backward groups (SC / ST) and low-income classes with little or no literacy. However, our financial inclusion therapy is distinct and wider than the current research. We also hope to draw some political findings from the study and shed some light on the question of whether the financial institutions' current mode of operation is sufficient to guarantee financial inclusion of rural individuals more specifically rural poor individuals.

Mass financial literacy and awareness which are among the marginalized segments of individuals are essential to achieving Bagli's financial inclusion. (Bagli, 2012); (Suryanarayana, 2008) focused on the concept of inclusion/exclusion in the broad-based development result situation as shown in the calculation of manufacturing, earnings and division of consumption. The research helps sketch the mainstream development phase of the excluder's occupational, social, and regional profiles. As a result, the investigator tried to provide a viewpoint, an inclusion measure and lastly an assessment based on the accessible estimates of the distribution of consumption for 2004–2005 for India.

(Singh, 2015); (A.Tamilarasu, 2014) concluded that the banking sector had to liberalize the borrower's security level to borrow money from the bank in the easiest way and that the banking sector had to announce the new schemes that they offered to all Indian citizens for the proper use of the fund. Singh also clarified that contact with monetary facilities such

as investments, coverage and payments for scarcity improvement and growth is highly essential. (Dangi N. a., 2013) suggested adequate regulation of financial inclusion in our nation and access to financial services through SHGs and MFIs. (Shabna, 2014) Some issues, such as reduced financial literacy, absence of understanding, transaction costs and client acquisition, have been observed to be highest and are not cost-effective at all. In a direction to strengthen financial inclusion, RBI has reserved numerous phases and measures. Information and communication technology provide banks with the chance to enhance financial inclusion for unbanked individuals.

(Shah, 2015) Suggested that banks should provide wide-ranging advertising to the non-frills account facility. Technology can provide access to banking products in distant regions as a very useful instrument. ATM money supply machinery can be appropriately altered to make them user-friendly for individuals who are analphabetic, less trained or who do not understand English. (Garg, 2014) said that the regulator should address banks' concerns about profitability as the whole method of economic integration would be a kind of social job in the first few years. It is necessary to address the government's worries about the reach, feasibility and execution of the last mile of government policies. According to the evidence, various financial development measures create favourable conditions at the cross-country level (including financial intermediaries' assets, financial institutions' liquid liabilities, private-sector domestic credit, and stock and bond market capitalization) are positively linked to economic growth. (Levine, 1998).

Innovative distribution channels are usually underutilized, companies that deploy fresh distribution channels such as Agency banking, E-Banking and M-banking are still facing lengthy queues in their banking halls, particularly at inquiries and customer service centres, despite these innovative channels. (Datche, 2013) Using frequency distributions, graphs and pie charts, descriptive statistics and correlation analysis were implemented in data analysis and results were provided.

(Aravazhi, 2013); (Vivekanandan, 2013), In encouraging self-help groups connecting them to banks, NGOs have played a commendable role, and India has witnessed fast economic growth in the last decade. The government has taken many measures over the past six centuries, such as the nationalization of banks, credit to the priority industry, the opening of Regional Rural Banks (RRBs), cooperative societies, direct benefit transfers, etc., but most rural families still do not have official credit.

(Chirodip Majumdar, 2013) The study disclosed that this system is not being targeted and that the greater classes of society are getting the advantages. A percentage of no-frills

account holders do not regularly run their accounts. The Indian Reserve Bank directed all banks to keep “no-frills” accounts— a bank account at zero balance— for 100% economic integration to include all families within the official economic industry. This research, which was carried out in 2008 in the district of Hooghly in West Bengal, collects first and secondary data and uses the least square and dummy variable technique. It shows that the system has mainly failed in the financial inclusion of excluded classes such as scheduled castes, planned tribes, Other Backward Classes, and those less trained.

MFIs break down many obstacles to financial inclusion; constraints are placed on those excluded in the extent of their outreach. (Shankar, 2013);(Sahu, 2013) studied Commercial Banks, Financial inclusion and economic growth in India and the outcomes of the Regression show that 34% of the shift in the index of economic inclusion is explained by the net government national product per capita.

(Neha Kumar, 2013)India’s mobile financial services industry is steadily increasing. Facilitating low-deposit and credit “no-frills” accounts and “general credit cards.” Some nations have also promoted alternative financial institutions, such as microfinance institutions and self-help groups.

2.1 Research Gap

Instead of using a sample poll, a minute research study that separates the country’s regions and integrates the findings at the grassroots level would yield the most accurate results. Since it is known that conducting research in different parts of the country to obtain specific data on financial inclusion is not practically feasible, Angul District has been chosen as a small geographic area, and a survey has been carried out here while taking into account all the factors that have a significant impact. Since Angul District is the largest district in Odisha in terms of geographic area, it is necessary to fill in the gap to conduct a quick study.

Many researchers have done their research on financial inclusion for rural development in India, but very few have done it in Odisha, so the present study is about the financial inclusion for rural development in Odisha especially in Angul District.

2.2 Research Objective

- To explore the present status of financial inclusion for rural development in Angul.
- To examine how financial inclusion, helps the SHGs in the Angul District.
- To evaluate the banking facilities in Angul District through financial inclusion.

3. Research Methodology

Research Design:

One of the most crucial components of any research project is the research design, which is a set of guidelines for gathering and analyzing data in a way that tries to balance procedural economy with relevance to the study's goal. Additionally, it aids or directs a researcher in the process of conducting research, which includes study preparation, execution, and analysis. In order to meet the research goals, the study uses both descriptive and exploratory research designs. Statistical analysis has been used to tabulate, analyze, and interpret the information that was gathered. Both manual and computer-assisted methods of data processing and analysis have been used. It is necessary to employ regression analysis techniques.

Data Collection:

Data has been collected with the help questionnaire and personal interviews with 100 residents of Badkera village of Angul District.

Statistical Tools and Techniques:

In this research, Regression analysis has been done through SPSS statistical analysis tool. For the analysis of results Chi Square and ANOVAs are also being used.

Hypothesis of the study

Chi-Square

- Null Hypothesis (H0) = Women's empowerment and income level are unrelated.
- Alternative Hypothesis (H1) = Women's empowerment and income level are related.
- Null Hypothesis (H0) = Income level and poverty alleviation are unrelated.
- Alternative Hypothesis (H1) = Income level and poverty alleviation are related.
- Null Hypothesis (H0) = There is no correlation between rising savings and income level.
- Alternative Hypothesis (H1) = An increase in saving is correlated with income level.

ANOVA

- Null Hypothesis (H0) = Angul District's development and income are unrelated.
- Alternative Hypothesis (H1): Angul District's development and income are related.
- Null Hypothesis (H0): There is no correlation between the development of Angul District and the loans taken out.

- Alternative Hypothesis (H1): The development of Angul District and the loans taken are related.

Regression

- Null Hypothesis (H0) = There is no significant impact of qualifications on the improvement of basic facilities.
- Alternative Hypothesis (H1) = There is a significant impact of qualifications on the improvement of basic facilities.
- Null Hypothesis (H0) = There is no significant impact of loans received by respondents on poverty alleviation.
- Alternative Hypothesis (H1) = There is a significant impact of loans received by respondents on poverty alleviation.
- Null Hypothesis (H0) = There is no significant impact of occupation on the empowerment of women.
- Alternative Hypothesis (H1) = There is a significant impact of occupation on the empowerment of women.

4. Data Analysis & result:

Chi-Square Test-1

- Null Hypothesis (H0) = There is no correlation between income level and women empowerment. • Alternative Hypothesis (H1) = There is a correlation between income level and women empowerment. Variable df Calculated value Tables value Remarks
Income 16 0.13 26.296 Rejected
- In this analysis, we examined the relationship between the income level of the respondents and women's empowerment.
- The results presented in the table indicate that the significance value (P) is .013, which is lower than the tabulated value of 26.296. This indicates that the null hypothesis can be rejected. Thus, we conclude that there is a correlation between income level and women's empowerment, and we accept the alternative hypothesis. Furthermore, we can state that an increase in income level contributes to the empowerment of women.

Chi-square Test-2

- Null Hypothesis (H0) = There is no relationship between income level and poverty reduction.
- Alternative Hypothesis (H1) = There is a relationship between income level and poverty reduction.

Variable	Df	Calculated value	Tabulated value	Remarks
Income	16	.000	26.296	rejected

- In this analysis, we have examined the connection between the respondent's income and poverty reduction. The null hypothesis indicates that there is no connection between income and poverty reduction, whereas the alternative hypothesis suggests that such a relationship does exist.
- The significance value is .000, which is lower than the tabulated value of 26.296, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. Therefore, we can conclude that there is a significant link between income and poverty reduction, implying that as income rises, the poverty level of the respondent decreases, while lower income leads to increased poverty.

Chi-square Test-3

- Null Hypothesis (H0) = There is no relationship between income level and increase in saving.
- Alternative Hypothesis (H1) = There is a relationship between income level and an increase in saving.

Variable	Df	Calculated Value	Tabulated Value	Remarks
Income	16	.036	26.296	rejected

- This analysis illustrates the connection between respondents' income levels and their savings growth. The null hypothesis posits that there is no correlation between income and savings increase, while the alternative hypothesis suggests that such a relationship exists.
- The significance value obtained is .036, which is lower than the critical value of 26.296, indicating that we reject the null hypothesis and accept the alternative hypothesis. Therefore, we can conclude that there is a significant relationship between income and the growth of savings.

ANOVA-1

- Null Hypothesis (Ho) = There is no association between income and development of Angul District.
- Alternative Hypothesis (H1) = There is association between income and the development of Angul District.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
1. Poverty reduction	Between Groups	7.821	3	2.607	4.198	.008
	Within Groups	59.619	96	.621		
	Total	67.440	99			
2. Increase in saving	Between Groups	.482	3	.161	.128	.944
	Within Groups	120.908	96	1.259		
	Total	121.390	99			
3. Increase in income	Between Groups	7.666	3	2.555	2.063	.110
	Within Groups	118.894	96	1.238		
	Total	126.560	99			
4. Women economically empowered	Between Groups	6.540	3	2.180	1.967	.124
	Within Groups	106.370	96	1.108		
	Total	112.910	99			
5. Ability and involvement in decision-making	Between Groups	11.984	3	3.995	5.696	.001
	Within Groups	67.326	96	.701		
	Total	79.310	99			
6. Improve decision power	Between Groups	12.433	3	4.144	5.927	.001
	Within Groups	67.127	96	.699		
	Total	79.560	99			
7. Self-esteem	Between Groups	15.087	3	5.029	8.825	.000
	Within Groups	54.703	96	.570		
	Total	69.790	99			
8. Improvement in health	Between Groups	9.749	3	3.250	3.975	.010
	Within Groups	77.665	95	.818		
	Total	87.414	98			
9. Gender equality	Between Groups	14.450	3	4.817	7.264	.000
	Within Groups	63.660	96	.663		
	Total	78.110	99			
10. Improve basic facilities	Between Groups	12.887	3	4.296	4.130	.008
	Within Groups	99.863	96	1.040		
	Total	112.750	99			
11. Improved standard of living	Between Groups	2.339	3	.780	.678	.568
	Within Groups	110.411	96	1.150		
	Total	112.750	99			
12. Education to children	Between Groups	13.145	3	4.382	5.437	.002
	Within Groups	77.365	96	.806		
	Total	90.510	99			

- In this analysis, we examine the relationship between the income of respondents and the development in Badakera Village. The null hypothesis posits that there is no link between income and development in Badakera Village, while the alternative hypothesis suggests that such a connection exists.
- The ANOVA table presented indicates that income significantly correlates with poverty alleviation, decision-making capabilities, enhanced decision-making power, self-esteem, health improvements, gender equity, enhancements in basic facilities, and children's education, as evidenced by the p-values: poverty reduction at .008, decision-making ability and improved decision power at .001, self-esteem and health improvements at .010, gender equity and basic facility improvements at .008, and children's education at .002, all of which are below the 0.05 threshold. Consequently, the alternative hypothesis is accepted and the null hypothesis is rejected. Thus, we can draw the conclusion that income and development are related. • However, other factors, such as increased saving (0.944), income (0.110), women's empowerment (0.124), and improved standard of living (0.568), have no significant correlation with income, even though their p-value is greater than 0.05.

ANOVA-2

- Null Hypothesis (H₀) = There is no association between loans taken and the development of Angul District.
- Alternative Hypothesis (H₀) = There is association between loans taken and the development of Angul District.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
1. Increase in saving	Between Groups	4.004	3	1.335	1.091	.357
	Within Groups	117.386	96	1.223		
	Total	121.390	99			
2. Increase in income	Between Groups	2.852	3	.951	.738	.532
	Within Groups	123.708	96	1.289		
	Total	126.560	99			
3. Women economically empowered	Between Groups	10.562	3	3.521	3.302	.024
	Within Groups	102.348	96	1.066		
	Total	112.910	99			

4. Poverty reduction	Between Groups	3.821	3	1.274	1.922	.131
	Within Groups	63.619	96	.663		
	Total	67.440	99			
5. Improve decision power	Between Groups	1.699	3	.566	.698	.555
	Within Groups	77.861	96	.811		
	Total	79.560	99			
6. Ability and involvement in decision-making	Between Groups	13.252	3	4.417	6.420	.001
	Within Groups	66.058	96	.688		
	Total	79.310	99			
7. Self-esteem	Between Groups	1.716	3	.572	.807	.493
	Within Groups	68.074	96	.709		
	Total	69.790	99			
8. Improvement in health	Between Groups	3.135	3	1.045	1.178	.322
	Within Groups	84.279	95	.887		
	Total	87.414	98			
9. Gender equality	Between Groups	6.570	3	2.190	2.939	.037
	Within Groups	71.540	96	.745		
	Total	78.110	99			
10. Improve in basic facilities	Between Groups	3.689	3	1.230	1.082	.360
	Within Groups	109.061	96	1.136		
	Total	112.750	99			
11. Improved standard of living	Between Groups	4.124	3	1.375	1.215	.309
	Within Groups	108.626	96	1.132		
	Total	112.750	99			
12. Education to children	Between Groups	11.393	3	3.798	4.608	.005
	Within Groups	79.117	96	.824		
	Total	90.510	99			

- In this case, we have linked the respondent's loan to development in Badakera Village. Where the null hypothesis demonstrates that the respondent's loan and the development of Badakera village are unrelated. On the other hand, the alternative hypothesis indicates a correlation between the respondent's loan and the advancement of Badakera village.
- According to the aforementioned Anova table, the p values for gender equality (.037), decision-making ability (.001), and women empowerment (.024) are all less than 0.05, indicating that taking out a loan has a significant correlation with these three factors. Consequently, the alternative hypothesis is accepted and the null hypothesis

is rejected. Therefore, we can conclude that there is an association between the loan taken by the respondent and the development in Badakera village.

- The P value is greater than 0.05, however, because there are other factors that do not significantly correlate with income, such as increased saving (0.357), increased income (0.532), poverty reduction (0.131), improved decision power (0.555), self-esteem (0.493), improved health (0.322) and improved basic facilities (0.360). Therefore, we can say that while there is progress in certain areas, such as family and economic development, there are still a lot of things that need to be improved.

Regression Analysis-1

- Null Hypothesis (H0) = There is no significant effect of qualification in basic facility improvement.
- Alternative Hypothesis (H1) = There is a significant effect of qualification in basic facility improvement.

Depend Variable	df	Calculated Value	Tabulated Value	Remarks
Improving basic facility	99	.195	-1.305	Accepted

- In this case, we examined the impact of qualification on basic facility improvement, and the null hypothesis indicates that qualification has no discernible impact on basic facility improvement. On the other hand, the alternative hypothesis indicates that qualifications have a significant impact on the improvement of basic facilities in Badakera village.
- Given that the computed value of .195 is higher than the tabulated value of -1.305, it can be concluded from the above table that there is no significant effect of qualification in basic facility improvement. Therefore, it can be said that the alternative hypothesis is rejected and the null hypothesis is accepted.

Regression Analysis-2

- Null Hypothesis (H0) = There is no significant effect of loans taken by the respondent in poverty reduction.
- Alternative Hypothesis (H1) = There is a significant effect of loan taken by the respondent in poverty reduction.

Dependent Variable	df	Calculated Value	Tabulated Value	Remarks
Poverty reduction	99	.020	2.372	Rejected

In this case, we have examined the impact of the respondent's loan on poverty reduction and the null hypothesis indicates that there is no discernible impact. On the other hand, the alternative hypothesis indicates that the respondent's loan has a significant impact on reducing poverty.

- Given that the computed value is 020, which is less than the tabulated value of 2.372, it can be concluded from the above table that there is a significant impact on the loan taken. Therefore, it can be said that the alternative hypothesis is accepted and the null hypothesis is rejected.

Regression Analysis-3

- Null Hypothesis (H0) = There is no significant effect of occupation on women's empowerment. Alternative Hypothesis (H1) = There is a significant effect of occupation on women's empowerment.

Dependent variable	df	Calculated Value	Tabulated Value	Remarks
Women empowerment	99	.472	-.722	Accepted

- The effect of occupation on women's empowerment is examined here, and the null hypothesis indicates that there is no discernible impact of occupation on women's empowerment. On the other hand, the alternative hypothesis indicates that occupation has a significant impact on women's empowerment in Badakera village.
- Since the computed value of .472 is higher than the tabulated value of -.722, it can be concluded from the above table that there is no significant effect of occupation on women's empowerment. Therefore, it can be said that the alternative hypothesis is rejected and the null hypothesis is accepted.

Findings

This chapter's primary goal is to provide an overview of the study's findings. The following conclusions were drawn from the analysis of the data gathered and the author's own observations.

- The majority of the members can effectively lead the group because they are literate and have a reasonable level of education.
- Of those surveyed, 10% are single and 85% are married.
- The majority of respondents who are taking out loans are in the 26–35 age range.
- Either 46% of respondents are not below the poverty line or 54% of respondents are.
- The maximum loan amount for respondents was between Rs. 20,000 and Rs. 50,000.
- The majority of the female members work in a variety of businesses.
- Schedule castes make up the majority of responders.
- The highest monthly income of the respondents was between Rs. 20000 and Rs. 30000.

9. SHG groups can have a maximum of 10 to 15 members.
10. According to the field survey, the financial institutions from which the respondents most frequently obtained loans were Andhra Bank and Bank of Baroda.
11. Women's empowerment and income level are significantly correlated.
12. Income and poverty reduction are significantly correlated.
13. There is a strong correlation between income and rising savings.
14. The reduction of poverty, decision-making ability, decision power, self-esteem, health, gender equality, basic facilities and children's education are all significantly correlated with income. However, other factors do not significantly correlate with increased saving, income, women's empowerment and improved standard of living, with a p-value greater than 0.05.
15. Although taking out a loan is strongly linked to women's empowerment, decision-making skills, and gender equality, there are other factors that are not significantly correlated with income, such as increasing savings, income, poverty reduction, decision-making power, self-esteem, health, and basic amenities.
16. There is no connection between basic facility improvement qualifications.
17. There is a positive effect of loan taken by the respondents on poverty reduction.
18. There is a positive effect of occupation on women's empowerment.

6. Conclusion

The funding is the lubricant that keeps the event running smoothly. All economies rely on finance's role as an intermediary to move resources from savers to investors. India, a developing nation, depends largely on its agricultural populace to meet its banking needs. Many people believe that monetary consideration is the most recent concept that helps to implement the results of reasonable development within the nation. It provides banking and financial services and products to any or all of the inhabitants in a reasonable, conspicuous, and active manner at a reasonable cost. The poor people whose salaries are often lower in total are unable to assess financial records and should spend their time and money on a few visits to obtain financial administrations. The degree of their portability to access a variety of financial services, such as investment funds and instalment accounts, credit protection, benefits, and so forth, is defended by monetary incorporation, which dives into the endeavour of weak groups. Monetary consideration translates into the simple openness of financial services that allow for almost any interest in business, training, and protection against risks, retirement, and so forth. The majority of monetary inclusion's users come from agricultural backgrounds and it is provided without bias to address and resolve issues that prevent people from engaging in the financial sector. By encouraging a saving culture

among a sizable portion of the rural populace, financial inclusion maintains the financial system's resource base and dictates its own approach to economic growth. The government works to put this strategy into practice to ensure that people can escape poverty. One of the main goals of economic inclusion may be to provide economic services that precisely match users' needs without discrimination. The financially included people are new so to coach and introduce them to the banking area also requires tremendous effort and they put plenty of effort thereto.

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SKILL GAP ANALYSIS IN SEAFOOD PROCESSING AND EXPORT UNITS USING AI

Mrs. Sipra Karmakar

Introduction

The seafood industry plays a vital role in global trade, yet it faces significant challenges in maintaining product quality, ensuring compliance, and meeting market demands. These challenges are exacerbated by skill deficiencies in areas such as processing, quality assurance, and logistics. Traditional skill gap analysis methods are often time-consuming and lack precision. AI offers a transformative approach, enabling dynamic, data-driven insights to bridge these gaps effectively.

Literature Review

Previous studies highlight the importance of workforce skill alignment in the seafood sector. However, limited research exists on integrating AI for skill assessment. This section reviews:

- Traditional Approaches: Surveys, interviews, and manual assessments.
- Emerging Trends: AI applications in agriculture and manufacturing sectors, with parallels drawn to seafood.

Research Gap and Objectives

Artificial Intelligence (AI) has rapidly emerged as a transformative tool across industries, including agriculture, manufacturing, and logistics, delivering unparalleled efficiency and precision. However, its penetration into the seafood processing and export industry, especially in the state of Odisha, remains conspicuously absent. Despite Odisha's prominence in seafood exports, the adoption of AI for addressing skill gaps is notably limited.

The continued reliance on traditional methods like manual assessments and surveys results in inefficiencies and a lack of actionable insights. This gap highlights a significant opportunity for modernization through AI-driven solutions. Furthermore, the scarcity of academic research focusing on the integration of AI in this sector underscores the need for investigative efforts. To date, no studies have explored this application in Odisha, creating a void in both practice and literature.

Objectives of the Paper

1. **Identify Existing Skill Gaps:** To assess and document the specific skill deficiencies in seafood processing and export units.
2. **Explore AI Applications:** To investigate how AI technologies can address these skill gaps effectively, enhancing quality, compliance, and operational efficiency.
3. **Analyze Results and Recommend Solutions:** To evaluate the outcomes of AI-driven interventions and propose strategies for seamless implementation in the seafood sector.

Research Methodology

This research proposes a multi-phase AI-driven framework for skill gap analysis in seafood units:

- **Skill Gap Identification**

AI Algorithms: Machine learning models compare existing skills with job requirements.

Benchmarking: Industry standards and international regulations guide the analysis.

- **Data Collection**

Sources: Employee profiles, performance metrics, training records, and industry standards.

Tools: AI-powered chatbots, Natural Language Processing (NLP) for document analysis, and IoT devices for real-time skill tracking.

- **Predictive Analysis**

Technological Advancements

Automation and Robotics:

Skills in maintaining, programming, and operating automated machinery. Expertise in integrating AI and machine learning for process optimization. Knowledge of IoT for monitoring production and supply chain systems.

Data Analytics:

Proficiency in analyzing production data is to identify inefficiencies in skills in predictive modeling for demand forecasting.

Sustainability Innovations:

This is a training in handling eco-friendly technologies, like energy-efficient systems, skills in waste management and circular economy practices. Regulatory Changes in Export Markets.

Compliance Expertise:

This is familiarity with evolving food safety standards (e.g., FDA, EU certifications), skills in traceability technologies, such as block chain, for transparent supply chains.

Trade Policy Adaptations:

Knowledge of international trade rules, tariffs, and non-tariff barriers. Skills to adapt packaging and processing to meet market-specific standards.

Sustainability and Ethical Sourcing:

Expertise in certifications like MSC (Marine Stewardship Council) or ASC (Aquaculture Stewardship Council). Training on ethical labor practices to meet consumer and regulatory expectations. Seasonal and Market-Driven Labor Demands

Flexibility and Cross-training:

It refers to skills in multiple roles to manage labor shortages during peak seasons, training seasonal workers in rapid up-skilling programs.

Demand Forecasting:

Proficiency in market trend analysis to predict high-demand periods, skills in inventory and logistics management to balance supply-demand cycles, customer Engagement and Marketing:

- Skills in leveraging digital platforms for market outreach.
- Training in cultural preferences of target export markets for product design.
- Emerging Skills at the Intersection of These Factors:
- Digital Literacy: Across all roles, workers will need to adapt to digital tools and platforms.
- Adaptability: Emphasis on lifelong learning and reskilling to remain relevant.
- Sustainability-Oriented Skills: Alignment with global demands for green and ethical practices.

AI tools and technologies can play a transformative role in seafood processing and export units, enhancing efficiency, quality, and compliance. Here's a breakdown of AI tools and their applications in this domain:

Artificial Intelligence (AI) is revolutionizing the seafood processing and export industry through its diverse applications in quality control, process optimization, supply chain management, compliance, waste management, marketing, and employee training. For

quality control and inspection, AI-powered computer vision tools such as TensorFlow, OpenCV, and AWS Rekognition automate defect detection, including discoloration and bruises, while also classifying seafood products based on size and weight to meet compliance with visual quality standards. Additionally, spectroscopy analysis, using hyperspectral imaging with AI models like PyTorch, ensures the detection of freshness and identification of contaminants or adulterants.

In process optimization, AI-based tools like MATLAB and RapidMiner monitor critical parameters such as temperature and humidity during storage and transportation. Predictive maintenance capabilities reduce machinery downtime, while digital twin technology, using platforms like Ansys and Simulink, simulates production lines to optimize workflows and identify bottlenecks, thereby enhancing throughput.

For supply chain and logistics, AI technologies like SAP Integrated Business Planning (IBP) and IBM Watson Supply Chain enable precise demand forecasting and inventory management, reducing waste through efficient stock rotation. Real-time tracking and traceability, facilitated by IoT platforms such as Azure IoT Hub and Particle.io, ensure seafood traceability from catch to customer and employ predictive analytics to mitigate spoilage risks during transit.

Compliance and documentation benefit significantly from AI tools, including NLP-based systems like GPT models and spaCy, which automate export documentation and label translations. Blockchain platforms such as Hyperledger Fabric and IBM Food Trust provide secure supply chain documentation, fostering consumer and regulatory trust.

In waste management and sustainability, AI models like Scikit-learn and H2O.ai optimize resource usage and identify opportunities to transform waste into by-products like fishmeal and gelatin. IoT sensors integrated with AI platforms like AWS IoT Core monitor and reduce energy and water consumption during processing, supporting sustainable practices.

AI also drives consumer insights and marketing through advanced market analysis tools like Google Cloud AI and Tableau, offering deep understanding of consumer preferences and pricing trends. Recommendation systems based on collaborative filtering algorithms in PyTorch or TensorFlow suggest product bundles or complementary items, enhancing customer experience.

Lastly, employee training and safety are enhanced through AR/VR technologies powered by AI. Platforms like Unity with AI plugins and Oculus simulate hazardous scenarios and offer practical, immersive training on safe handling practices. These AI-driven innovations collectively enhance efficiency, compliance, sustainability, and profitability in the seafood processing and export sector.

Result & Analysis

- Adaptive learning platforms and AI-driven content recommendations.
- Virtual reality (VR) simulations for practical skill-building.

Continuous Monitoring

- Wearable devices and AI dashboards track employee skill progression.
- Automated reporting for compliance and efficiency metrics.

This section presents findings from a case study involving a mid-sized seafood processing unit:

Skill Gaps Identified:

30% of workers lacked expertise in advanced quality testing. 40% was unfamiliar with updated export documentation processes.

AI Interventions:

Adaptive training improved compliance rates by 25%.

Predictive analytics identified emerging needs in sustainability practices.

Efficiency Gains:

- Reduced processing errors by 15%.
- Improved export cycle time by 10%.

Challenges

Despite the numerous advantages offered by Artificial Intelligence (AI), its implementation in seafood processing and export units comes with significant challenges that require careful consideration and strategic planning. One primary challenge is **data availability**. AI systems rely heavily on large, high-quality datasets to function effectively, but many seafood units struggle with inconsistent or incomplete record-keeping practices. This lack of reliable data hampers the ability of AI tools to generate meaningful insights or provide accurate predictions. For instance, irregular documentation of employee skills, operational metrics, and production processes makes it difficult for AI algorithms to identify gaps or inefficiencies, limiting the system's overall effectiveness.

Another critical challenge is **adoption barriers**, often stemming from resistance to technology among workers. Many employees, especially those accustomed to traditional methods, may feel apprehensive about the shift to AI-driven processes. This resistance

could arise from fears of job displacement, lack of familiarity with AI tools, or concerns about the complexity of the technology. Additionally, limited digital literacy among the workforce can exacerbate these challenges, making it essential for organizations to invest in robust training and change management programs to ease the transition and build confidence in AI systems.

Finally, **cost constraints** pose a significant hurdle for seafood units, particularly smaller or mid-sized enterprises. Implementing AI solutions often involves a high initial investment in infrastructure, software, and specialized hardware, such as IoT devices and machine learning platforms. These costs can be prohibitive for businesses operating on thin margins, especially in the competitive seafood industry. Furthermore, ongoing expenses for maintenance, updates, and staff training add to the financial burden. As a result, many units may hesitate to adopt AI despite its long-term benefits, highlighting the need for scalable, cost-effective solutions and potential support from industry bodies or government initiatives.

Addressing these challenges is crucial for enabling the widespread adoption of AI in seafood units, ensuring the technology's transformative potential is realized in enhancing quality, compliance, and operational efficiency.

Suggestion

To overcome the challenges associated with the implementation of Artificial Intelligence (AI) in seafood processing and export units, several strategic suggestions can be considered. One critical recommendation is the establishment of **unified data platforms**. Centralized systems for collecting, storing, and analyzing skill and performance data can address the issue of inconsistent record-keeping. By integrating information from various sources, such as employee training records, production metrics, and compliance documents, these platforms ensure that AI algorithms have access to comprehensive and reliable datasets. This not only enhances the accuracy of AI-driven insights but also simplifies data management for businesses, enabling them to make informed decisions more efficiently.

Another essential suggestion is the implementation of **change management programs** to address resistance to AI adoption among workers. These programs should focus on building awareness of AI's benefits and dispelling fears of job displacement. Training sessions tailored to the workforce's skill levels can improve digital literacy and foster a sense of confidence in using new tools. Open communication about the role of AI in augmenting, rather than replacing, human capabilities are vital to gain employee trust. Additionally,

phased implementation of AI systems, accompanied by support and feedback mechanisms, can help workers adapt gradually, ensuring a smoother transition.

Finally, adopting **scalable AI solutions** can alleviate the financial barriers associated with AI deployment. Cloud-based tools, which require minimal upfront investment, offer a cost-effective alternative to traditional on-premise systems. These solutions provide the flexibility to scale AI capabilities according to the business's growth and evolving needs, making them particularly suitable for small and medium-sized enterprises. By leveraging subscription-based models and modular AI tools, businesses can access advanced technologies without significant financial strain. Government subsidies or industry-backed incentives could further support this approach, enabling broader access to AI-driven innovations in the seafood sector.

By implementing these suggestions, seafood units can not only mitigate the challenges of AI adoption but also unlock its transformative potential to enhance operational efficiency, workforce development, and global competitiveness.

Conclusion and Recommendations

Artificial Intelligence (AI) holds immense potential to transform skill gap analysis in the seafood processing and export sector, offering precise, real-time insights and customized solutions. By leveraging AI, organizations can effectively identify and address skill deficiencies, ensuring improved compliance, operational efficiency, and global competitiveness. However, to fully realize these benefits, key strategic actions are necessary.

Firstly, organizations must prioritize investments in **robust data infrastructure**. Comprehensive and centralized data systems are essential to support the seamless integration of AI technologies. These platforms should enable the collection, storage, and analysis of diverse datasets, ranging from employee performance metrics to compliance records and production parameters. A strong data foundation not only enhances the functionality of AI tools but also facilitates accurate and actionable insights.

Secondly, the role of **governments and industry bodies** is critical in fostering AI adoption within this sector. By introducing skill development initiatives, subsidies, and financial incentives, they can mitigate the high initial costs that often deter small and mid-sized enterprises from embracing AI. These efforts should include providing access to affordable AI tools, conducting awareness campaigns, and offering training programs to build a technologically adept workforce capable of leveraging AI effectively.

To address specific challenges, tailored AI-driven solutions can play a pivotal role. For example, the issue of **data silos** in seafood units can be resolved through the implementation of unified, AI-based platforms that integrate and standardize data across departments. Similarly, resistance to AI adoption among workers can be minimized through **gamified training modules** and a phased implementation approach that allows gradual adaptation to the technology. For businesses constrained by the costs of AI implementation, **cloud-based and modular AI solutions** provide a scalable and cost-effective alternative, enabling organizations to adopt AI capabilities incrementally without significant financial strain.

By adopting these measures, seafood processing and export units can not only address existing skill gaps but also position them to navigate future market and regulatory changes effectively. AI's transformative potential ensures that businesses in this sector can achieve greater efficiency, sustainability, and competitiveness in an increasingly complex global landscape.

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LEADER MEMBER EXCHANGE THEORY APPROACH: ORGANIZATIONS TRANSFORMATIONS TO DIGITALIZATION

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Introduction

Today's business world has been changed due to the industrial revolution brought by the digitalization. [1] Today changes and challenges that make new systems and processes shifting the paradigm from industrial to new information base systems that makes possible by the transformation through the digitalization of the organizations. [2] Companies are being evaluated and creating the value in the form of productivity which are making more digitalization through internet. [2] Leadership describes the relationship between leadership and subordinate that lead towards completing the tasks in time. It can be understood through the clarity of the team members' visions and in the form of maximizing the productivity. [3] Leaders lead the transformational process in the organization and identify the innovations needed. Because he has the capability and authority to predict future hurdles to come and bring the required changes in the organization. [4].

Research studies revealed that apart from the soft knowledge of Technology, Transformation also needed the right skill and mental ability of the leader to give right consideration for transformation. [5, 6] The transformation in organization of any digital change implementation is always required refurbishing their tools by the leaders. This change is also related to employees attitude and behavior change in the process.[7] leader has an critical role in implementing any change in organization.[8] Digital transformation is regarded as to meet the modern business and customer needs by implementing the modern technologies tools to improve their procedures and practices.[9] Every organization has different approaches to the transformation process its depend on their nature of business and sector needs. [10]. Digitally mature business most of time focused on the selected digitals forums for the transformations using different applications and forums. [11]

Why organization transform, the digital transformation also refers to organizations change. There are several reasons for the organization change. This change may for the purposes of Technology advancement, to improve the organization growth, changes in business operations and competitive advantage of the organization. [12] The need of transformation rise most of time because of manmade or natural situations, It enforce the organization to plan suddenly for the changes needed. The crises may be raised slowly in the organization.

[9] We will hereby discuss the planned digital transformations. Because its planned transformation by the leader, he has positive attitude toward the change and the team member work show their voluntariness [13] leaders support the team to foster the change process with mutual collaboration. [14]

Problem Statement:

Research studies show that leader has an important role in successful organization transformation [8] Most of time they face hurdles in transition of the change in team members to effectively manage it . [15] The organizations have no time when the digital transformation is due because of natural or manmade. The organizations would like to make the processes less confusing if the change is planned or forced. This will be effective in all cases whether the technology is incubating or updating it to a higher level.[9] During digitalization processes the team leader may have hurdles like to increase the benefits , workplace feasibility and adaptability are more likely to face.[16] Leadership experiences the problems in transforming the organization capabilities, productivity and innovation. These resistance and problems faces at every small level in the processes the leader needs to handle.[3, 17] The study explore that Leader members exchange theory (LMX) has an positive impact on enhancing the team capabilities in innovative working abilities.[18]

Digitalization has changed the world on other hand it creates new challenges for the leaders,[19] because it has affected the business on the micro level their business dynamics, process and other routine works.[20] Growing digitalization also create less job security at the team level, leader has the potential to upskill and invest in employee keep them motivated to learn for the high cognitive challenges. So the leader role becomes more vital to keep and achieve the real outcome of the digitalization by notably managing and retaining the skillful and talented employees. This will manage by keeping them connected and engaged. [21, 22] The team is only convenient for the transformation if they feel favorable and relatable the adaptation of transformation in their tasks completion. So it is the leader responsibility to steer this strategic alignment and the proliferation of a digital culture. [19]

Scientific Gap

Previous research on leadership role in transformation has been revealed that it has significantly impact the relationship between leader and transformation and recommend further research on the Leader behavior and attitude of the follower in transformation process [9]. The role of leadership in digitized world also focused and emphasized on the

updated lenses of literature between the relationship of leader and digitalization as the 4th industrial revolution emerged new technology day by day. Further the study is systematic their recommendation is to research the topic empirically and the topic should be discuss at the macro level that how digital transformation process can be implemented on different level organizations and teams. [19]

Research Questions

According to research model variables which will be investigated, research questions are following.

1. What is the impact of Leader member exchange theory on digitalization?
2. What is the impact of leader exchange theory on transformation?
3. What is the impact of leader exchange theory on team members' effectiveness in transformation?

Research Objectives

According to the research model, research objectives are the following,

1. To verify the leader members exchange theory impact on digitalization.
2. To verify the leader members exchange theory impact on transformation.
3. To verify the leader members exchange theory on team members effectiveness in transformation.

Significance of the Study

The results of this project are critical for the management to implement transformation process in the organization and how to handle different team members in to be effective in implementing the processes. The leader member exchange theory supports the team members in group and out group team members for the important tasks. These relations of variables will be effective in adding insight to academic and industry literature. This research will give am empirical implication for the better understanding of the leadership dimension in enhancing the transformation procesess and operations.

Literature Review

• Leader Member Exchange Theory

Leader Member Exchange theory focuses on the dyadic relationship between the team members and leader. Higher LMX relationships have strong trusted relationships on

reciprocal benefits.[23] The leader shares tangible and intangible resources with the members of the team in reciprocal the team member with high quality leader member exchange theory perform their task as desired by the management and on the other hand the low quality leader member relation show less interest in the desirable tasks. [24] the leader may want to develop the high LMX with all their team members but ideally it is not possibly and contradictory to the LMX. [25, 26] This vertically dyad relationship has been tested between the leader and the team members more then 90 percent of research results revealed that those with high quality of LMX relationships shows more responsibility and contribute more to the team task compare to those report low quality relationship[26].

In industry there is in understanding that leadership has an critical role in attracting employees for the digital transformation and provide greater competitive advantage. [27, 28] leadership has crucial role in adapting and shaping the transformation in team to keep them motivate by collaborating with them to achieve the shared goals [29, 30] In transformation and digitalization leadership and novelties effect each other. Advancement in technology transformation the leadership need to possess new skills and responsibilities to adopt according to the change of work environment. [19] In the digital era the leader needs the to equipped with skills that is communicate with the team thorough modern digital platforms, Fast decision making, Management of any disruptive change, fast connectivity arrangements and should have renaissance of technical skills. As the LMX is the dyadic relationship between team and leader, the responsive leadership, keeping the strong communication skills, responding to the feedback continues essential skill in digital workplace. [19, 26, 31].

- **Organization Transformation**

Organization Transformation is the process of developing the organization immediately and comprehensively that adapts any changes occurs internally and externally suddenly that cannot be predicted in advance. It mainly focuses on organization structure , Management processes and their culture.[32] The fast changes in the Information communication technology has the great role in creating and bringing unplanned and unpredictably changes locally and internationally, because the world industrial revolution is around 4th industrial revolution. That are no longer limited to traditional and conventional procedures. [33] The organization is dynamic system that continue to change and needs to be ready to transform at any time to avail any opportunities and face challenges that occur internally or externally.[33] The question always arises why the organizations need to transform? The organizations always need to transform and bring the accidental or planned change

on small or large level because it has a certainly impact on the organization. The leader has the responsibility to be ready and get ready all the members and organization for the transformation. [34]

Innovative behavior for the digitalization can be increase by the leader member exchange theory [18]. Digital transformation has been generating more research after COVID-19 both in academia and industrial as this global pandemic accelerated the digital transformation from small to large all type of organizations, but the depth and scale of the decision making is still required by these organizations. [35] We experienced the same as in change processes, we alter the processes procedures, technology and data processing of the organization . [35, 36] the digital transformation may be centered to structure change in the organization to achieve customer satisfaction or organization efficiency [35, 37, 38] the success of the digital transformation depends on the right direction from the leadership. [39] We hereby must know the leader role in digital transformation as he must decide what to implement in the transformation process. And we must appreciate that what the leader is focusing on during the transformation process. [40] this transformation process can lead to critical complexity in business processes if not managed properly.[41]

Organization Digitalization

“Digitalization means modernization, or the renewal of business processes and business models supported by IT, so business processes” Digitization and transformation words are used synonymously but they are different in use and practice. Digitization focuses on the potential changes in the process while transformation focuses on the cultural, organizational and relational changes. Transformation is more comprehensive than digitalization. [42] It changes the external or internal value creation activities. It is required by the organization to change their internal operation to change the external product that results to remain in market competition. Leader must needs some skills to complete the digitalization process. [43] It is fast moving mega trend that changing the existing product chain and value. Companies have taken the initiatives to get benefits of the digitization. [44, 45]

The rapid changes in the digitalization creating uncertainty in the business process, it required the leadership to cope with digitalization in high dynamic environments and implement it successfully. [46-48] Transformation starts from the changes ranging from simply introducing new method of communication through to totally changing the business model of the organization, while on other hand the digitization works on the introducing the Information communication technology to simplifying the business process and team work or storing and distributing the information in organization. [49-51]

Team Member Effectiveness / Efficiency

Technology contribute to more knowledge based organization so its need more competent and skill full persons [52] It is important in the transformation process that leader must be digitally literate and that is critical to convert the same to their team members because the team members should know about the digital tools , system , technology platforms and understanding of relevant digital concepts to keep them informed about the limitations and capabilities of innovation. [53, 54] Collin argued that it is important for the transformation process we have professional trained staff which increase the effectiveness. [55] Research shows that LMX has an positive and significant impact on the employee performance, motivation , task performance has been directly affected by the leadership relationship .[24] It is important to empower the staff because the employee has the critical role in bringing innovation in organization. It can be enhance by removing any psychological threaten to their position by bringing innovation that can be in the form of dealing them with respect, give them sufficient feedback and remove any structure hindrances .[56]

Proposed Research Model

The LMX is based on dyadic relationships between leadership and team members which reflect the behavior from the leader toward the team members that reflect the learning from leaders' behaviors. Social Cognitive Theory (SCT) developed by Albert Bandura a psychological theory that reflects how people learn from each other through communication and their behaviors. It further explains how their experience, environment and personal factors influence. [57] Self efficacy can be built on the bases of strong relationships between leader and team members as discussed in LMX In-group team members.[57] LMX influence the relationship between the variable are to be research as the transformation process depends on the digitalization and employees effectiveness.

Hypothesis

- H_1 : Leader members exchange theory has a positive impact on digitalization.
- H_2 : Leader members exchange theory has a positive impact on transformation.
- H_3 : Leader members exchange theory has a positive impact on team members' effectiveness in transformation.

Research Methodology

Research methodology is the blueprint for the measurement of variables and defining the unit of analysis and procedure for the data collection [58] This research study is explanatory to explain the cause and effect relationship between the variables [59] Population Frame

is the group of all individuals, events or interests the researcher wants to be researched. The group selected for the investigation is called population of the study it is defined on the bases of geographical boundary, their characteristics and time. [60]. Population associated to research group is known as target population.[61]. This data will be collected from Services industry and private organizations. These selected firms are based on the firms having their staff strength more than 20 and hierarchy management. I also have been working with many firms in twin cities so that it will help in precise data collection from twin cities industry. This is also the first study to conduct in the leader members exchange theory using innovative management as mediator in twin cities. The data will be collected through Random sampling technique. this sample will generalize to all population. [60]. We will use random sampling techniques to distribute the questionnaires for respondents. The rationale behind using random sampling technique for this study is to give equal opportunity to all respondents to get the data as similar studies selected the same sampling techniques for data collection.

Data will be collected through structured questionnaire data will be collected from top level management and their team members [62] according to Uma Sekaran 2019, 30 % to 40% sampling selection for data analysis of population is enough for better results, data will be collected from 300 to 350 participants, the total population is 700 . [60] [63] questionnaire will be distributed online to collect fair and timely all the data. Questioners involve a liker Scale ranking (5- point liker scale) It is the most widely used approach to scaling responses in survey research. A Liker scale is the sum of responses on several liker items. In liker scale, 5 stands for strongly agree, 4 agree, 3 neutral, 2 disagree and 1 strongly disagrees[64].This study is explanatory in nature and Quantitative research is used to measure the variables relation as used by previous research study. It will help to get precise information from the correspondent.

Descriptive statistics is the way of organizing, summarizing, and presenting data into informative way. Statistic tools will be used to convert the collected data to use in complete knowledgeable form. Data presents in the form of pie chart and graphs, frequency measure of central tendency mean, median mode will be used. [65]. It always seems important that data present in graphs give clear picture of analysis of collected data. Inferential statistic used to make valid comparisons and to predict the outcome of a decision. It allow you to make inferences from the data, helps you to assess the data where your data is generalizing to the border population. [65] The collected will be analyzed by using SPSS and SMART PLS software (mean median, mode, and regression analysis).

Discussion and Conclusion,

Literature discussed earlier shows significant relationships between the variables proposed to research. It shows that LMX has a significant effect on digitalization and transformation. The leadership role is always critical in bringing any planned or accidental change in the organization. The transformation process is a planned change which needs to be addressed by the top management in significant way to the subordinate. LMX has a dyadic relationship between members and leader, so it is important on the transformation process to have strong communication and trust-based relationships to avoid any challenges during the transition. These variables relation is new and has an important impact on the future literature and insights. It has an important implication for both academia and industrial research. We will further recommend conducting study on these variables relationships with other demographics to generalize the results.

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NAVIGATING THE FUTURE OF HIGHER EDUCATION: THE IMPACT AND ETHICAL INTEGRATION OF AI

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Introduction

Background and Significance

The introduction of Artificial Intelligence (AI) in higher education represents a paradigm shift with profound implications for academic institutions, pedagogical approaches, and student learning experiences. As technological innovations continue to reshape societal structures, educational systems face unprecedented opportunities and challenges in leveraging AI technologies effectively and ethically.

1. Overview

The integration of AI in higher education addresses challenges like operational inefficiency, lack of personalization, and scalability issues. AI's ability to process vast datasets, automate repetitive tasks, and create adaptable learning environments has made it a valuable tool for universities. This paper examines the benefits, applications, and ethical considerations necessary for responsible and inclusive AI adoption.

2. Why AI in Higher Education?

AI addresses critical challenges in higher education, reshaping how universities operate, conduct research, and deliver instruction. Its key benefits include:

- **Scalability:** AI enhances scalability by supporting large student populations without compromising academic quality. Platforms like Massive Open Online Courses (MOOCs) use AI to deliver personalized content to millions, ensuring consistent learning experiences.
- **Personalization:** Adaptive learning systems analyze student preferences, strengths, and weaknesses in real time, tailoring content to individual needs. This fosters inclusivity, deeper understanding, and improved retention.
- **Efficiency:** Automating administrative tasks like grading and admissions improves operational efficiency. AI-powered chatbots provide 24/7 support, enabling institutions to allocate resources effectively and reduce operational costs.
- **Innovation:** AI promotes interdisciplinary collaboration and accelerates research by analyzing large datasets and generating insights. Virtual labs and simulations further enhance experiential learning and drive innovation.

3. AI Applications in Higher Education

- **Personalized Learning and Tutoring:** Adaptive systems, such as Knewton and Smart Sparrow, deliver tailored challenges and support, boosting engagement and retention.
- **Key Technologies:**
 - Intelligent Tutoring Systems (ITS): Create personalized learning paths.
 - Natural Language Processing (NLP): Enables platforms like Duolingo to adapt content based on user performance.
- **Administrative and Operational Efficiency:** AI automates tasks like scheduling and resource allocation. Tools like Ivy.ai streamline student support and reduce administrative burdens.
- **Key Technologies:**
 - Chatbots: Provide 24/7 query resolution.
 - AI-Driven CRMs: Efficiently manage student records and communications.
- **Research Enhancement:** AI accelerates research by identifying patterns in large datasets and generating actionable insights. For example, IBM Watson aids researchers in data analysis.
- **Key Technologies:**
 - Machine Learning (ML): Analyzes complex data.
 - NLP: Facilitates literature reviews and content analysis.
- **Accessibility and Inclusivity:** AI tools like Microsoft Seeing AI and Otter.ai enhance accessibility for students with disabilities, ensuring inclusive participation.
- **Key Technologies:**
 - Speech Recognition: Converts speech to text.
 - Assistive AI Tools: Enhance learning for students with disabilities.

4. List of AI Technologies and Platforms in Higher Education

1. **Adaptive Learning Platforms:** Knewton, Smart Sparrow, DreamBox Learning
2. **Intelligent Tutoring Systems (ITS):** Carnegie Learning, ALEKS, Socratic by Google
3. **AI-Powered Administrative Tools:** IBM Watson, Ivy.ai, Salesforce Education Cloud
4. **Virtual Teaching Assistants:** Jill Watson, Moodle's Virtual Assistant, Hubert.ai

5. **Automated Assessment Tools:** Gradescope, Turnitin, Edgenuity
6. **Research Platforms:** Google AI, DeepMind, Scikit-Learn
7. **Accessibility Technologies:** Microsoft Seeing AI, Otter.ai, Voice Dream Reader
8. **AI-Driven Content Creation:** ChatGPT, Grammarly, Synthesia
9. **Predictive Analytics Platforms:** Tableau, Power BI, Blackboard Predictive Analytics
10. **VR/AR Platforms:** Google Expeditions, Unity, zSpace
11. **Collaboration Tools:** Slack AI, Microsoft Teams AI, Zoom AI Companion

5. Advantages of AI in Higher Education

1. **Enhanced Learning Outcomes:** Automates time-consuming administrative duties, including scheduling, grading, admissions processing, and student support. Due to the decreased operational load, faculty and staff can concentrate on more worthwhile endeavors like research and student mentorship. Institutions can enhance resource allocation and save substantial money by simplifying these procedures. Furthermore, by anticipating and optimizing resource utilization, the abovementioned platforms may guarantee that institutions run smoothly and effectively, thereby improving the educational experience for all parties involved.
2. **Operational Efficiency:** Handles repetitious administrative duties including scheduling, grading, applications processing, and student support automatically. This frees teachers and staff to concentrate on more important tasks like research and student mentorship by lessening their operational burden. Institutions can save a lot of money and allocate resources more effectively by simplifying these procedures. Furthermore, the platforms can assist in anticipating and optimizing resource utilization, guaranteeing seamless and effective institution operations and eventually improving the entire educational experience for all parties involved.
3. **Data-Driven Decision Making:** It uses big data's potential to deliver useful insights that guide institutional decision-making. This tool finds trends and patterns in student performance, enrollment, and resource use by examining big datasets. This makes it possible for academic institutions to make evidence-based choices about operational plans, student support services, and curriculum development. Additionally, early identification of at-risk students by institutions is made possible by data-driven insights, which enable prompt interventions that raise academic success rates and enhance overall institutional efficacy.

4. **Improved Student Engagement:** A dynamic and captivating learning environment is produced via interactive tools and adaptive learning platforms. Students are kept engaged and focused by these technologies' interactive features, real-time feedback, and individualized information. AI-powered simulations and gamification offer experiential learning opportunities that simplify difficult ideas. This technology creates a more engaging and encouraging learning environment by accommodating a variety of learning preferences and styles. It also lowers dropout rates.
5. **Global Accessibility:** Students all over the world can now access top-notch education thanks to the targeted online courses and virtual learning platforms that cut across regional borders. For students who live in remote locations or have limited access to traditional educational institutions, these platforms provide flexibility. Additionally, they provide adaptable interfaces and multilingual material thus guaranteeing inclusive and culturally appropriate education. Further, this technology promotes global learning equity and inclusion by simplifying access to higher education by bridging socioeconomic and geographic divide.
6. **Enhanced Research Capabilities:** It accelerates research by automating data analysis, pattern recognition, and predictive modeling. Researchers can process vast datasets quickly, uncovering insights that would be difficult or time-consuming to identify manually. And tools like machine learning algorithms and natural language processing assist in literature reviews, hypothesis testing, and interdisciplinary research. This not only increases the speed of discovery but also fosters innovation by enabling new approaches and deeper analysis, significantly advancing academic research.
7. **Support for Faculty:** They assist faculty members by automating time-consuming tasks such as grading, content creation, and administrative work. Intelligent tutoring systems and virtual assistants support students, freeing faculty to focus on high-value activities like personalized mentoring and research. Further, it also helps in designing customized course content and identifying knowledge gaps among students. This enhances teaching quality, allowing educators to deliver more effective and personalized instruction, ultimately enriching the learning experience for students.
8. **Scalability:** They help manage large-scale learning environments without compromising educational quality. Adaptive learning platforms and automated administrative systems ensure that institutions can accommodate growing student populations efficiently. This scalability is crucial for online learning

programs and large universities. By leveraging this technology, institutions can maintain consistent standards of education, regardless of class size, ensuring that all students receive high-quality instruction and support. This scalability makes higher education more accessible and sustainable in the long run.

6. Challenges and Ethical Considerations

1. **Data Privacy and Security:** Student data protection is essential since higher education systems handle sensitive data, including academic records, personal information, and behavioral data. For institutions to protect this data, strong encryption, access controls, and cybersecurity procedures must be implemented. Adherence to laws such as the General Data Protection Regulation (GDPR) is necessary to prevent violations and guarantee responsibility. You would agree that trust can be built while ensuring student data's ethical and secure use through regular audits and open data legislation.
2. **Equity and Accessibility:** Although it needs to be developed to serve various people fairly, this cutting-edge technology can potentially reduce educational gaps. Institutions must ensure that students with impairments and those from different socioeconomic backgrounds may use the resources above. Granting access to the required technology and internet infrastructure entails closing the digital gap. An equal learning environment for all students can be established in higher education by encouraging inclusive design principles and making sure AI systems don't unintentionally disadvantage groups.
3. **Bias and Fairness:** Unfair results may result from the algorithms' inadvertent reinforcement of biases in their training data. Biased admissions or grading choices, for example, may penalize underrepresented groups. To reduce these risks, clear AI models, varied datasets, and frequent audits are essential. Institutions must set policies to identify and address biases to maintain accountability and fairness. Including a range of stakeholders in the design and evaluation of AI systems can also contribute to the creation of more just and equitable educational applications.
4. **Impact on Faculty and Pedagogy:** The incorporation of AI in higher education raises concerns over the possible marginalization of professor positions and conventional teaching techniques. AI cannot replace the complex, compassionate connections between teachers and pupils, even though it can automate administrative duties and offer tailored support. To make sure that technology enhances rather than replaces human instruction, faculty participation in implementation is crucial. Teachers should receive training in using these resources wisely, balancing pedagogical integrity and technical innovation.

7. How Can You Best Support AI Initiatives at University Level?

1. **Evaluate Existing AI Tools:** Perform an in-depth review of the said tools that the organization currently uses. Evaluate how well they accomplish administrative and educational objectives. Examine opportunities for integration or enhancement after identifying any gaps, duplications, or antiquated systems. A comprehensive evaluation is ensured by involving stakeholders, including students, instructors, and IT personnel. In line with the university's strategic goals, this ongoing evaluation process aids in resource optimization, functionality improvement, and keeping up with technical developments.
2. **Train Faculty and Staff:** Establish organized training initiatives to give staff and academics the know-how to employ them properly. Both technical skills, such as using AI-powered platforms and pedagogical integration, should be covered in training so that teachers may use AI to improve instruction. Confidence and competence are fostered through workshops, certification programs, and ongoing professional development. Providing AI literacy to employees increases adoption rates and guarantees that AI is applied morally and sensibly in administrative and academic settings.
3. **Foster Collaboration:** Encourage interdisciplinary cooperation within departments to optimize the impact of this technology. To obtain access to the newest AI technology and insights, promote collaborations with tech firms, academic institutions, and business figures. Collaborations of this kind stimulate research, encourage innovation, and give students real-world learning experiences. Enhancing the educational environment, collaborative research initiatives, and industry-academia alliances guarantee that the AI solutions created are helpful, pertinent, and in line with real-world problems.
4. **Develop Ethical Guidelines:** Create thorough ethical standards that will regulate the university's use of this technology. These regulations should cover essential topics like algorithmic bias, security, data privacy, and fair access. Form a group to oversee adherence to ethical and regulatory requirements and conduct routine reviews of AI activities. Unambiguous rules encourage accountability and openness while reducing the risks of abuse. The inclusion, equity, and alignment of the guidelines with the institution's values and educational objectives are guaranteed when various stakeholders are included in the policy-making process.

8. Future Directions

Emerging Trends in AI for Higher Education

1. **AI-Driven Assessments:** The technology powered tests that deliver real-time, adaptive feedback based on each student's performance are revolutionizing evaluation. These technologies provide a customized learning experience by evaluating replies and modifying the degree of difficulty. Giving pupils immediate feedback encourages ongoing learning by assisting them in identifying areas for growth. The tests allow teachers by streamlining grading, minimizing biases, and revealing patterns in student performance. By creating a more responsive and exciting learning environment, this adaptive strategy improves learning outcomes and encourages mastery over rote memorization.
2. **Virtual Teaching Assistants:** Assistants assist teachers provide tailored instruction as support systems with virtual teaching assistants (VTAs) help teachers provide individualized instruction. These intelligent systems handle routine duties like organizing course materials, responding to student inquiries, and offering additional resources. It helps analyze individual student progress and suggest personalized content, ensuring that each learner's unique needs are met. For educators, VTAs reduce administrative burdens, allowing them to focus on mentoring and high value teaching activities, thereby enhancing both instructional quality and student engagement.

Potential Areas of Development

1. **Augmented Reality (AR) and Virtual Reality (VR):** By enabling interactive, immersive learning environments, AR and VR can potentially transform higher education. Students can interact with complex ideas through virtual simulations, improving their comprehension and memory. For example, engineering students can experiment with virtual prototypes, and medicine students can do virtual surgery. The experience learning they provide helps bridge the gap between theory and practice. Irrespective of the location, both these technologies simplify access to high-quality, immersive learning.
2. **AI Ethics Education:** Students who receive ethics instruction can use this technology to create responsible AI. Ethics must be taught in higher education institutions to prepare future students to deal with the moral problems raised by the creation and application of artificial intelligence. Students taking this course could develop critical thinking skills in areas including bias, data privacy, and AI's social ramifications. Future AI experts can create more equitable and responsible systems by comprehending ethical notions. This focus would ensure that the

technological advancements align with human values, promoting accountability and social responsibility in AI applications across various sectors.

9. Final Words

AI has the potential to revolutionize higher education by bringing about improvements in research creativity, operational efficiency, and personalization. For the advantages to be shared fairly, its integration necessitates a cautious, moral approach. To keep current discrepancies from getting worse, issues like algorithmic bias, data privacy, and accessibility issues need to be aggressively addressed. Building transparency and trust requires cooperation between legislators, educators, and technology. Strategies for reducing AI biases, improving accessibility, and comprehending the long-term effects of AI on pedagogy and academic culture should all be investigated in future studies. It may be possible to improve learning and operational results by looking into how AI can be integrated with cutting-edge technologies like blockchain, augmented reality (AR), and advanced analytics. Universities may use AI responsibly to foster a more equitable society by giving ethical issues and equity priority.

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SUSTAINABLE AGRIBUSINESS STRATEGIES FOR HYBRID PADDY SEED PRODUCTION AND DISTRIBUTION IN ODISHA

Sumit Gouraba Patra, Dr. Manmath Nath Samantaray

1. Introduction

Odisha, situated on the eastern coast of India, is mainly an agrarian state, with approximately 70% of its population relying on agriculture for their livelihoods (Government of Odisha, 2022). Paddy is the staple crop, covering a substantial part of the state's cultivated land. Agricultural practices in Odisha are largely traditional and heavily dependent on monsoon rains, which render the sector highly vulnerable to climate variability and other environmental stresses (Nayak & Behera, 2018).

The introduction of hybrid paddy seeds has revolutionized the agricultural sector, particularly in regions like Odisha, where paddy cultivation is a cornerstone of the rural economy. Paddy is not only a staple crop but also a significant source of livelihood for millions of farmers in Odisha and India as a whole. Odisha having diverse agro-climatic zones offers a unique setting to study the impact of hybrid paddy seeds on agricultural productivity as well as challenges related to their adoption and distribution. Hybrid seeds have been engineered to enhance productivity, resistance to pests and diseases, and adapt to varying environmental conditions, making them a vital component in the pursuit of food security and agricultural sustainability (Spielman et al., 2013).

The importance of this study stems from its focus on a specific region, such as Odisha, where empirical investigations are being conducted to find out factors of sustainable agribusiness strategies for the production and distribution of hybrid paddy seeds.

2. Literature Review

Currently, agriculture is a major sector in India it plays a major role in providing food security and employment avenues, and contributes to the gross domestic product of the country. Rice, a traditional food crop, is especially important and occupies an important position, especially in states such as Orissa where it is widely grown. Being in a beneficial agro-climatic zone, Odisha stands a good chance of improving its paddy production; through the use of varieties in hybrid seeds, that produces more improved yields and is less susceptible to attack by pests and diseases. Nevertheless, several constraints hinder the

use of hybrid seeds in Odisha, the constraint can be in terms of technology, production and distribution system constraints (Singh et al., 2020).

The Triploid hybrid seeds are made up of two distinctly different parent plants that result in better performance and technological improvements. They are preferred to traditional seeds in the market due to their high yield productivity hence a key innovation in sustainable agriculture. However, the successful use of hybrid seed technologies calls for a strong agribusiness framework that accommodates the challenges faced in production, distribution and making a breakthrough in the market without exerting more pressure on farmers than what can be afforded in terms of sustainability.

Agriculture is the most important sector in Odisha and 70% of people are still involved in agricultural activities (Government of Odisha, 2023). The rice crop which is grown in the state plays a crucial role in supplementing the food demand of Eastern India. However, traditional farming methodologies, reliance on standard seeds, and vulnerability to the unpredictable monsoon and climate have restricted crop yield. Hybrid paddy seed is an improved seed that is comparatively better yielding and has better adaptation which can solve these constraints (Mishra & Jena, 2021).

The use of hybrid paddy seed also has positive implications for attaining sustainable agriculture because it means there will be less pressure on the land resources but the output will be high. Hybrid seeds may help reduce food insecurity in Odisha, and increase the income of farmers, and the state's economy at large. However, the consumption rate of hybrid seeds is still low, which calls for focused efforts to address the problems associated with the production and access of those seeds (Kumar et al., 2019).

Hybrid paddy seed production requires many steps including the development of the parentage lines, pollination, and genetic purity. Some problems that seed producers in Odisha experience are: narrow access to quality seed stocks, poor access to inputs and technology, lack of infrastructure and human resource constraints (Swain et al., 2022). Also, smallholder farmers who are the majority in producing seeds, lack resources and markets to compete with large-scale seed producers such as commercial producers.

Distribution is another major problem that springs to mind. The lack of supply chains in Odisha, the lack of efficient channels of distribution, and the absence of proper cold storage are the major challenges that result in delayed delivery of quality seeds to the farmers. Besides, farmers are unaware of how hybrid seeds are beneficial, and another drawback is their expensive cost at the initial stage of sowing (Das et al., 2020).

Sustainability in hybrid seed production and distribution is not only environmental but also economic as well as social. Environmentally, it entails adopting efficient seed production principles with a less negative impact on the ecological system and increasing the intensity of seed production while enhancing the seed genetic resources diversity. Economically it involves the innovation of efficient production methods and reasonable market price for the producers and consumers. Sustainable development in the social context, therefore, involves the improvement of the well-being of all value chain actors with specific reference to smallholder farmers and workers.

Hybrid seed production requires the proper adoption of advanced agricultural practices including low chemical input, efficient water usage and crop interchange. Also, distribution networks have to be fashioned to allow impoverished farmers to participate in the use of hybrid seeds. In implementing the above objectives, public-private partnerships as well as farmers' cooperatives are very important in sourcing the needed inputs, training and markets among others (Patra et al., 2023).

The hybrid seed industry is strongly influenced by governmental strategies and overwhelming institutions. Current and ongoing policies in Odisha include the Odisha State Seed Corporation (OSSC) and Odisha Agriculture Policy; which seek to encourage the use of high-yielding varieties including hybrids. The subsidies credit facilities and the technical assistance these policies offer to the farmers and the seed producers are as follows- (Government of Odisha, 2023).

Nonetheless, policy implementation is not without some challenges such as bureaucratic proneness to delay, failure to co-ordinate policy implementation with other reforms, and inadequate monitoring of the implementation process. Improvement of these policies and coordination of government institutions, private businesses, and academic institutions can improve the hybrid seed market. For one, inputs directed towards agricultural R&D can result in the production of hybrid varieties suitable to the various agro-climatic zones of Odisha (Sahu et al., 2021).

The hybrid seed industry is shifting due to technological innovations like precision agriculture, seed coating technologies, and digital platforms for seed distribution. The application of these technologies in the Odisha context can solve critical problems of seed production and its dissemination. For instance, digital platforms can help the gap between producers and farmers by giving them information on seed availability, prices, and farming techniques (Reddy & Rao, 2022).

Market forces also play a role in the use of hybrid seeds. Some of the factors that help in determining demand include price, credit, and consumer knowledge. All these factors should be taken into account by the agribusiness strategies when planning for the production and distribution systems. Furthermore, working with local farmer groups and cooperatives may also help build the farmers' trust and acceptance towards the new technology which will improve the use of hybrid seeds (Mishra et al., 2023).

For the improvement of the sustainable hybrid paddy seed production and marketing system in Odisha, the following strategies need to be applied. This includes developing Research and Development, improving the supply chain, increasing farmers' knowledge, and developing private and public partnerships. Inclusive business models that include smallholder farmers with a focus on gender, and climate-smart agriculture are critical for sustainability.

Furthermore, the role of international partnerships cannot be ignored either. Collaboration with other international agricultural research institutions can help design more effective and suitable solutions for Odisha. For instance, collaborations with organizations like the International Rice Research Institute (IRRI) can grant access to hybrid seed technologies and know-how (Kumar & Swain, 2023).

3. Objectives of the Study

Based on the inputs from the various literature studies, the research study was carried out with the following objective:

- To explore the factors that help in designing sustainable agribusiness strategies for the production and distribution of hybrid paddy seeds.

4. Research Methodology

4.1. Study Design

The research was conducted as a mixed-method approach in order to assess hybrid paddy seed production and distribution systems in Odisha. To increase the validity and reliability of the collected and analysed data, both qualitative and quantitative research methods were used. The research design used both descriptive and exploratory approaches to establish factors that affect the adoption and sustainability of hybrid paddy seeds.

4.2. Study Location

This study was carried out in the state of Odisha and specifically in the districts which are major contributors to the production of paddy. These regions are also comprised of both

coastal and non-coastal areas in order to capture all the possible climatic conditions and farming practices in the state.

4.3. Study Duration

The study was conducted for six months from January to June 2024. This timeline was outlined to cover periods of key paddy growing seasons to enable data collection at strategic times within the farming process.

4.4. Sampling Procedure

4.4.1. Selection

The researcher selected farmers, seed producers and distributors for the study. Strategically, farmers were selected in the study who were actively involved in paddy cultivation and those farmers were excluded whose primary crop was not paddy. Similarly, seed producers were included in the study who were engaged in hybrid seed development and distribution and distributors were selected who were operating in the agricultural input supply chain. Also, many participants were excluded who were unwilling to provide consent information.

4.4.2. Study Sampling

To increase the validity of the study, a stratified random sampling method was used to capture participants across the various stakeholder categories. Farmers were grouped into small, medium and large farmers according to the size of their farms and into coastal and inland farmers according to their location. Seed producers and distributors were chosen based on their market size and the size of their operations in Odisha.

4.4.3. Study Sample Size

A total of 300 participants were selected for the study. Out of 300, 200 were farmers, 50 were seed producers, and the remaining 50 were distributors. The sample size was calculated concerning the estimated population of the stakeholders and the necessity of the statistical representation in the survey.

4.4.4. Study Groups

Participants were divided into three groups such as farmers (sub-divided by farm size and geographical location, seed producers (differentiated by scale of operation i.e. small-scale vs. large-scale) and distributors (based on regional operational areas).

4.4.5. Study Parameters

The study parameters included the yield performance of hybrid paddy seeds, the cost-effectiveness of seed production and distribution, accessibility and availability of hybrid

seeds for farmers, awareness and adoption levels among farmers and environmental and economic sustainability of hybrid paddy seed practices.

4.4.6. Study Procedure

The study procedure involved several stages such as developing a comprehensive questionnaire tailored for each stakeholder group, conducting interviews and surveys with participants to gather qualitative and quantitative data and collecting secondary data from government reports, industry publications, and academic studies to supplement primary data.

5. Study Data Collection

The primary data was collected through a questionnaire administered to the selected farmers through interviews, focus groups and self-administered questionnaires at the participants' workplace. The questionnaire and the checklist used in the study were pre-tested to enhance the reliability of the data collected. To get secondary information for the present study, reports and publications were collected and used for context and confirmation.

6. Ethical Considerations

The participants were recruited under a previously approved research proposal and ethics clearance was sought from the institutional review board. The study subjects were explained the purpose of the study and, therefore, their consent was sought before data collection. The information of the respondents was not disclosed, and all necessary precautions were taken to ensure the ethical conduct of the research involving human subjects.

7. Data Analysis

The quantitative and qualitative data collected were analysed using both qualitative and quantitative methods. Quantitative methods were employed to analyse the trends and patterns. Data collected through interviews and focus group discussions was involving contents analysed to identify key themes concerning challenges and possibilities.

7.1. Results

7.1.1. Yield Performance of Hybrid vs. Traditional Paddy Seeds

The study evaluated the yield performance of hybrid paddy seeds compared to traditional varieties across different farm sizes and geographical locations in Odisha. The results indicate a significant increase in yield with hybrid paddy seeds (see Table 1).

Table 1: Average Paddy Yield Comparison

Seed Type	Small-Scale Farms (tons/ha)	Medium-Scale Farms (tons/ha)	Large-Scale Farms (tons/ha)	Overall Average (tons/ha)
Traditional	3.5	4.2	4.8	4.2
Hybrid	5.0	5.8	6.5	5.8
Increase (%)	42.9%	38.1%	35.4%	38.1%

It was found that hybrid paddy seeds demonstrated an average yield increase of 38.1% over traditional varieties across all farm sizes. Small-scale farmers experienced the highest percentage increase (42.9%), indicating significant potential for enhancing productivity among the most vulnerable groups.

7.1.2. Cost-Effectiveness of Hybrid Seed Production and Distribution

The cost-effectiveness analysis (see Table 2) compares the production and distribution costs of hybrid seeds against the returns from increased yields.

Table 2: Cost-Effectiveness Analysis

Cost Component	Traditional Seeds (INR/ha)	Hybrid Seeds (INR/ha)	Difference (INR)	% Change
Seed Cost	1,500	3,000	+1,500	+100%
Fertilizer & Pesticides	2,000	1,800	-200	-10%
Labor Costs	1,200	1,300	+100	+8.3%
Total Production Cost	4,700	6,100	+1,400	+29.8%
Yield Revenue	4,200	5,800	+1,600	+38.1%
Net Profit	-500	-300	+200	+40%

The above table states that the percent change in the initial production cost for hybrid seeds was higher (+29.8%). But the increased yield revenue (+38.1%) resulted in a net profit improvement of 40%. This suggests that despite higher upfront costs, hybrid seeds are more cost-effective in the long run due to higher productivity.

7.1.3. Accessibility and Availability of Hybrid Paddy Seeds

The study assessed the accessibility and availability of hybrid paddy seeds across different regions and farm sizes.

Table 3: Accessibility and Availability of Hybrid Seeds

Parameter	Coastal Regions (%)	Inland Regions (%)	Small-Scale Farms (%)	Medium/Large Farms (%)
Seed Availability	75	60	50	90
Distribution Network Reach	70	55	45	85
Pricing Affordability	60	50	40	80
Overall Accessibility	68%	55%	45%	85%

Accessibility of hybrid seeds was higher in coastal regions (68%) as compared to inland regions (55%). Large-scale farms exhibited better accessibility (85%) than small-scale farms (45%), highlighting disparities in seed distribution and affordability that need to be addressed to ensure equitable access.

7.1.4. Awareness and Adoption Levels Among Farmers

The study measured the levels of awareness and adoption of hybrid seeds among different farmer groups (see Table 4).

It was found that the awareness level of hybrid seeds was significantly lower among small-scale farmers (40%) compared to large-scale farmers (90%). Consequently, adoption rates were also lower in small-scale farms (20%) versus large-scale farms (80%). These findings indicated a critical need for targeted awareness campaigns and support mechanisms for small-scale farmers.

Table 4: Awareness and Adoption Levels

Parameter	Small-Scale Farms (%)	Medium-Scale Farms (%)	Large-Scale Farms (%)
Awareness of Hybrid Seeds	40	70	90
Adoption of Hybrid Seeds	20	50	80
Adoption Rate Increase	+50%	+14.3%	+ -

7.1.5. Environmental and Economic Sustainability of Hybrid Seed Practices

The sustainability assessment evaluates both environmental and economic aspects of hybrid seed practices.

Table 5: Sustainability Metrics

Sustainability Aspect	Traditional Seeds	Hybrid Seeds	Improvement (%)
Chemical Usage (kg/ha)	150	100	-33.3%
Water Consumption (liters/ha)	10,000	8,000	-20%
Biodiversity Index	60	75	+25%
Farmer Income (INR/ha)	3,700	4,200	+13.5%
Overall Sustainability	Moderate	High	Significant Improvement

The above table states that hybrid paddy seed practices result in a 33.3% reduction in chemical usage and a 20% decrease in water consumption, contributing to environmental sustainability. Additionally, the Biodiversity Index improved by 25%, and farmer income increased by 13.5%, indicating both environmental and economic benefits.

7.1.6. Distribution Efficiency and Farmer Satisfaction

The study evaluated the efficiency of the distribution system and overall farmer satisfaction with hybrid seed distribution.

Table 6: Distribution Efficiency and Farmer Satisfaction

Parameter	Traditional Seeds (%)	Hybrid Seeds (%)
On-Time Seed Delivery	85	70
Seed Quality (purity)	80	90
Farmer Satisfaction	75	85
Overall Distribution Score	80%	81.7%

The participants stated that on-time seed delivery for hybrid seeds was slightly lower (70%) compared to traditional seeds (85%), and the seed quality and farmer satisfaction were higher for hybrid seeds (90% and 85%, respectively).

This indicates that improvements in the distribution network could further enhance the overall distribution score for hybrid seeds.

7.1.7. Barriers to Adoption Identified by Farmers

The study identified key barriers hindering the adoption of hybrid seeds among farmers.

The table given below states that the most critical barriers to hybrid seed adoption are high initial costs (60%) and lack of awareness (50%). Addressing these issues through financial support and comprehensive awareness programs is essential to increase adoption rates among farmers.

Table 7: Barriers to Hybrid Seed Adoption

Barrier	Percentage of Farmers Affected (%)
High Initial Cost	60
Lack of Awareness	50
Limited Access to Credit	45
Inadequate Distribution Networks	40
Preference for Traditional Seeds	35
Climate Variability Concerns	25
Most Critical Barriers	High Initial Cost, Lack of Awareness

8. Discussion

This study presents a detailed overview of the strategies required to support sustainable hybrid paddy seed production and distribution in Odisha and identifies numerous potential prospects as well as some difficulties. The results established that the yield performance improved by 38.1% with the hybrid paddy seeds as compared to the traditional varieties and this was observed across all the farm sizes. In particular, the small-farm size realized the greatest increment in its yield of 42.9%, medium farm size realized an increment rate of 38.1% while the large-scale farm size realized an increment of 35.4%. This sharp rise in productivity shows that there is a strong possibility of hybrid seeds improving paddy crop production in Odisha and the smallholder farmers who are the mainstay of the State's agriculture sector. The higher yield not only helps in the production of food security but also improves the income for farmers where the farm income per hectare with hybrid seeds is 13.5% higher than traditional varieties.

The cost-effectiveness analysis further elucidates the economic viability of adopting hybrid seeds. Although the initial production costs for hybrid seeds are significantly higher, with a 29.8% increase from INR 4,700 per hectare for traditional seeds to INR 6,100 per hectare, the net profit improvement of 40% due to higher yield revenue (from INR 4,200 to INR 5,800 per hectare) makes a compelling case for their adoption. This indicates that despite the higher upfront costs, the long-term financial benefits for farmers are substantial, potentially offsetting the initial investment and fostering economic sustainability. However, the higher seed costs (a 100% increase from INR 1,500 to INR 3,000 per hectare) and labour costs (an 8.3% increase from INR 1,200 to INR 1,300 per hectare) highlight the financial barriers that may deter small-scale farmers from transitioning to hybrid seeds without adequate support mechanisms such as subsidies or credit facilities.

The accessibility and availability of hybrid seeds present another critical aspect of the study. The data reveal that hybrid seeds are more accessible in coastal regions (68%) compared to inland regions (55%), and large-scale farms have significantly better access (85%) than small-scale farms (45%). This disparity points to uneven distribution networks and affordability issues that could hinder widespread adoption, particularly among the most vulnerable farmer groups. The low accessibility in the inland and small-scale farms calls for focused approaches to address these issues to enable the hybrid seeds benefits to be felt across the board. This means expanding

In conclusion, the research indicates that there is a significant possibility of hybrid paddy seed in the agricultural system of Odisha. The analysis of the yield and economic returns demonstrates the potential of hybrid seeds in raising farm output and farmers' income. Nevertheless, the variation in the level of accessibility, knowledge, and usage of AIF strategies by various farmer groups is an indication of structural barriers that need to be overcome to reach many more farmers. The environmental impacts also strengthen the argument for using hybrid seeds as a positive form of agricultural practices, which include lowering the use of chemicals, and water and encouraging diverse varieties of crops. The positive effects of PPPs are evidence of the need for partnerships to break barriers in production and distribution to create opportunities for innovation and sustainability.

Realizing these benefits of hybrid seeds, there is the need to deploy some specific and strategic interventions that would help in the abolition of financial constraints, improving the awareness of the seeds and the distribution channels. These policies should include provisions for subsidies on hybrid seed, infrastructure development and a strong farmer training program. Besides, enhancing PPPs can help to enhance hybrid seed production and distribution, thus, making sure that all farmers' sectors get the necessary benefits. It is therefore recommended that further research be conducted on the effects of hybrid seed uptake on soil nutrition, climate change and social and economic well-being to understand the overall contribution of hybrid seeds to sustainable agriculture. By engaging the multifaceted challenges in the paddy sector through specific agribusiness approaches, Odisha can foster sustainable development in its paddy sub-sector thereby enhancing food security, economic development and environmental conservation.

7. Conclusion

In conclusion, this study establishes that the use of hybrid paddy seeds in Odisha has the potential to greatly improve agricultural yields and output. Hybrid seeds realized a remarkable average yield boost of 38.1%, with smallholder farmers gaining a 42.9% boost, which greatly boosted food security and farm incomes, which rose by 13.5%. Although the production costs of seeds of hybrid varieties were higher than for conventional ones,

the net profit increased by 40%, which proves the sustainability of the approach. But the study reveals major gaps in accessibility and awareness, especially in the inland and small-scale farmers where hybrid seed has some availability at 55% and 45% respectively, while the adoption rates are very low at 20% compared to 80% in large-scale farms. The environmental improvements include the use of fewer chemicals (33%), a 20% decrease in water usage, and a 25% enhancement in biological diversity. Distribution efficiency is still an issue, as hybrid seed delivery is slow compared to the traditional varieties even though the seeds are of higher quality and the farmers are satisfied. The major barriers identified include initial cost (60%) and lack of awareness (50%) which calls for specific financial incentives and extensive educational campaigns. Public-private partnerships have been found useful in increasing seed production and distribution by 30% and 25% respectively, and farmer support by 40%; thus, improving the entire hybrid seed system. For hybrid paddy seeds to deliver their potential, more attention should be paid to financial access, distribution channels, and the promotion of farmer uptake across all categories. Through this, the government of Odisha can come up with strategies that can effectively address the challenges faced in the paddy sector hence ensuring that the state's economy grows sustainably, the environment is protected, and the lives of the farmers are improved.

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ARTIFICIAL INTELLIGENCE IN BANKING: UNLOCKING NEW FRONTIERS FOR FINANCIAL INCLUSION IN INDIA

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Introduction

“AI is not just a technology, but a powerful tool for social good. In finance, it has the potential to bring millions into the formal economy, fostering growth and reducing inequality.” **Christine Lagarde, Former MD of IMF**.

AI refers to the attempt to develop methodology used by the brain of humans and their ability to understand language, process information, and solve problems. It refers to the simulation of human intelligence processes by computer systems. Artificial Intelligence has experienced remarkable growth and transformation in recent years, becoming one of the most influential and rapidly evolving technologies across multiple sectors. It has significantly transformed the financial services industry and its operations presently. India, being the fastest-growing economy with the second largest population in the world, has a significant stake in the AI revolution. Artificial Intelligence (AI) is revolutionizing the banking sector, especially in developing countries like India, by driving financial inclusion to higher levels. This article explores how AI technologies such as machine learning, natural language processing, and predictive analytics are being leveraged to provide accessible, efficient, and personalized banking services. By overcoming traditional barriers like geographic limitations, lack of credit history, and resource-intensive operations, AI is enabling banks to reach under-banked and unbanked populations. The integration of AI in finance is transforming how markets operate, institutions manage risks and consumers interact with financial services in India. Recently, the Reserve Bank of India unveiled its Financial Inclusion Index for FY24, showing an increase to 64.2 from 60.1 in March 2023.

Table -1 Findings of the Financial Inclusion Index over the Years

Financial Year	Financial Inclusion Index Value
2019-20	53.1
2020-21	53.9
2021-22	56.4
2022-23	60.1
2023-24	64.2

Source: RBI's Data

The Financial Inclusion Index (FII), as depicted in Table 1, reflects a steady improvement in financial inclusion in India over the five years from 2019-20 to 2023-24. The index, sourced from RBI data, measures the extent of access, usage, and quality of financial services across the country. Table 1 showcases a consistent rise in the Financial Inclusion Index (FII) from 53.1 in 2019-20 to 64.2 in 2023-24, indicating steady progress in financial inclusion in India. The gradual increase reflects the impact of initiatives like digital payment systems, government schemes, and improved access to financial services in rural and semi-urban areas. A notable surge is observed post-2020-21, likely influenced by the adoption of technology and enhanced financial literacy efforts. These findings emphasize the growing integration of underserved populations into the formal financial system, though continued efforts are needed to address regional disparities.

Use of AI and Banks

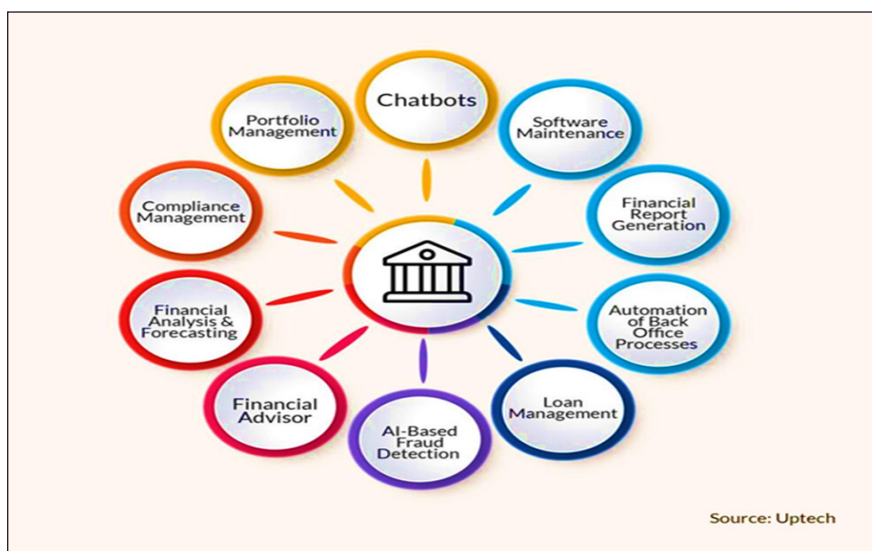


Figure-01

Review of Literature

Mhlanga (2020) explores the revolutionary role of Artificial Intelligence (AI) in promoting the inclusion of the digital economy in marginalized groups such as low-income people, women, youth, and small businesses. By addressing key challenges such as risk management, information asymmetry, and fraud detection, AI applications such as chatbots and algorithms are enabling wider access to financial services. The results show how AI-powered tools increase trust, efficiency, and accessibility in the formal financial market.

Despite concerns about artificial intelligence in Industry 4.0, the benefits of promoting inclusion are significant. The research encourages institutions and governments to use and scale AI solutions to improve economically vulnerable populations.

Yanting and Ali (2023) Artificial intelligence (AI) is revolutionizing financial inclusion by increasing access to non-payment groups through better credit scoring, risk assessment, and fraud detection. AI-enabled tools provide access to financial services to people with limited credit histories and low incomes. However, challenges such as the digital divide, privacy concerns, and the risk of over-indebtedness remain. Addressing these issues through research and policy can unlock the potential of AI for an inclusive financial system.

Anusha (2023) transforms artificial intelligence (AI) into the economy by improving problem-solving, compliance management, and affordable access to financial services. This study explores the role, applications, and challenges of AI in banking and microfinance, highlighting its potential for economic growth and poverty reduction. Despite its benefits, issues such as cyber security risks, gaps in public awareness, and job losses remain significant. The study recommends AI awareness programs, important security measures, and equal integration of AI with human experience. These efforts aim to bring about sustainable and inclusive development in the financial services sector.

Objectives of the Study

1. To know the potentiality and benefits of AI in Banking by enhancing Financial Inclusion in India.
2. To study the impact of AI in promoting financial inclusion in India through banking.
3. To discuss the challenge of AI in the banking sector in India for promoting financial inclusion.

Research Methodology

The study adopts a descriptive research design and relies on secondary data sourced from government reports, academic research, industry analysis, and bank publications to examine how AI enhances financial inclusion in India's banking sector. It also aims to identify challenges in AI adoption, offering a comprehensive understanding of its role in advancing financial inclusion.

Potentials and benefits of AI in enhancing Financial Inclusion:

Banks have been at the forefront of adoption of newer technologies for the past few decades. Many of the routine activities have already been entrusted to machines. There

have been phenomenal improvements in user interfaces, payment channels, internal controls, and useful dashboards. They have also been using AI-related systems like robotic process automation, robot receptionists, chatbots, and machine learning techniques. AI is helping build the critical digital infrastructure that will allow every community, urban and rural; every business, small and large; every worker, first-line, and knowledge workers; and every person, including people with disabilities to benefit from tech intensity. AI is demonstrating a huge impact on the banking sector, impacting the working of organizations at three fundamental levels: (i) the processes they adopt (ii) the products and services they sell and (iii) the user experiences they offer to their customers and employees.

1. **Gathering and evaluating information** - The lack of data availability is the most difficult challenge banks must overcome. Banks mostly cater to the segment of society with little access to financial services. AI gathers and analyses enormous volumes of data and organizes it into comparable representations with the use of mobile devices and the internet. In this manner, organizations can reach more people and fulfill their full potential.
2. **Guidelines for evaluating creditworthiness** – Banks may now identify people and firms and assess their creditworthiness with the help of AI. This is done by analyzing their location, market conditions, buying behavior, social media behavior, public data, etc., in the absence of any credit history with mainstream banking.
3. **Cost saving** - Saving money is the most useful artificial technological feature. It aids banks in reducing operating expenses associated with repetitive tasks. It reduces human mistakes while simultaneously saving money. Today, a lot of banks use AI-based chat software that can answer consumer questions. A higher amount of business may be handled by AI with far greater efficiency and accuracy, assisting businesses in expanding and serving wider markets.
4. **Statistical or Predictive Analysis** - Data can have special patterns and connections that AI can identify that were previously apparent to traditional technology. It will be a common advantage form AI, encompassing widely used predictive analytics as well as applications for natural language and semantics that are general-purpose.
5. **Regulatory Adherence** - Banking is the industries which are most tightly regulated globally. The use of banks by banking customers to commit financial crimes is prohibited by government regulation. To handle these issues, banks employ an internal AI compliance team.
6. **Increase customer satisfaction** - Consumers are always looking for a more convenient experience. For instance, ATMs were successful because they allowed users to access necessary services when banks were shut. This degree of comfort has only stimulated

advancement in AI. Recording and collection of basic required data of customers is accelerated by AI technology, which also removes errors.

Impact of AI in promoting financial inclusion in India through banking:

1. **Enhanced Credit Accessibility:** AI analyzes alternative data sources like mobile transactions, e-commerce behavior, and utility bill payments to create credit profiles for individuals without formal credit histories. Banks leverage this to extend loans and credit facilities to underserved communities, especially in rural areas where traditional credit assessment tools are ineffective. This inclusion expands financial access to farmers, small business owners, and daily wage earners.
2. **AI-Powered Chatbots:** AI chatbots in banks provide multilingual and round-the-clock assistance, catering to India's diverse linguistic population. These bots guide users through basic banking services, such as opening accounts, transferring funds, or applying for loans. By reducing dependency on physical bank branches and human agents, chatbots make banking services more accessible and user-friendly for those in remote or underserved regions.
3. **Personalized Banking Solutions:** With AI's ability to analyze customer behavior and preferences, banks can design customized financial products. For example, microloans or small-value savings plans tailored to low-income groups help meet their specific needs. This personalization increases the relevance and uptake of banking services among marginalized populations.
4. **Fraud Detection and Security:** AI systems monitor banking transactions to detect unusual patterns, such as unauthorized withdrawals or phishing attempts, in real-time. By ensuring secure banking experiences, AI builds trust among unbanked or underbanked individuals, who may otherwise hesitate to use formal financial systems due to fear of fraud or loss.
5. **Automated Processes for Efficiency:** AI automates time-consuming processes like KYC (Know Your Customer) verification, loan approvals, and account updates. For example, Aadhaar-based eKYC allows customers to open bank accounts digitally within minutes. This efficiency reduces operational costs for banks, making services more affordable for low-income individuals.
6. **Mobile Banking Innovations:** Mobile banking apps powered by AI are transforming financial inclusion by providing an intuitive and user-friendly interface for banking services. Features like voice assistance in regional languages, transaction tracking, and savings recommendations empower users to manage their finances with ease.

This is particularly beneficial for individuals in rural areas with limited access to physical branches.

7. **Rural Outreach via AI Insights:** AI helps banks analyze geospatial and demographic data to identify regions with low banking penetration. Based on these insights, banks strategically place branches, ATMs, or mobile banking units in underserved areas. This targeted approach ensures resources are effectively utilized to expand financial access in rural and semi-urban India.
8. **Financial Literacy Programs:** AI-powered platforms are being used to educate individuals about basic financial concepts like savings, investments, and credit management. By delivering personalized and interactive learning content through mobile apps, SMS, or chatbots, AI improves the financial literacy of populations with limited prior exposure to formal banking systems. This empowerment enables better decision-making and increases engagement with banking services.

Through these mechanisms, AI acts as a catalyst for financial inclusion, enabling banks in India to reach the unbanked and underbanked population, and bridging the gap between technology and social equity.

Challenges of AI in the banking sector in India for promoting financial Inclusion:

1. **Ancient Infrastructure** - Business processes frequently result in new needs for the data, infrastructure, and technology needed to create and scale models. The development of AI banking applications can be computationally difficult, resulting in prohibitive upfront costs, and replacing large legacy systems is expensive.
2. **Governance Structures and Regulations** -Any use of new technologies might clash with the strictly controlled financial services industry. Banks that are expanding their usage of artificial intelligence must adhere to governmental regulatory guidelines. The need for compliance on the part of the bank arises from more services, such as internet transactions and net banking fall under the purview of privacy regulatory rules, and several financial sectors are struggling with their resistance to change or adopt new strategies.
3. **Absence of a Well-Defined Strategy** - In a technological world that is always evolving and requires considerable investments in new equipment and human resources, executives might not fully embrace Smart technology. In that situation, implementing a company-wide strategy to fully utilize AI's technical potential would be difficult, and the banking sector is already experiencing a disconnect between client demand and reaction owing to a lack of supporting data to implement operational modifications.

4. Creates the situation of Unemployment
5. Lack of Trust, Security, and Training for the employees which creates unhealthy relations with customers.

Suggestions & Recommendations:

Banks should concentrate more an emphasis on educating the public about the usage of AI-based applications in financial activities, particularly by offering AI awareness programs to those ages over 40. As AI systems are vulnerable to cyber-attacks, rigorous regulatory requirements and appropriate security measures should be established by government and financial institutions. The study's main recommendation is that there should be a good balance between using AI by banks and the enhancement of financial inclusion in a better and more transparent manner.

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SUSTAINABLE PERSPECTIVE OF ELECTRIC VEHICLE AND ITS FUTURE PROSPECTS

Smruti Ranjan Muduli, Dr. Alaka Samantaray

Introduction

The aging transportation sector, heavily reliant on petroleum, is having a profound impact on the environment. Carbon emissions are causing significant harm in major cities worldwide, including India. Addressing these emissions is crucial in the fight against climate change and fostering sustainable development. Decarbonizing internal combustion engines is essential to reducing greenhouse gas emissions and tackling this pressing issue in a sustainable manner.

Climate change is predominantly caused by greenhouse gases such as carbon dioxide, methane, nitrous oxide, and fluorinated gases. Approximately 75% of the world's greenhouse gas emissions are driven by human activities, including the burning of fossil fuels, deforestation, and industrial operations, according to statistics. In India, many cities report alarming levels of PM_{2.5}, often exceeding the World Health Organization's guideline of 5 µg/m³; for instance, Delhi frequently records annual averages above 100 µg/m³, underscoring the urgent need for sustainable transportation solutions.

In response to these global challenges, the adoption of electric vehicles (EVs) is gaining momentum worldwide as a key contributor to sustainable development. Norway leads the way, with 54% of new cars sold in 2022 being electric. Other countries, such as China, the United States, Germany, the UK, France, and Sweden, have also set ambitious targets for a sustainable future. India aims for 30% of all vehicles on the road to be electric by 2030, encompassing two-wheelers, three-wheelers, and four-wheelers.

Recent advancements in India's EV sector have accelerated, driven by initiatives like the FAME schemes, along with various subsidies, incentives, and improvements in infrastructure. However, significant potential for sustainable growth remains, particularly in addressing challenges and seizing opportunities for a sustainable future.

Several barriers hinder the transition to sustainable electric mobility, including high upfront costs, insufficient charging infrastructure, range anxiety, and concerns about battery lifespan. Understanding consumer perceptions of electric vehicles in India is vital for fostering sustainable development. Research shows that insights into consumer expectations and perceptions can greatly influence the market landscape. By comprehending the genuine needs of consumers and creating a supportive, sustainable ecosystem, we can transform the transportation sector.

To promote sustainable practices, it is imperative to enhance awareness through educational initiatives, workshops, seminars, and media outreach, encouraging consumers to adopt greener choices. Effective mitigation techniques must be implemented immediately to lessen the effects of climate change, improve air quality, and reduce our dependency on fossil fuels, paving the way for a more sustainable future.

Literature Review

The literature on electric vehicle (EV) adoption highlights a range of factors, from consumer attitudes to infrastructure needs, with insights spanning diverse geographic and economic contexts. Singh et al. (2020) categorize factors influencing EV adoption into demographic, situational, contextual, and psychological categories, emphasizing the importance of understanding consumer behavior to boost adoption rates. Their review underscores the need for integrated frameworks that also incorporate sustainability practices, such as the use of renewable energy in EV charging infrastructure and sustainable manufacturing processes. These frameworks are critical as EV technology and infrastructure evolve to address environmental challenges.

Similarly, Shetty et al. (2020) identify barriers in emerging Asian markets, pointing to resistance to new technology, limited consumer awareness, and insufficient policies as key obstacles. They argue that targeted consumer education, enhanced government incentives, and psychological insights are essential to overcoming these challenges, alongside the promotion of sustainability practices like eco-friendly battery production and recycling initiatives.

Further analyzing global and emerging markets, Meszaros et al. (2020) examine the economic and infrastructural hurdles faced by developing countries, noting that high EV costs, limited charging infrastructure, and low purchasing power significantly hinder adoption. The study highlights the potential of sustainable policies, such as integrating EV charging stations powered by renewable energy, to mitigate these challenges. Liao et al. (2017) contribute to this discussion by comparing economic and psychological approaches to understanding EV adoption, proposing a framework that includes technical, financial, and policy-related attributes, along with sustainability-focused measures, as critical influences on consumer preferences.

Focusing on successful case studies, Hannisdahl et al. (2013) examine Norway's BEV policies, such as tax exemptions and dedicated bus lane access, which have made EVs more competitive against conventional vehicles. The study presents Norway's model as a three-step blueprint for other nations, emphasizing the integration of sustainability practices like renewable energy use and circular economy principles in battery lifecycle management.

Examining the Indian context, Verma et al. (2020) and Kv et al. (2022) explore EV adoption factors in Bengaluru. Verma's study, grounded in innovation diffusion theory, identifies environmental benefits and financial incentives as motivators, with barriers like high initial costs and limited charging infrastructure impacting adoption. The study highlights the importance of embedding sustainability practices into the EV ecosystem, such as promoting shared mobility and implementing policies that incentivize the use of clean energy. Kv et al. complement this with data indicating that high costs, range anxiety, and limited charging remain critical barriers in India. Both studies suggest that targeted policy adjustments and the adoption of sustainable technologies could address these issues, paving the way for broader EV uptake.

In China, Adnan et al. (2022) highlight the role of policy measures, such as unrestricted traffic access for EVs, in shaping consumer perceptions in Beijing. The study concludes that sustainability-focused practices, such as the use of green energy for charging stations and the development of energy-efficient EV models, play essential roles in encouraging adoption. Likewise, Mali et al. (2022) investigate Nepal's EV landscape, discussing the country's need for reliable infrastructure, government policies, and case studies from developed markets to facilitate EV integration while prioritizing sustainable energy solutions.

Bhattacharyya et al. (2021) take a different approach by interviewing industry experts and identifying eleven factors that influence EV adoption in India, particularly the availability of charging stations. Their findings emphasize the importance of collaboration among stakeholders to address psychological and technical factors impacting consumers' adoption decisions. The study also highlights the need to incorporate sustainability practices, such as lifecycle assessments and the development of low-carbon production processes, into EV strategies. P. Maske et al. (2021) highlight EVs as sustainable alternatives to fossil fuel vehicles, emphasizing advancements in lithium-ion batteries, charging infrastructure, and government incentives in India. The study addresses challenges like costs, infrastructure gaps, and battery lifespan, advocating research, collaboration, and education for sustainable transportation. H. Usman et al. (2024) explores the integration of EVs with renewable energy, focusing on solar-wind hybrid solutions and technological advancements. It also examines economic, environmental, and policy factors supporting sustainable transportation. Lastly, Diez et al. (2021) and Dost et al. (2018) delve into advanced EV applications, with Diez's study focusing on the potential of Vehicle-to-Building (V2B) and Vehicle-to-Home (V2H) strategies to enhance energy efficiency and reduce carbon footprints. Dost examines user charging behaviors, suggesting that EVs could support smart grid applications through load

balancing, demand-side management, and the integration of renewable energy sources.

Overall, the literature indicates that while the environmental and economic benefits of EVs are well-recognized, diverse barriers—from consumer perceptions and high initial costs to policy inconsistencies and infrastructural gaps—remain pervasive across regions. These studies collectively advocate for collaborative frameworks, consumer education, and technology advancements, alongside sustainability practices such as renewable energy integration, eco-friendly manufacturing, and efficient recycling systems, to accelerate EV adoption. They offer valuable insights for policymakers, automakers, and researchers working to overcome these challenges and achieve a sustainable future for electric mobility.

Objectives

1. To explore the growth potential of electric vehicles (EVs) in India.
2. To identify the challenges hindering EV adoption in the Indian market.

Research Design

The research is descriptive in nature, focusing on understanding the current EV landscape, challenges, and opportunities. It also provides practical suggestions for sustainable EV adoption. Secondary data involves the analysis of reports from government and private organizations, as well as a comprehensive review of articles, research papers, and market studies related to electric vehicles (EVs) in India.

Challenges faced by Electric Vehicles in India

Electric vehicle (EV) adoption in India faces multiple challenges, mainly around high upfront costs, limited charging infrastructure, and grid-related issues. While battery prices are gradually dropping, the cost remains prohibitive for many in India's price-sensitive market. Charging infrastructure is still sparse outside urban centers, creating range anxiety among potential buyers. Additionally, the country's power grid may struggle to support increased demand from EVs, particularly in areas with unreliable power supply. The lack of standardized charging and battery systems complicates infrastructure expansion and increases operational costs for both providers and users.

Other obstacles include limited consumer awareness, concerns over battery life, and insufficient after-sales support due to a shortage of trained technicians. India's existing automotive industry, heavily invested in traditional vehicles, adds inertia to the shift towards EVs. Policy inconsistencies across states and insufficient workforce training further slow adoption. Addressing these issues will require government, industry, and

consumer collaboration, with a focus on long-term policies, infrastructure development, and advances in battery technology. As these barriers are overcome, India's transition to EVs could help create a cleaner and more sustainable future.

Opportunities for Electric Vehicles in India

The electric vehicle (EV) sector in India holds vast potential for economic, environmental, and technological advancement, especially as the country looks to reduce its reliance on imported oil and address severe air pollution in urban areas. EVs promise a cleaner environment by cutting emissions and air pollution, aligning with India's climate commitments. Leveraging renewable energy sources like solar and wind to power EVs can further reduce the environmental impact, especially with decentralized charging solutions in rural areas. Additionally, as consumer interest in sustainable options rises, EVs present a viable alternative for urban mobility, particularly with two-wheelers and e-scooters.

On the economic front, government support through policies such as the FAME scheme and Production-Linked Incentive (PLI) for EVs has fostered a promising landscape for domestic manufacturing and job creation. Investments in charging infrastructure, battery technology advancements, and battery recycling can establish a sustainable EV ecosystem that reduces costs and minimizes dependence on imported materials. With continued government support, policy consistency, and investments in R&D, India can position itself as a major player in the global EV market, driving long-term economic growth and securing a sustainable future in transportation.

Consumer Adaptation

India's EV adaptation is influenced by economic factors, changing consumer attitudes, technological advancements, and regional variations. Despite higher upfront costs, consumers are drawn to long-term savings on fuel and maintenance, especially as awareness of total cost of ownership (TCO) grows. Rising environmental consciousness and the demand for urban mobility solutions drive interest in EVs, with social influence playing a role as early adopters share positive experiences. Technological improvements, such as mobile app integrations, longer battery life, and fast charging, enhance convenience, while state incentives and expanding infrastructure support adoption, particularly in urban areas. Fleet electrification and the popularization of EV two-wheelers and auto-rickshaws are further normalizing EVs, alongside the availability of diverse models tailored for Indian conditions. Robust after-sales support, battery-swapping options, and affordable battery replacements are building consumer confidence, setting the stage for broader EV uptake across India.

Government Policies

India's government is accelerating EV adoption through a blend of policies that include direct consumer incentives, tax benefits, and substantial support for manufacturing and infrastructure. The FAME schemes provide subsidies for EV purchases and infrastructure, while Production-Linked Incentive (PLI) schemes promote local battery and EV component manufacturing. State-specific policies add further financial incentives, and tax reductions on EVs make them more affordable. Efforts to expand charging networks, introduce battery swapping, and integrate solar-powered charging reduce reliance on traditional energy sources. Additionally, policies like vehicle scrappage incentives and mandates for fleet electrification encourage greener transport options, positioning India as a rising global player in EV innovation and sustainability.

Sustainability of Electric Vehicle in India

The sustainability of electric vehicles in India holds immense potential in addressing critical environmental challenges such as air pollution and carbon emissions while fostering energy security. With a growing focus on renewable energy integration and advancements in EV technology, India is well-positioned to transition towards cleaner transportation. Key factors driving EV sustainability include ongoing improvements in battery efficiency, the expansion of charging infrastructure, and supportive government policies offering incentives and subsidies. However, challenges such as high initial costs, limited charging networks, and dependence on imported raw materials for battery production must be addressed. Strengthening domestic manufacturing capabilities, fostering public-private partnerships, and promoting renewable energy-based charging solutions are crucial steps for long-term EV viability. By overcoming these hurdles, EVs can significantly contribute to India's sustainable development goals and help shape a low-carbon future for the transportation sector.

Discussion

The research emphasizes the growing importance of electric vehicles (EVs) in addressing environmental concerns and fostering sustainable development in India. While government initiatives like the FAME schemes have spurred EV adoption, challenges such as high costs, insufficient infrastructure, and policy inconsistencies remain significant barriers.

Lifecycle sustainability of EVs, including eco-friendly production, renewable energy-powered charging stations, and effective battery recycling, is critical for minimizing their environmental impact. Additionally, understanding consumer behavior and enhancing awareness can drive wider adoption.

Policy support, technological advancements in batteries and local manufacturing are pivotal to building a robust EV ecosystem. Comparative insights from global markets can inform strategies tailored to India's socio-economic context.

EV adoption also holds economic potential through job creation and reduced fossil fuel imports. Targeted skill development and innovative solutions for rural areas, such as decentralized charging networks, are essential.

In summary, India's transition to a sustainable EV ecosystem requires a holistic approach encompassing policy, technology, consumer engagement, and sustainability, paving the way for a greener future.

Suggestions

Car manufacturers in India may focus on affordable EV models, advanced battery technology, and reliable charging infrastructure, while the government could support adoption through consistent policies, expanded charging networks, and local manufacturing incentives. Strengthening after-sales support, public awareness, and skill development may further boost the EV ecosystem. Consumers can benefit by considering long-term savings, staying informed through awareness programs, and supporting eco-friendly practices like renewable energy for charging. Advocating for better public EV infrastructure could also promote sustainable mobility in their communities.

Scope for further Research

Future research can delve into consumer behavior, focusing on demographic and regional factors influencing EV adoption, particularly differences between rural and urban areas. Sustainable EV ecosystem development could be advanced by exploring renewable energy-powered charging, eco-friendly battery production, and recycling. Research on optimal EV charging infrastructure, especially in rural regions, and public-private partnership models can offer solutions to current barriers. Studies on the economic viability of EVs can assess long-term impacts on costs, job creation, and national energy security. Evaluating the effectiveness of current policies and harmonizing them across states is crucial for consistent EV growth.

Integration of EVs with smart grids, exploring Vehicle-to-Grid (V2G) and Vehicle-to-Home (V2H) applications, and advancements in battery technologies, such as sodium-ion and solid-state batteries, present key opportunities. Research on the impact of EV adoption on urban mobility and transportation planning can support better urban infrastructure. Additionally, identifying workforce skill gaps and designing training programs are essential

for industry growth. Comparative analysis of successful global EV practices could provide valuable lessons for India's transition to a sustainable EV ecosystem.

Conclusion

The future of electric vehicles (EVs) in India holds immense promise, though it is accompanied by considerable complexity, balancing both significant opportunities and notable challenges. As India stands on the brink of a transformative shift, EV adoption has the potential to drive environmental sustainability, reduce reliance on oil imports, and fuel economic growth through new job opportunities and industry expansion. Key advantages such as improved air quality, renewable energy integration, favorable government policies, and opportunities for local manufacturing position India to emerge as a global leader in EV production and usage. However, achieving this vision depends on overcoming crucial hurdles, including high upfront costs, limited charging infrastructure, and gaps in consumer awareness.

For India to fully realize its EV potential, collaboration among government agencies, private sector leaders, and consumers will be essential. Strategic investments in expanding charging networks, advancing battery technology, and incorporating renewable energy, combined with stable and supportive policies, are critical to accelerating EV adoption across both urban and rural areas. With ongoing advancements and coordinated efforts, India's EV ecosystem is well-positioned to thrive, laying the groundwork for a greener, more energy-secure future.

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MITIGATING STEREOTYPE THREAT IN FEMALE LEADERSHIP ASPIRATIONS

Hani, Irina Sergeevna

Introduction

It is commonly known that women are underrepresented in leadership roles in a variety of sectors, governments, and organizations around the world (Catalyst, 2020). Despite advancements in the cause of gender equality, obstacles including unconscious biases and gender stereotypes still prevent women from rising to positions of leadership. One significant psychological barrier contributing to this issue is stereotype threat. Stereotype threat, as first conceptualized by Steele and Aronson (1995), refers to the fear of confirming negative stereotypes about one's social group. For women aspiring to leadership positions, societal stereotypes often frame leadership as a predominantly masculine trait, thus contributing to lower confidence, motivation, and performance in leadership roles (Heilman et al., 2004). This article examines how stereotype threat impacts women's leadership aspirations and identifies strategies and interventions to mitigate its effects.

Understanding Stereotype Threat

Definition and Origin

When people are aware of a negative stereotype about their social group and worry about being assessed or behaving poorly in a way that could support the stereotype, this is known as stereotype threat (Steele & Aronson, 1995). Anxiety brought on by this fear affects motivation, performance, and cognitive abilities. For example, women may question their leadership skills and be less inclined to pursue leadership positions if they believe that leadership is a characteristic that is exclusively male (Ryan et al., 2011).

The Psychological Underpinnings of Stereotype Danger

According to Steele and Aronson's (1995) model, stereotype threat triggers a number of psychological processes, such as:

1. Performance Anxiety: Cognitive exhaustion and poor performance result from the fear of validating a stereotype.
2. Distraction: Rather than concentrating on their goals, women may become distracted by worries about being judged.

Mitigation Techniques

In order to encourage female leadership aspirations, efforts must be made to lessen the impacts of stereotype threat. Numerous evidence-based tactics have demonstrated potential:

Mentorship Programs and Positive Role Models

The idea that leadership is a masculine quality can be contested by exposing people to accomplished female leaders. According to research by Rhoden and Kakar (2020), mentorship programs that pair up prospective female leaders with accomplished female role models can boost motivation and self-esteem.

Programs for Leadership Development

Programs for structured leadership development can provide women the abilities and self-assurance they need to combat the negative impacts of stereotype threat. It has been shown that skill-building, resilience, and confidence-boosting training works (Heilman, 2012).

Interventions in Organizations

Gender bias must be actively addressed by organizations through inclusive leadership, training, and diverse recruiting policies.

Methodology

Design of Research

A mixed-methods research methodology is used in this study to investigate how stereotype threat affects female leadership ambitions and assess countermeasures. A more thorough grasp of practical therapies and psychological mechanisms is made possible by combining quantitative surveys and qualitative interviews.

Involved Party

Women presently enrolled in graduate-level leadership programs and early-career professionals hoping to advance to leadership positions across industries were the study's target audience. Participants were gathered from professional associations and educational programs. Sample Size: 250 women responded to the study's survey.

Demographics: The participants had a diversity of educational backgrounds, industries, and leadership experiences, and their ages ranged from 22 to 45.

Techniques for Gathering Data

Numerical Information - a well-organized online survey form

Quantitative Analysis: To find trends in the responses, descriptive statistics were computed.

The associations between avoidance behaviors, leadership self-efficacy, and stereotype threat were investigated using correlation analysis.

To evaluate the effects of interventions on leadership motivation and self-efficacy levels, regression analysis was done.

Qualitative Analysis: Thematic analysis was used to examine interview data once it was transcribed (Braun & Clarke, 2006). Based on participant experiences, reactions to stereotype threat, and the perceived efficacy of mitigation techniques, themes were determined.

Findings

Numerical Results

Leadership Self-Efficacy and Stereotype Threat Analysis showed a negative relationship between leadership self-efficacy and stereotype threat levels ($r = -0.42$, $p < 0.01$). Lower confidence in pursuing leadership posts was linked to higher stereotype danger.

Conclusion

Female leadership aspirations are still significantly hampered psychologically by stereotype danger. Its consequences contribute to the gender leadership gap in businesses and society by undermining motivation, performance, and confidence. Effective methods for reducing the impact of stereotype threat include leadership development, organizational changes, mentorship programs, positive role models, and cognitive reframing. It is crucial that educators, organizational leaders, and legislators carry out these initiatives to guarantee equity in leadership possibilities. By tackling the underlying factors that contribute to stereotype threat, cultures can create a more equal atmosphere that encourages women to pursue leadership roles.

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DRIVING CLIMATE RESILIENCE IN THE STEEL INDUSTRY: DECARBONIZING FOR ACHIEVING CARBON NEUTRALITY AND NET-ZERO GOALS

S N Panigrahi

Introduction

The global steel industry, a cornerstone of the world economy, is also a significant contributor to greenhouse gas (GHG) emissions, responsible for **approximately 7-9% of global CO2 emissions**. As the sector faces mounting pressure to align with the Paris Agreement's climate targets, decarbonization has become imperative. This paper examines the urgency and strategies for achieving net-zero emissions in the steel industry with particular reference to Indian Steel Sector, emphasizing the adoption of innovative technologies such as decarbonization, carbon capture, use of green hydrogen, Artificial Intelligence (AI), Machine Learning (ML), Blockchain etc. These advancements aim to enhance energy efficiency, reduce emissions, and transform traditional production methods.

Globally, the **steel industry emitted 3.6 billion metric tons of CO2 in 2022**, with China accounting for nearly 50% of production and emissions. In the Indian context, this challenge is particularly pronounced, with the steel sector contributing around 12% of the country's total industrial emissions. India, the second-largest steel producer, has significantly reduced CO2 intensity per ton of steel but continues to face challenges due to reliance on coal-based production methods. Indian states like Odisha, Chhattisgarh, and Jharkhand play pivotal

roles in steel production and emissions. Initiatives such as the Perform, Achieve, and Trade (PAT) scheme and investments in green hydrogen and carbon capture technologies highlight India's progress toward decarbonization.

The Indian steel sector is progressively adopting AI and ML for energy optimization, exploring green hydrogen and EAF technologies for emission reductions, and participating in global sustainability initiatives. The nation's commitment to achieving net-zero emissions by 2070, announced at COP26, necessitates transformative approaches in heavy industries like steel. While challenges such as high costs and resource limitations exist, these efforts signify a commitment to transitioning towards more sustainable steel production practices.

Despite advancements, challenges such as high capital costs, technological gaps, and regulatory disparities remain.

This study underscores the necessity of integrating emerging technologies, robust policies, and international collaboration to achieve a sustainable, climate-resilient future for the steel industry. Decarbonization is not just an environmental imperative but a critical enabler of long-term industry viability.

Key Challenges in Sustainability for Indian Steel Supply Chain

1. **Carbon Footprint:** The sector contributes approximately 12% of India's industrial CO₂ emissions.
2. **Resource Utilization:** Inefficiencies in raw material procurement and energy consumption.
3. **Waste Management:** High levels of industrial waste with limited recycling initiatives.
4. **Regulatory Compliance:** Balancing cost efficiency with adherence to environmental norms.
5. **High capital investment** requirements for green technologies.
6. **Limited domestic manufacturing Capabilities** of low-carbon steel production equipment & technologies.
7. **Technological gaps** in hydrogen-based and carbon capture technologies.
8. **Limited financial mechanisms** for supporting green transitions.
9. **Competitive pressures** in global markets.
10. **Inadequate renewable energy infrastructure.**
11. **Insufficient carbon measurement** and monitoring systems. **Limited specialized workforce** for advanced green technologies

Research Gap

While significant efforts are being made to decarbonize the steel industry, key gaps persist in achieving carbon neutrality and net-zero goals:

Existing literature and policy frameworks predominantly focus on theoretical decarbonization strategies, with limited empirical research on:

1. **Comprehensive, context-specific implementation roadmaps** for the Indian steel industry
2. **Integrated approaches** combining technological, economic, and policy interventions
3. **Long-term economic and social impact assessments** of decarbonization strategies.
4. **Technological Adoption:** Limited integration of advanced technologies like AI, ML, Blockchain, and green hydrogen in real-world steel production processes.
5. **Regional Disparities:** Countries like India face unique challenges due to reliance on coal-based methods, contrasting with cleaner technologies adopted in developed economies.
6. **Economic Viability:** High capital costs and uncertain returns hinder large-scale adoption of green technologies.
7. **Policy Frameworks:** Lack of cohesive international policies and regulatory standards for global decarbonization strategies.
8. **Knowledge Integration:** Fragmented research on integrating multiple technologies (e.g., AI with green hydrogen) for holistic decarbonization.
9. **Supply Chain Challenges:** Limited focus on decarbonizing upstream and downstream supply chain processes in the steel industry.

Research Objectives

Based on the identified gaps, the study aims to:

1. Analyze the current status of CO₂ emissions in the global steel industry, focusing on major producers like China and India.
2. Evaluate the potential of innovative technologies (AI, ML, Blockchain, and green hydrogen) in achieving decarbonization goals.
3. Identify regional challenges, especially in developing economies, in transitioning to low-carbon steel production methods.
4. Examine the economic feasibility of decarbonization strategies, including investments in green technologies and policy incentives.

5. Propose a framework for integrating emerging technologies with policy interventions to achieve a climate-resilient steel industry.
6. Assess global collaborations and initiatives, highlighting their role in knowledge sharing and standardization for net-zero transitions.

Literature Review

1. Global Steel Industry Emissions

- *World Steel Association (2023)* reports the global steel industry's contribution of 7–9% to CO₂ emissions and highlights the urgency of aligning production with the Paris Agreement.
- Studies by *IEA (2022)* underscore the dominance of coal-based production methods, particularly in China and India, and emphasize green hydrogen and electric arc furnaces as transformative solutions.

2. Technological Advancements

- *Zhang et al. (2021)*: AI and ML applications in steel production can optimize energy efficiency, reducing emissions by up to 15%.
- *Nakamoto et al. (2020)*: Blockchain enhances transparency in the steel supply chain, enabling better traceability of emissions.
- *Green Hydrogen Deployment Report (2022)* highlights its ability to reduce CO₂ emissions by up to 90% in steelmaking processes.

3. Regional Insights: India's Challenges

- *Ministry of Steel (India, 2023)* acknowledges significant progress in reducing CO₂ intensity but emphasizes coal dependence as a persistent barrier.
- *State-Level Analysis (2022)* highlights Odisha, Chhattisgarh, and Jharkhand as key contributors, necessitating focused decarbonization strategies in these regions.

4. Policy and Economic Feasibility

- *Perform, Achieve, and Trade (PAT) Scheme (India)*: A government initiative promoting energy efficiency but lacking scalability.
- *European Steel Technology Platform (2021)*: Demonstrates the role of robust policy frameworks in enabling decarbonization in developed regions.
- Economic barriers, as outlined by *Smith et al. (2022)*, include high upfront costs and inadequate incentives for green technology adoption.

5. Global Collaborations and Best Practices

- *Global Low-Carbon Steel Production Alliance (2023)*: Facilitates knowledge sharing and standardization but highlights gaps in participation by developing nations.
- *IEA Technology Roadmap (2021)*: Recommends coordinated international efforts to bridge technological and regulatory disparities.

6. Integration of Emerging Technologies

- Limited research focuses on the synergistic application of technologies such as AI, Blockchain, and green hydrogen for holistic decarbonization (*Jones et al., 2022*).
- Calls for interdisciplinary studies integrating technology, policy, and supply chain innovations (*Kumar et al., 2023*).

eCO₂ emissions (per ton of manufacturing output) for 10 key Industrial sectors

Here's an overview of **eCO₂ emissions (per ton of manufacturing output)** for 10 key industrial sectors, based on industry averages. Note that these values may vary depending on geographic region, technology, and production efficiency:

Crude Steel Production: Global Vs India

One of the primary forces behind industrialization has been the use of metals. Steel has traditionally occupied a top spot among metals. Steel production and consumption are frequently seen as measures of a country's economic development because it is both a raw material and an intermediary product. Therefore, it would not be an exaggeration to argue that the steel sector has always been at the forefront of industrial progress and that it is the foundation of any economy. The Indian steel industry is classified into three categories - major producers, main producers, and secondary producers.

Globally, the steel industry produced **1.89 billion metric tons** of crude steel in 2023, with **China** leading at nearly **50%** (1019.0 MT) of total production. India is the second largest producer of crude steel. China was world's largest crude steel producer in 2022 (1018.0 MT) followed by India (140.2 MT), Japan (87 MT) and the USA (80.7 MT).

India's Crude Steel Production & Capacity Outlook to 2030

India's crude steel production is projected to reach **300 million tons (MT)** by 2030, aligning with the **National Steel Policy 2017** target. The current production stands at around **125-140 MT**, with a capacity of approximately **160-170 MT**. India aims to boost capacity to **300 MT** by 2030, driven by infrastructure development, urbanization, and rising domestic demand. Key enablers include investments in **green technologies**, policy support for

decarbonization, and energy-efficient production methods to ensure sustainable growth and competitiveness in the global market.

India's Crude Steel Production Surging Ahead with New Initiatives

The industry's growth, particularly between 2019 and 2023, has been notable. During this period, India's steel output expanded at an impressive 6% compound annual growth rate (CAGR), significantly outpacing China's 1% and outshining global steel production, which saw a 1% decline. The past five years have witnessed a global increase in steel capacity by nearly 62 million tonnes, with India accounting for 6% of this growth. Notably, ASEAN and India are projected to account for nearly 89% of Asia's steelmaking capacity additions.

This performance highlights the country's strategic position in the global market, driven by domestic manufacturing pushes like '**Atmanirbhar Bharat**'. India is not just producing steel; it is crafting a roadmap to reduce import dependency and enhance export competitiveness.

Crucial to this success has been the **National Steel Policy (NSP) 2017**, which set ambitious targets to achieve a crude steel capacity of 300 million tonnes by 2030-31, with an expected production of 255 million tonnes of crude steel and 230 million tonnes of finished steel. The policy aims to make India self-sufficient in steel production while catering to both domestic and international markets, emphasising increasing capacity, enhancing quality, and adopting sustainable and energy-efficient practices.

Crude steel production grew from 109.137 million tonnes (MT) in 2019-20 to 144.299 MT in 2023-24, registering a robust growth of 13.4% over the previous year (127.197 MT in 2022-23). The domestic steel industry's capacity expanded from 142.299 MT per annum in 2019-20 to 179.515 MT in 2023-24, supporting the production growth. Capacity utilization increased to 81% during the same period.

But India's steel story isn't merely about expansion in capacity—it is equally about rising domestic consumption. Total finished steel consumption grew from 100.171 MT in 2019-20 to 136.291 MT in 2023-24, indicating a strong domestic demand with a growth rate of 13.7% over the previous year. Industry projections, including a conservative 6% CAGR in steel demand through FY27, suggest that India's steel sector is poised to meet—and perhaps exceed—demand.

To boost steel production, a key initiative is Production Linked Incentive (PLI) Scheme, aimed at attracting capital investments and reducing imports, with an anticipated ₹29,500 crores investment and an additional capacity creation of 25 million tonnes for specialty

steel. To make the steel industry globally competitive, in **Budget 2024**, the Government reduced the Basic Customs Duty on ferro nickel, a raw material, and extended the duty exemption on ferrous scrap until March 2026. Another key initiative is the Domestically Manufactured Iron & Steel Products (DMI&SP) Policy, which promotes 'Made in India' steel for Government procurement.

CO₂ Emissions per Ton of Steel: Global Vs India

Globally, the average CO₂ emissions per ton of crude steel production stand at approximately **1.85 - 1.90 tons**. In India, emissions are relatively higher, averaging **2.2 - 2.5 tons** per ton of steel, primarily due to reliance on coal-based production methods like **blast furnaces**. Transitioning to cleaner technologies such as green hydrogen and electric arc furnaces is essential to bridge this gap and meet global sustainability targets.

Breakdown of Global Crude Steel Production Routes and their CO₂ Emissions Intensity

A comprehensive breakdown of global crude steel production routes and their CO₂ emissions intensity, referencing authoritative sources is referenced below-

Global Crude Steel Production Routes (2024 Estimates):

1. Blast Furnace-Basic Oxygen Furnace (BF-BOF):
 - Approximately 71% of global steel production
 - Primary route for primary steel production
2. Electric Arc Furnace (EAF) with Scrap:
 - Around 22% of global steel production
 - Predominantly using recycled steel
3. Direct Reduced Iron-Electric Arc Furnace (DRI-EAF):
 - Approximately 7% of global steel production
 - Emerging decarbonization pathway

CO₂ Emissions Intensity (tCO₂ / t crude steel):

1. BF-BOF Route:
 - Approximately 2.23 tCO₂/tcs (accounting for 50%)
 - Highest carbon intensity
2. EAF with Scrap:
 - Approximately 0.67 tCO₂/tcs (accounting for 14%)
 - Lowest carbon intensity

3. DRI-EAF Route:

- Varies significantly based on energy source:
 - With fossil fuels: 1.65 tCO₂/tcs (accounting for 36%)
 - With green hydrogen: 0.1 - 0.3 tCO₂/tcs

Key Observations:

- BF-BOF remains the dominant production route globally
- EAF with scrap offers the lowest carbon footprint
- DRI-EAF with green hydrogen represents a promising decarbonization pathway

Decarbonizing Steel: A Comprehensive Strategic Approach to Emissions Reduction

The global steel industry faces an unprecedented challenge: achieving a radical transformation in its carbon footprint while maintaining economic viability. The International Energy Agency's Sustainable Development Scenario provides a rigorous blueprint for this critical transition.

Emissions Reduction Imperatives:

- Mandatory 50% emissions reduction by 2050
- Targeting net-zero emissions trajectory post-2050
- Dramatic decrease in CO₂ emission intensity from 1.4 to 0.6 tonnes of CO₂ per tonne of crude steel

Multifaceted Decarbonization Strategy:

1. Material Efficiency Optimization
 - Projected global steel demand reduction of approximately 20% by 2050
 - Key intervention points:
 - Upstream: Improving manufacturing yields
 - Downstream: Extending infrastructure and building lifecycles
 - Anticipated contribution: 40% of cumulative emissions reductions

Contribution Breakdown:

- Supply chain interventions: Moderate impact
- Downstream lifecycle extensions: Primary source of material savings
- Energy Performance Enhancement
- Current state-of-the-art blast furnaces approaching theoretical minimum energy efficiency

- Significant efficiency gaps exist in legacy/inefficient equipment
- Operational improvements include:
 - Advanced process control
 - Predictive maintenance strategies
 - Best available technologies implementation
- Projected contribution: 20% of cumulative emissions savings

Strategic Insights:

- Efficiency measures alone are insufficient for comprehensive decarbonization
- Technological transformation is imperative
- Economic incentives increasingly align with emissions reduction

The steel industry's decarbonization journey represents a complex, multi-dimensional challenge requiring synchronized technological, operational, and strategic innovations.

Global Decarbonization Trends

Recent studies by the International Energy Agency (IEA) and World Steel Association highlight significant global momentum towards green steel production. Key technological trajectories include:

- Hydrogen-based Direct Reduced Iron (H-DRI) technologies
- Electric Arc Furnace (EAF) powered by renewable energy
- Carbon Capture and Storage (CCS) technologies
- Advanced process optimization techniques

Decarbonization Initiations - Indian Context

Research by NITI Aayog and the Ministry of Steel outlines several pathways to enhance sustainability in India's steel industry:

- **Incremental Technology Upgrades:** Implementing advanced technologies can improve energy efficiency and reduce emissions. For instance, adopting Carbon Capture, Utilization, and Storage (CCUS) technologies can significantly mitigate CO₂ emissions in steel production.
- **Renewable Energy Integration:** Transitioning to renewable energy sources, such as solar or wind, to power steel plants can substantially lower the industry's carbon footprint.

- **Circular Economy Principles:** Embracing circular economy strategies, including recycling and efficient resource utilization, can enhance sustainability. The Ministry of Electronics and Information Technology (MeitY) emphasizes the importance of circular economy principles in various sectors, which can be applied to steel production as well.

These strategies align with India's commitment to sustainable development and reducing greenhouse gas emissions.

New Technological Adoption

Artificial Intelligence (AI) and Machine Learning (ML) are being integrated into Indian steel manufacturing to enhance process efficiency, minimize waste, and reduce energy consumption. These technologies enable real-time monitoring and optimization of operations, leading to lower carbon emissions. For instance, AI-driven solutions can optimize resource use and improve energy efficiency in steel production.

India is evaluating the feasibility of green hydrogen-based steelmaking, which involves using hydrogen as a reducing agent instead of traditional carbon-intensive methods. Studies suggest that while this technology holds promise for significant emission reductions, it may become a primary steelmaking route in India by 2050, contingent upon reductions in green hydrogen costs and the implementation of carbon pricing mechanisms.

The adoption of Electric Arc Furnaces, which utilize scrap steel and electricity, is being considered to reduce emissions. However, the limited availability of scrap steel in India poses a challenge to widespread EAF implementation. Despite this, transitioning to EAFs powered by renewable energy could potentially reduce emissions by up to 88% compared to conventional methods.

India has announced a formula for classifying "green steel," defining categories based on carbon emissions per metric tonne of produced steel. This initiative aims to guide the industry towards decarbonization and aligns with global efforts to reduce carbon footprints in steel production.

Transforming Steelmaking: A Strategic Approach to Decarbonization

The steel industry stands at a critical technological crossroads, requiring a nuanced, multi-pathway approach to dramatically reduce carbon emissions. Our comprehensive analysis reveals that no single technological solution will universally address the sector's decarbonization challenges. Instead, a robust portfolio of complementary strategies emerges as the most promising pathway:

Key Decarbonization Technologies:

- Hydrogen-based processes
- Carbon capture, utilization, and storage (CCUS)
- Bioenergy integration
- Direct electrification

Hydrogen-Based Steelmaking: Access to *low-cost renewable electricity* (USD 20-30 per MWh) in specific regions gives a competitive edge to the hydrogen-based Direct Reduced Iron (DRI) process. By 2050, this route is projected to account for nearly 15% of global primary steel production.

Source: International Energy Agency (IEA), Sustainable Development Scenario.

CCUS-Equipped Technologies: Innovative smelting reduction, gas-based DRI, and advanced blast furnace concepts integrated with CCUS will prevail in areas with favorable policies and affordable fossil fuels.

Example: Regions with abundant natural gas or coal can adopt these processes while mitigating emissions through CCUS deployment.

Contribution to Emission Reductions: Combined, hydrogen-based processes and CCUS are expected to deliver *one-quarter* of cumulative emission reductions under the Sustainable Development Scenario by 2050.

Source: IEA World Energy Outlook 2023.

Conclusion

The research highlights the critical need to bridge the existing research gap in decarbonizing the steel industry, particularly in balancing India's growing crude steel production with global climate goals. While global crude steel production remains substantial, India's outlook to 2030 indicates rapid capacity expansion, increasing the urgency to address CO₂ emissions per ton of steel, where India currently lags behind global benchmarks. By analyzing CO₂ emission intensity and comparing global and Indian production, the study underscores the necessity for adopting transformative approaches to achieve carbon neutrality and net-zero goals.

A comprehensive strategic approach integrating advanced technologies—Hydrogen-based Direct Reduced Iron (H-DRI), Electric Arc Furnaces (EAF) powered by renewable energy, Carbon Capture and Storage (CCS), and process optimization techniques—is vital for driving decarbonization. India's decarbonization initiatives must align with global trends

and adopt the Global Steel Sector Sustainability Matrix to enhance environmental, social, and economic performance. By implementing robust environmental metrics, such as energy efficiency, carbon intensity, and circular resource utilization, alongside social metrics like workplace safety and community engagement, the Indian steel sector can emerge as a global leader in sustainable steelmaking while achieving its climate resilience goals.

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CORPORATE SOCIAL RESPONSIBILITY PRACTICES FOR AN INCLUSIVE AND SUSTAINABLE GROWTH: EVIDENCE FROM INDIA

Dr. Priyabrata Satapathy

I. Introduction:

Economic growth of a country is possible only through an efficient consumption of inputs available in the Business Environment. The utilization of natural resources has a direct impact on the economy, environment, and society at large. Social, Economic and environment are the three pillars or dimensions of Sustainable development. The 2030 Agenda for Sustainable Development adopted by all United Nations Member states in 2015 provides a common blueprint and recognize that the ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality and spur economic growth tackling climate change and working to preserve our oceans and forest achieving sustainable development goal (SDG).

The Business world is becoming environmentally and socially responsible. The success of a business organisation goes beyond profitability, growth rate, and brand recognition. Now a days customers, employees and other stakeholders judge the company by how its activity

impacts the environment, economy and society at large with its best practice in Governance on various sustainability and ethical issues. Sustainable development is grounded on three basic pillars i.e social, economic and environment. According to Brundtland Commission set up by United Nations General Assembly in 1983 defined Sustainable development as that “meets the need of present generation without compromising the ability of future generation to meet their own needs”.

Corporate Social Responsibility (CSR) is not a new term, whether we talk about it globally or in respect to our country. CSR is a term which can be used as a synonym for charity, philanthropy, and donations, which have been an integral part of business activities since ages. With effect from April 1, 2014, CSR is a mandatory requirement for certain companies under section 135 of the Companies Act, 2013, which compels them to engage in activities that contribute to the social, environmental, and economic development of the country. India is the first country in the world where there is a mandatory requirement of minimum 2 per cent of net profit to be spent on CSR activities. Since India is facing multiple socio-economic challenges, it is important for India to make it mandatory for corporates if sustainable and inclusive growth is desired. We have experienced a shift in focus from charity and philanthropy towards direct engagement of corporates in the mainstream development of the country. There is no single definition which can give an overall view of what CSR implies. According to Lord Holme and Richard Watts, “Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large.”

CSR encompasses not only what companies do with their profits, but also how they make them. It goes beyond philanthropy and compliance, and addresses how companies manage their economic, social and environmental impacts. As well as their relationships in all key spheres of influence: workplace, marketplace, supply chain, community and the public policy realm. (Harvard University)

According to the Ministry of Corporate Affairs, Government of India, Corporate Social Responsibility “urges business to embrace the ‘triple bottom line’ approach whereby its financial performance can be harmonized with the expectation of society, the environment and the many stakeholders it interfaces with in a sustainable manner”.

II. Literature Review

The idea of CSR is based on the concept that corporates should manage their business in such a way that they maximize the profit along with their contribution to the resolution of

social and economic problems in society. Corporates should contribute more than economic goods and services. They should emphasize creating quality of life in society. There are various viewpoints of different researchers with respect to definition and adaptability of CSR. For many years, CSR has been a major area of concern for many researchers. In 1960, the idea of CSR originated with the conception that corporates have responsibilities beyond legal obligations (Bronn and Vrioni, 2001). According to Angelidis and Ibbrahim (1993), CSR is “Corporate social actions whose purpose is to satisfy social needs”.

In recent times, organisations are more focused towards the stakeholder’s approach than shareholders. (Stubbs and Cocklin, 2007). As per the European commission, 2002, CSR is a concept whereby corporates merge social and environmental concerns in their business operations and discuss social concerns with their stakeholders before taking any decisions.

Mahabir Narval (2007), in his study, suggests that Indian banks are concentrating mainly on education, health, environment and customer satisfaction irrespective of the location of the bank. CSR in India has gone beyond merely ‘charity and donations’ and is approached in a more organised fashion. It has become an integral part of corporate strategy (Das Gupta, 2010). Carroll (1979), identified the CSR pyramid, which comprises four stages of CSR development, namely economics, legal, ethical and philanthropic obligations.

It is expected from a company that since they have resources and capital, they should be given a chance to solve the problems our society is facing (Davis, 1973). Where there are supporters of CSR policy, there are a few critics also. Friedman (1970) communicated his thoughts against CSR and said that a profit maximizing firm should not divert its funds to create social good at the cost of shareholder returns. According to him, it amounts to “theft” and it’s socially irresponsible of the firm to engage in CSR. He believed that CSR would lead to allocated inefficiencies and social losses.

It has been observed that inclusive growth cannot be achieved unless we all won’t contribute towards the development of society. Long time back, Kautilya’s ‘Arthashastra’ talks about merchants trading, while having responsibilities towards the betterment of society, though it was a voluntary act. Revival and inclusive growth cannot be achieved by the government alone. Corporates do have to play their role to help the country attain inclusive growth through fair practice of CSR policy. Anjan Kumar, M.J. (2016) speaks about CSR and its impact on inclusive growth. To him influx of funds by corporates (2 per cent of net profit) would multiply the reserves of the NGOs and make them liable to develop proper reporting mechanisms in order to trace the funds given by corporates.

Dash Ranjan et al. (2020) in their study discovered that the average CSR expenditures over the period of study done by private companies are significantly more than that of Govt. corporations. Satapathy & Paltasingh (2022) in their paper makes a modest attempt to explore the connections between CSR and (Sustainable development goal) SDGs in contemporary India and examines how CSR in India contributes to SDGs.

III. Objectives:

The objective of the paper is to provide a framework on the role of corporate in ensuring a sustainable tomorrow through inclusive growth. Given India's diverse socio-economic landscape, CSR practices have become vital for addressing critical issues such as poverty, inequality, and access to basic services. The article explores key CSR practices implemented by Indian businesses and their impact on marginalized communities, education, healthcare, and employment. This Paper examines the alignment between CSR initiatives and inclusive growth objectives, offering insights into how CSR contributes to sustainable and equitable development in India.

IV. Data & Methodology:

This paper shares a conceptual framework based on the previous literature. The present study is analytical in nature based on secondary data collected from Ministry of Corporate Affairs. To study the trend of CSR expenditure data was collected from Ministry of Corporate Affairs for the year 2014-15 to 2021-22. The data collected is based on the Annual report filled by the companies for the year. To have an understanding and study the objectives, the research design employed for the study is descriptive and conceptual in nature. Secondary data has been collected and analyzed from various journals, data available on the Ministry of Corporate Affairs website, Wikipedia, reports and data available on company websites, World Bank reports and magazines articles.

V. Discussion & Analysis:

Enactment of Companies Act, 2013 by the Ministry of Corporate Affairs, Government of India was one of the world's largest experiments of introducing the CSR as a mandatory provision by imposing statutory obligation on Companies to take up CSR projects towards social welfare activities. This has made India the only country which has regulated and mandated CSR for some select categories of companies registered under the Act. This CSR Initiative will push the nation towards achievement of sustainable development goals and public-private partnership in transforming India.

India being an emerging developing economy, has to spend huge amounts on the well-being of its people. According to World Bank estimates of Growth forecast, India has achieved growth rate of 7.2 percent in 2023-24 which is now showing a sharp decline to 5.4 percent in last quarter of 2024. Despite rapid economic growth, India faces widespread poverty, inequality, and social exclusion. Inclusive growth aims to ensure that the benefits of growth are equitably distributed, particularly benefiting the marginalized sections of society, including women, lower-caste groups, rural populations, and economically disadvantaged communities.

So coming back to inclusive growth, the challenges that our country is facing are varied. It ranges from corruption, social limits of Indian democratic politics, slow growth rate in rural areas, need for urban transformation, women's safety, child labour, improper basic amenities, polluted water and environment, depletion of resources and so on. To cope with these challenges, inclusive growth has been projected as the strategic pillar of the 12th Five Year Plan. The objective for 12th Five Year Plan is titled as 'Faster, more inclusive and sustainable growth'. To overcome the threat posed by the economy in its inclusive growth, the government of India came up with 13 flagship programmes that work towards rural development, health and family welfare, women and child development, school education and literacy, urban development, water resources, power, drinking water supply and agriculture.

Businesses have the potential to promote inclusive growth through responsible and ethical practices that prioritize social welfare alongside profit. CSR activities such as skill development, infrastructure improvement, education, healthcare, and environmental sustainability can significantly contribute to inclusive development.

V.I Key Areas of CSR Initiatives for Inclusive Growth

Inclusive growth basically means broad based growth, shared growth and pro-poor growth. The concept holds a tremendous relevance in today's world of growing disparity. The growing disparity between shining 'India' and shrinking 'Bharat' has raised questions on government policy of inclusive growth. CSR is one such tool which can be considered as a mechanism towards sustainable inclusive growth. CSR programme in areas like education, health, livelihood creation, skill development, empowerment of disabled woman are common practices adopted by the companies in India. Almost all major companies in India have a CSR programme in areas like education, health, livelihood creation, skill development, empowerment of disabled and woman. These include the Maharatna, Navratna and Miniratna public sector organizations along with private sector such as

Tata Group, Infosys, Mahindra and Mahindra, Bharti Enterprises, Coca Cola India Pvt Ltd, Pepsico, ITC Welcome Group, Johnson & Johnson Ltd, NASSCOMM Foundation, Thermax Limited, Hero Honda and others.

In order to understand the role of corporate for sustainable inclusive growth through CSR, a framework is developed to map the inclusive growth parameters with CSR interventions.

- **Education and Skill Development:**
 - Investment in education and skill-building initiatives to empower marginalized communities.
 - Focus on creating employment opportunities through vocational training and capacity-building programs, especially in rural areas.
- **Healthcare Initiatives:**
 - CSR investments in healthcare infrastructure, medical research, and programs to provide healthcare to underserved populations.
 - Public-private partnerships in areas such as maternal and child health, sanitation, and disease prevention.
- **Gender Equality and Empowerment:**
 - CSR programs aimed at empowering women through education, employment, entrepreneurship, and leadership programs.
 - Supporting women's health and safety programs, providing financial literacy and self-help groups.
- **Environment and Sustainability:**
 - Businesses have a critical role in promoting environmental sustainability by reducing their carbon footprint and investing in green technologies.
 - Protecting natural resources and contributing to climate action through sustainable agriculture, renewable energy, and conservation efforts.
- **Infrastructure Development:**
 - Building basic infrastructure such as roads, sanitation, drinking water, and affordable housing in underserved areas.
 - Creating models for sustainable rural development
- **Sustainable policies & Strategies:**
 - CSR policy in line with companies strategy
 - CSR practices benchmarking
- **Executive coaching and training:**
 - Leadership development
 - Team and Individual Coaching

V.II CSR Trend: Public Sector Undertaking Versus Non- Public Sector Undertaking in India

The business houses are earning profits by rendering their services to customers in society. In a way they are also causing damages to the society and environment in several forms due to the inevitable nature of their business. The government alone cannot uplift the downtrodden people. Corporate houses and non-governmental organisations (NGOs) have to come forward to eradicate various social evils and play a vital role in societal development by activities such as providing quality education, extending healthcare facilities, reducing malnutrition, creating awareness on environment safety, drinking water facilities, sponsoring the sports events, participating in natural disaster management programmes, ethical values promotion and enriching the Indian culture. The corporate houses have to come forward to play their part towards the development of the society. This contribution will be helpful to the organisations to enhance their brand awareness and reputation in the market. Therefore, community development is a responsibility of the government, NGOs and business organisations as well.

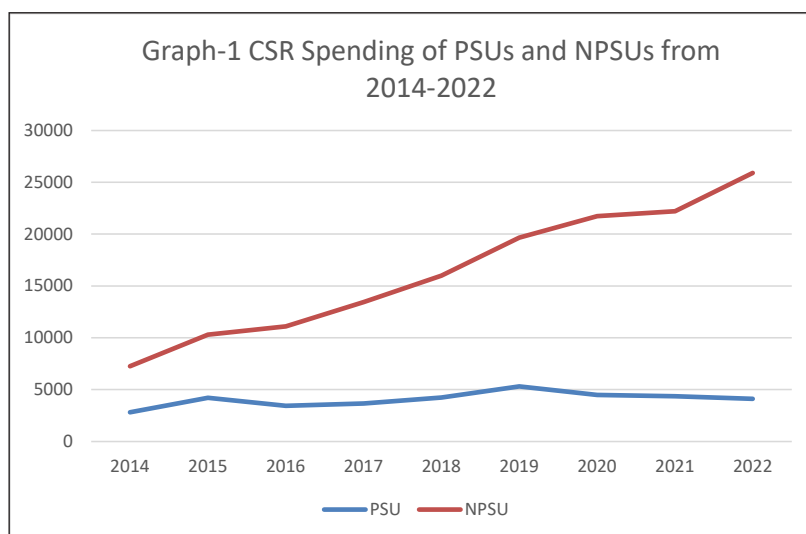
	Sector Wise-Year Wise Spending by Companies from 2014-15 to 2022-23								
Development Sector	2014-15 (INR Cr.)	2015-16 (INR Cr.)	2016-17 (INR Cr.)	2017-18 (INR Cr.)	2018-19 (INR Cr.)	2019-20 (INR Cr.)	2020-21 (INR Cr.)	2021-22 (INR Cr.)	2022-23 (INR Cr.)
Education	2589.42	4057.45	4534.16	5763.45	6111.66	7179.51	6693.25	6557.13	10085.38
Environmental Sustainability	773.99	796.69	1082.63	1301.96	1368.27	1470.53	1030.16	2432.26	1959.96
Livelihood Enhancement Projects	280.17	393.38	518.49	832.4	907.98	1077.72	938.91	854.48	1654.39
Prime Minister'S National Relief Fund	228.18	218.04	158.8	200.42	322.19	798.43	1698.38	1214.84	815.85
Conservation Of Natural Resources	44.6	49.85	119.09	228.14	173.55	160.6	92	273.82	580.37
Rural Development Projects	1059.35	1376.16	1572.87	1724.07	2434.17	2301.02	1850.71	1832.82	2005.37
Safe Drinking Water	103.95	180.16	160.12	220.87	228.23	253.4	203.13	182.54	246.36
Slum Area Development	101.14	14.1	51.49	39.16	51.06	42.94	88.95	58.29	93.84
Art And Culture	117.37	119.17	306.13	395.22	225.94	933.57	493.13	248.09	441.02
Socio-Economic Inequalities	39.04	77.97	148.01	155.95	167.92	214.88	149.81	164.85	154.01
Swachh Bharat Kosh	113.86	325.52	184.06	272.07	95.5	53.47	161.35	34.92	55.32
Training To Promote Sports	57.62	140.12	197	285.41	310.16	304	243.39	291.75	526.14
Women Empowerment	72.87	122.79	163.46	251.37	236.54	259.57	206	259.82	396.85
Armed Forces, Veterans, War Widows/ Dependants	4.76	11.14	37.86	29.09	90.18	62.06	84.05	47.21	62.27
Clean Ganga Fund	5.47	32.82	24.37	33.96	8.11	6.63	13.39	55.41	41.66

Gender Equality	55.21	73.85	72.6	24.01	51.86	82.93	43.83	104.63	119.83
Health Care	1847.74	2569.43	2503.91	2776.95	3617.15	4905.72	7325.83	7806.3	6830.41
Nec/ Not Mentioned	1338.4	1051.16	437.43	15.2	87.61	502.79	203.14	0.59	1.5
Agro Forestry	18.12	57.85	45.48	66.79	64.75	67.38	20.9	34.27	65.07
Other Central Government Funds	277.1	334.35	419.99	292.73	731.06	932.16	1618.17	309.22	179.02
Poverty, Eradicating Hunger, Malnutrition	274.7	1252.08	614.65	811.2	1195.78	1159.71	1407.58	1894.08	1232.62
Sanitation	299.54	631.8	433.98	460.68	506.66	521.72	338.97	313.1	429.91
Senior Citizens Welfare	8.94	21.87	27.75	40.1	46.52	52.33	56.47	79.55	132.87
Setting Up Homes And Hostels For Women	8.74	29.28	62.22	70.58	57.01	48.5	44.52	100.81	48.53
Setting Up Orphanage	5.12	16.9	16.8	39.87	12.89	36.5	21.88	27.52	41.24
Special Education	41.43	125.84	165.33	140.01	186.13	196.88	209.24	190.51	305.57
Technology Incubators	4.74	26.34	25.4	16.94	32.1	53.5	62.62	8.57	1.38
Animal Welfare	17.29	66.67	78.71	63.52	98.33	106.12	193.55	168.59	315.98
Vocational Skills	277.07	344.4	379.7	546.46	798.36	1181.23	717.65	1033.84	1164.19

Source: Ministry of Corporate Affairs, Govt of India

The above table shows sector wise and year wise spending by companies on CSR practices. The sectors like Education, Health care, Environmental sustainability, Vocation skills, Prime Minister's National relief fund, Rural development Projects, Poverty, Eradicating Hunger, Malnutrition and Livelihood Enhancement Projects have massive spending by companies from 2014-15 to 2022-23 as shown from table. More particularly spending on Education and Health care has always been in growth agenda for common people where business can contribute though their spending on these sectors. If we have to bring about inclusive growth in India, we need to focus on very basic issues like education, poverty, employment, health, agriculture and infrastructure. The government alone is not capable of achieving revival and inclusive growth. In 2014-15, total 16055 number of Non-PSU spent Rs 7249.11 crore and 493 number of PSU spent Rs 2816.82 crore and the total amount spent on was Rs 10065.93 crore on CSR activities. In 2022-23, total 24021 number of Non-PSU spent Rs 25891.15 crore and 371 number of PSU spent Rs 4095.78 crore and the total amount spent on was Rs 29986.93 crore on CSR activities.

It is clearly visible from the line graph-1 that there is a continuous increase in spending by Private sector undertaking (NPSUs) than PSUs over the period from 2014 to 2022. From Graph-2 it is revealed that there is a continuous increase in in Education and Health care spending by companies over the period.



The following Table makes State wise expenditure as part of Corporate social responsibility by companies from 2014-15 to 2022-23. It is revealed from table that in 2022-23 Maharashtra is the leading state when it comes to CSR spending, followed by Karnataka, Andhra Pradesh, Gujarat, Uttar Pradesh and Tamil Nadu. But the states like Arunachal Pradesh, Goa, Bihar, Punjab have spent very low amount of expenditure on CSR initiative for inclusive growth of the country.

State wise CSR Expenditure from 2014-15 to 2022-2

States	2014-15	2015-16	20-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Andhra Pradesh	414.28	1276.73	745.24	575.07	665.97	710.23	719.81	656.05	954.65
Arunachal Pradesh	11.05	1.48	24.05	11.91	24.56	18.02	10.58	119.42	13.35
Assam	134.78	158.97	257.19	211.33	210	285	180.23	405.92	470.25
Bihar	36.69	123.8	100.84	106.17	137.95	110.48	89.89	165.97	235.37
Chhattisgarh	161.3	239.72	84.85	176.7	149.35	269.68	325.63	304.83	596.11
Delhi	237.44	455.17	460.71	579.37	750.85	830	724.59	1190.39	1483.72
Goa	27.11	28.15	36.25	53.77	46.77	43.91	41.92	45.43	58.16
Gujarat	313.41	547.94	865.81	967.97	1082.18	984.37	1461.6	1603.51	2008.41
Haryana	187.41	373.44	386.65	363.43	378.11	537.91	550.86	678.88	700.95
Himachal Pradesh	10.95	52.2	23.32	69.23	78.79	78.78	106.31	140.22	138.49
Jammu And Kashmir	38.48	107.8	42.97	50.77	36.44	25.27	35.56	50.36	71.22
Jharkhand	79.44	116.93	119.84	109.23	109.8	155.21	226.54	193.33	388.35
Karnataka	403.47	771.59	876.84	1145.79	1257.69	1448.16	1277.81	1836.86	1985.55

Kerala	68.23	145.03	133.84	219.73	354.78	298.56	290.67	239.5	351.6
Madhya Pradesh	141.85	171.58	161.39	163.92	243.55	220.46	375.51	426.9	656.42
Maharashtra	1445.92	2026.91	2420.35	2797.53	3147.72	3353.24	3464.81	5375.26	5497.3
Manipur	2.44	6.25	12.6	4.81	7.81	14.21	10.39	15.62	53.45
Meghalaya	3.53	5.59	9.88	11.18	16.54	17.65	17.63	19.63	21.73
Mizoram	1.03	1.07	0.46	1.28	0.11	0.25	0.97	6.94	10.99
Nagaland	1.11	0.95	0.53	1.81	2.12	5.1	3.57	12.46	13.57
Odisha	252.18	618.69	355.32	504.22	697.91	717.39	578.16	670.23	987.59
Punjab	55.61	69.14	75.05	112.36	166.85	189.44	158.46	184.48	247.57
Rajasthan	299.76	483.99	353.75	443.35	595.49	734.12	670	709.85	1102.37
Sikkim	1.19	1.45	6.71	7	5.87	10.99	17.28	28.24	36.18
Tamil Nadu	539.64	588.22	548.28	669.65	877.08	1072.26	1174.07	1428.84	1562.48
Telangana	101.96	263.6	256.39	380.57	428.06	445.8	627.71	681.46	1007.39
Tripura	1.33	1.39	1.25	1.88	23.06	9.4	9.29	15.91	19.26
Uttar Pradesh	148.9	416.99	321.63	435.21	521.32	577.98	907.32	1338.23	1152.57
Uttarakhand	74.79	73.11	102.37	85.79	172.31	124.7	160.58	228.08	301.11
West Bengal	194.86	412.14	276.59	338.32	382.23	423.85	471.48	566.83	762.29

Source: Ministry of Corporate Affairs, Govt of India

V.III Few Case Studies of CSR for Inclusive Growth in India:

A few cases have been discussed showing the private sector CSR initiatives of organization bringing in inclusive growth.

- **Tata Group:**
 - Known for its long-standing commitment to CSR, Tata Group invests in education, healthcare, rural development, and sustainability initiatives.
 - Tata's rural health initiatives provide medical services to underserved areas, contributing significantly to health equity.
- **Reliance Industries:**
 - Initiatives like the Reliance Foundation focus on improving healthcare, education, rural development, and sustainable livelihoods.
 - The company's skill development programs help empower rural youth and women with employable skills.
- **Infosys Foundation:**
 - Focuses on education, healthcare, rural development, and disaster relief.
 - The foundation's education initiatives reach underserved children, providing learning opportunities through digital literacy programs.

- **Mahindra Group:**
 - Mahindra's "Rise for Good" initiative promotes inclusive growth by investing in women's empowerment, sustainable agriculture, and education for underprivileged communities.
- **FabIndia:**
 - A well-known retail brand that sells various handmade products through its stores across India and overseas.
 - Best-known urban middle class brand in India. Though they are best known for home linen and garments, they have expanded into organic food, personal care products, furniture and jewelry.
 - This company started as an export house, exporting Indian hand woven fabric to the developed markets in the west.
- **ITC e- Choupal:**
 - Introduced by ITC in June 2000 as an initiative to improve the supply chain by linking directly with farmers for procurement.
 - Designed to play the role of a social gathering place for the exchange of information as well as a place for e-commerce transactions.
 - Started initially as a way to modify the procurement process for crops like soy and wheat, has now turned into a lucrative distribution and product development channel for ITC.

V.IV Challenges in Implementing CSR for Inclusive Growth:

The main factor driving the country's rapid adoption of corporate social responsibility is the fact that India has one of the fastest-growing economies, and socioeconomic issues like poverty, illiteracy, a lack of access to healthcare, etc. are still widespread and the government has little resources to address these issues. This has made it possible for many companies to support in the development of society. Here are some major challenges in implementing Corporate Social Responsibility (CSR) for inclusive growth:

❖ Lack of Awareness and Understanding of CSR

- Many companies, especially small and medium enterprises (SMEs), lack a clear understanding of CSR beyond philanthropy. This limits their ability to design effective, long-term CSR strategies aimed at inclusive growth.
- Businesses often view CSR as a regulatory burden rather than an opportunity to contribute to societal development.

Solution: Promote CSR awareness programs and capacity-building initiatives to help companies align CSR with business goals and social impact.

❖ **Inadequate Legal and Policy Frameworks**

- CSR regulations in some countries are either too rigid or too vague, making it difficult for companies to comply effectively.
- Governments may lack robust mechanisms to monitor and evaluate the impact of CSR initiatives.

Solution: Strengthen CSR policies with clear guidelines and measurable outcomes to ensure companies focus on inclusive growth.

❖ **Lack of Stakeholder Engagement**

- Companies often fail to engage key stakeholders, such as local communities, NGOs, and government bodies, in the planning and execution of CSR projects.
- This leads to misaligned CSR activities that do not address the real needs of marginalized communities.

Solution: Adopt participatory approaches by involving stakeholders in the planning, implementation, and evaluation of CSR projects.

❖ **Inconsistent Commitment and Short-Term Focus**

- Many companies engage in CSR as a one-off activity, focusing on short-term gains rather than long-term societal benefits.
- Inconsistent CSR efforts reduce the overall impact on inclusive growth.

Solution: Develop long-term CSR strategies that integrate sustainable development goals (SDGs) and focus on creating lasting social impact

❖ **Resource Constraints**

- Limited financial, human, and technical resources can hinder companies, particularly SMEs, from implementing impactful CSR programs.
- Companies may also struggle to balance profit-making with investing in CSR for inclusive growth.

Solution: Encourage partnerships with governments, NGOs, and other businesses to share resources and enhance the impact of CSR initiatives.

❖ **Lack of Measurement and Evaluation Mechanisms**

- Many companies lack the tools and frameworks to measure the social impact of their CSR activities.
- Without proper evaluation, it becomes difficult to gauge the effectiveness of CSR efforts in promoting inclusive growth.

Solution: Implement impact assessment frameworks and key performance indicators (KPIs) to monitor progress and ensure accountability.

❖ **Corruption and Mismanagement**

- Corruption at various levels can divert CSR funds from reaching the intended beneficiaries.
- Mismanagement of CSR projects can result in poor outcomes and loss of trust among stakeholders.

Solution: Ensure transparency and accountability through regular audits and public disclosure of CSR activities and outcomes.

❖ **Lack of Skilled Professionals**

- Implementing effective CSR programs requires professionals with expertise in social work, community engagement, and sustainable development.
- Many companies lack such expertise in-house.

Solution: Invest in training programs and hire CSR specialists to design and implement impactful projects.

VII. Summary and Conclusion:

Corporate Social Responsibility (CSR) plays a pivotal role in promoting inclusive growth in India, where social disparities and developmental challenges persist. Indian companies are increasingly aligning their CSR initiatives with the country's development goals, contributing to improved education, healthcare, empowerment, and infrastructure. While challenges remain, effective CSR practices can significantly bridge the gap between economic growth and social equity, fostering a more inclusive and sustainable future for all segments of society. CSR in India is not a new concept; companies have been practicing it in a voluntary spirit with a philanthropic approach. Not all companies were practicing it in a structured manner with many practicing it with the objectives of gaining publicity, tax benefits or goodwill generation. CSR in its current form is in its nascent stage and hence study like this will help organisations to understand and learn from the CSR practices of the leading companies of the country. The CSR analysis reflects on the trust areas of education being the most prominent area where all the companies are working, initiatives in the area of environment and water need more emphasis and the study highlights the need for innovative, sustainable and scalable projects.

During the study, it was found that companies design strategies to incorporate CSR in their operations. CSR has had a positive effect on education, infrastructure, health, livelihood and environmental development. But CSR is a continuous and evolving process. Corporates have to work continuously in the long run to help in the development of the country. CSR has been adopted across the globe as a concept that determines the success and failure of

a company. In India, since the companies are struggling to establish their base and earn profits, it is quite challenging for them to spend on CSR.

CSR should not be restricted to corporates alone. Even universities, institutes and other businesses which are outside the purview of CSR rules should do CSR. Every industry exploits resources and depends on stakeholders in one way or another, so it is the responsibility of all of us to repay our debts to society. This nation belongs to all and therefore it is the duty of all to contribute towards its development.

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SUSTAINABILITY IN SOFTWARE USING AUTOMATIC TESTING FOR POWER CONSUMPTION

Rajeeb Sankar Bal, Jibendu K Mantri, Suwendu K Jaysingh

I. Introduction

1.1 The Concept Of Sustainability In Software Engineering

Currently, the Sustainable development is an evolution that meets the demands of the present without find a happy medium ability of future generations to meet their own demands. Mainly, it contains two key concepts within it: i. the concept of 'needs' i.e., the necessary demands of the world's poor, to which most important priority should be specified and ii. The 'limitations' idea i.e., the social organization and present of technology on the environment's ability to meet the needs of present and future. The objectives of economic and social development must be considered in terms of sustainability in world i.e., the developing, and centrally designed or planned [1].The sustainability in Information and Communication Technology (ICT) is one of demand for power consumption of data centres in the world increased from 58TWh (terawatt-hour) in 2000 up to 123TWh (terawatt-hour) in 2005 and is still growing. There is mainly demand of power consumption or several efforts exist in the area of computer hardware i.e., Green-Information Technology (IT) or understanding in the area of computer software. Mostly, any methods available to integrate sustainability aspects in software development.

What is Sustainable Software? It is defined as direct or indirect impacts on human beings, society, environment and economy. But the result from development, deployment and utilization of software are minimal which has positive effect on Sustainable Software development [2]. Further, software engineering practices have important effects on the environment. It includes e-waste from computers made ignored due to software changes in the power demands of new versions of software. Sustainable software engineering objects to create well founded, long-lasting

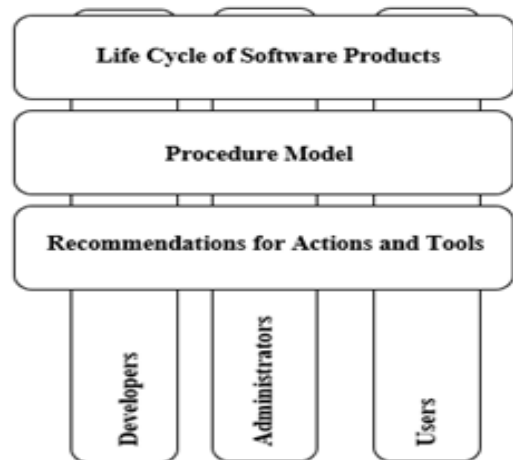


FIGURE 01: The Model for Sustainable Software Engineering.

software that content the requires of users while reducing environmental effects. A model for Sustainable Software Engineering shown in figure 1 which comprises three parts: i. a lifecycle model for software products ii. A procedure model and iii. Recommendations for actions and tools. These are all provided for various roles, like Developers, Administrators, and User. [3].

In 2007, the ICT sector was responsible for 2% of global carbon emissions in the SMART 2020 report. Additionally, the combined carbon footprint of Personal Computers and monitors is expected to triple by 2020 in the estimated report. It there is growing interest between software Developers or engineers and environmental sustainability, if it is thought of at all, for most users and developers [4].

1.2 The Green Software

The software is the one of environmentally sustainable and should have minimum influence on the environment. Green software can be built more efficiently with minimum influence. The software products are non-essential goods, their use can bring about remarkable materials. Software is basic for reducing the use of natural resources in IT products. The Green Project Management consider on project management points in an environment friendly way. But, each phase of software development lifecycle can advantage from environment friendly measures. The Computer Energy Consumption review and Potential Savings, analyses the power consumption by computers and monitors in the recent years manufactured by different vendors shown in table 1 and 2 with bar-chart figure 2 and 3 [5].

TABLE I: The Power consumption of computers manufactured between 1999 and 2001.

Description	Power Consumption of Computers in Watts (W)		
	Active	Lowpower	Off
Desktop	55	25	1.5
Desktop with Power Management	36	27	0
Desktop without Power Management	48	0	0
Desktops manufactured -2000-2001	70	9	3
Desktop with Pentium and Pre-Pentium manufactured 1999	55	25	0
Desktop with –Macintosh manufacture in 1999	50	48	0

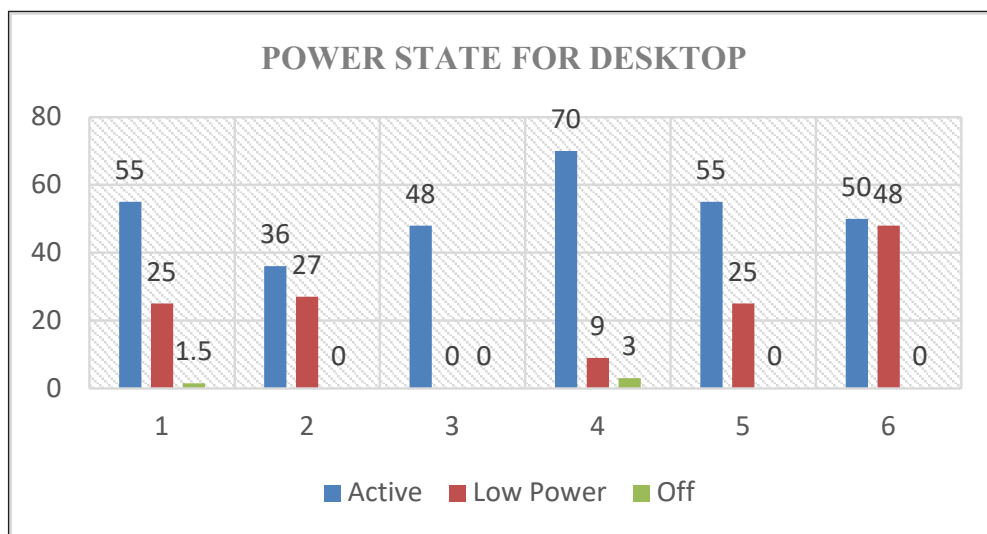


FIGURE 02: The Power consumed by computers manufactured between 1999 and 2001.

In TABLE I, the Analysis was made for three states of the power consumed i.e., Active, Low-power and Off. But the outcome was the amount of power consumed by computers considerable. The TABLE I shown the computers of different types and compares the power consumption from 1999-2001. The TABLE I with figure 2 of bar-chart clearly shown that the power consumption of computers is slowly growing with new hardware components. TABLE II shown the different types monitors i.e., CRT (cathode Ray tube) and LCD (liquid crystal display) with sizes between 15 to 17 inches and power consumption.

TABLE II: The Power consumption of CRT and LCD Monitors.

Description	Power Consumption of Monitors in Watts (W)		
	Active	Lowpower	Off
CRT with Power Management	66	15	0
CRT without Power Management	67	0	0
CRT	85	5	0.5
CRT 15"	75	10	0
CRT 17"	80	15	0
LCD	15	1.5	0.5
LCD 15"	30	2	2
LCD 17"	35	15	0.5

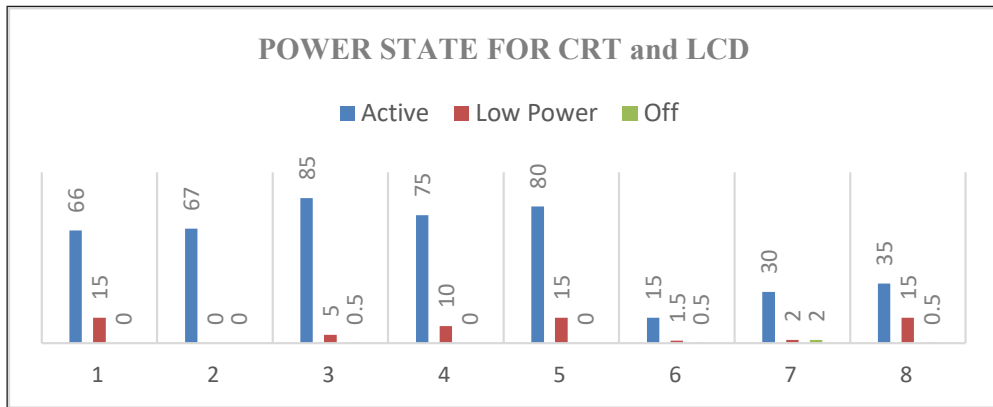


FIGURE 03: The Bar-chart Power consumption of CRT and LCD manufactured between 1999-2001.

The bar chart in figure 3 is shown the power consumed by different kinds of the monitors i.e., CRT and LCD from TABLE II. It is clearly shown LCD monitors consume much less power compared with CRT monitors. hence LCD monitors indicate that a significant amount of power can be saved.

II. Related Work

In [6], it is presented e-economy for industries software advance based on transformed most markets and productions into e-business. Also, it is considered climatic changes in the world for software practitioners. software practitioners implemented software systems in a more workable way that suggests “Greener” opportunities. In [7], it is presented many possible paths to grow sustainability of and with ICT. Also, it is developed a life cycle of software products in general and of green software products and integrated approach of “green and sustainable software and software engineering” with some definitions. In [8], we have studied an ABC prioritization algorithm to prioritize the test cases. To overcome the performance issues of ABC algorithm, some qualifications are suggested in original ABC algorithm. Also, the improved ABC algorithm is used to solve the test suite prioritization problem. The aim of the ABC prioritization algorithm is to work out optimum order of test cases for decreasing cost and time of regression testing. The results of ABC prioritization algorithm are contrasted with random, reverse and original sequence of test cases. In [9], we have studied the prioritization of requirement and concentrate on cost as a basis parameter applying approach Artificial Bee Colony (ABC) Algorithm. Basically, it is optimization algorithm known as an iterative process, similar to other population-based algorithms. The prioritize requirement between the Functional Requirement and Non- Functional Requirement.

III. The Green Software Development Model

In software development life cycle, the Green Software Development Model refines each phase namely requirements, design, Implementation, testing, deployment, maintenance and retirement.

1. *Requirements:* In this phase, it is necessary to define shelf life of software. The software serves the society to achieve a specific goal. If the shelf life is considered for a project, it avoids disposal of existing hardware to develop the software.
2. *Design:* In the Design phase, the primary object should be to achieve in design. Always, the design changes may not be considered environment friendly. In the design changes, it may lead to a lot of paper work, use of tools to construct. Also, it impacts on old and new hardware components and software, higher consumption of power state.
3. *Implementation:* In implementation phase, it is an important phase for mapping between the requirements and design to build a working system. It also enhances the quality of the software. But the Sustainable or environment friendly implementation should be another important objective. The use of Application Programming Interface (API's) for sustainable software implementation that are hardware component specific should be discouraged. Because the software implementation is coupled to a hardware specific. Thus, the disadvantage is that if the hardware is outdated the software becomes useless.
4. *Testing:* In this phase, a development software system is verified and validated for perfect error free. A major role in achieving defect free software using Unit test at a more granular level. If no defects in software there is no change required in the software. The software testing automation should be encouraged to reduce manual errors. Also, they weight on re-use of test cases and regulate the testing process. The creativity and reduces power consumed by extra resources in the testing of manual process.
5. *Deployment:* In this phase the actual software is produced for installation in the production environment. The installation package size plays an important role, installation is larger, more the time taken for installation in the production environment. Also, it adds an overhead of storage and maintenance and needs lot of disk space for storage. Another approach used for online license verification-based installation to avoid the e-Waste.

6. *Maintenance*: In this phase, the software system moves to the features are implemented and the software is functioning well at the same time in the production environment for some time. In this phase, it includes fine-tuning the system, fixing the bugs, implementing new features, etc. It helps to avoid disposal of e-Waste such as outcome hardware which affects the environment.
7. *Retirement*: It is the last phase of the software system for the reusable parts of the software should be archived for future use rather than disposing.

IV. Artificial Bee Colony (ABC) Algorithm

In ABC algorithm, the Bees administer the foraging information to members in other colonies, and such behaviours can be detected according to the conduct of the real bees. In the optimization problem, the value of the food origin corresponds to the objective function value. If the value of the food source grows and reduces with the objective function value and the best food source can be procured from the packing the end of the algorithm. The boundary of colony size would be set before applying the ABC algorithm. Colony size is the group of all bees. The group of all bees is divided into two groups, one group applied by employed bees, and another group is used by onlookers bees. There are three groups of bees in this algorithm: a. employed bees, b. onlookers bees, and c. scouts bees. The employed bees are conduct for searching for the initial food origins and sharing their information with other bees. The onlookers bees decide the searching area based on the information sent from the employed bees. Scouts bees search the whole environment randomly. Hence, the ABC algorithm consists of these main components to find the best solution [9].

Initialize Solutions:

In the ABC algorithm, the colony size would be defined. The initial solutions are randomly generated in the searching range in eq. (1).

$$x_{i,j} = x_{\min,j} + \text{rand}(0, 1)(x_{\max,j} - x_{\min,j}), \quad (1)$$

Where $i = 1, 2, \dots, N_p$. The N_p and j are food sources and the dimension, respectively.

Employed Bee Phase:

The employed bee makes a new mitigation from initial food origins, and uses greedy selection between the old one and the new one. There are five steps:

- (i) Let x_{kj} be the neighbour food origin, for $k = \text{rand}(1, N_p)$.

- (ii) Find a new food origin near the current food origin; the new food origin can be derived from:

$$v_{ij} = x_{ij} + \phi_{ij}(x_{ij} - x_{kj}), \quad (2)$$

Where $\phi_{ij} = \text{rand}(-1, 1)$, $i = 1, 2, \dots, N_p$, and j is the dimension.

- (iii) Determine the objective function value of v_{ij} .
- (iv) Contrast the objective function values of x_{ij} and v_{ij} .
- (v) Bees cover a new memory of the food origin v_{ij} , which has a better objective function value, into the old one of v_{ij} . On the other hand, v_{ij} is restrained if it has a worse value. After each employed bee completes its job of searching, a waggle dance is conducted to show the onlookers the positions of the food origins

Onlookers' Phase:

During this, they are standing by until employed bees complete the food-searching procedures. The following methods are alike to worker bees. Each onlooker provides a new food origin near the previous one and uses the greedy selection between them. Now, the steps are described as follows:

- (i) First define the fitfunction for $i = 1, 2, \dots, N_p$:

$$\text{fit}_i = 1 / (1 + f(x_i)). \quad (3)$$

- (ii) From (i), one can derive the probability value:

$$\text{probability}_i = \text{fit}_i / \sum_{i=1}^{N_p} \text{fit}_i \quad (4)$$

$$x_{i,j} = x_{\min,j} + \text{rand}(0, 1)(x_{\max,j} - x_{\min,j})$$

- (iii) The onlooker chooses the food origin to search depending on the probability. Let v_{kj} be the neighbour food origin, for $k = \text{rand}(1, N_p)$.
- (iv) Express the relation between the selected and a new food origin by the following equation:

$$v'_{ij} = x_{ij} + \phi_{ij}(v_{ij} - v_{kj}), \quad (5)$$

Where $\phi_{ij} = \text{rand}(-1, 1)$, $i = 1, 2, \dots, N_p$ and j is the dimension.

- (v) Determine the objective function value of v'_{ij} .
- (vi) Contrast it to the objective function value of v_{ij} with v'_{ij} .

- (vii) Substitute a new memory of the food origins v_{ij} , which has a better objective function value, into the old one of x_{ij} . On the other hand, v_{ij} is taken if it has a worse value. After this selection, each onlooker bee searches for a new setting based on the probability value.

Scouts Phase

In ABC algorithm, scouts are in charge of searching the whole area surrounding the nest if the rejected food origin exists. The food origin supported by the scout replaces the rejected food origin.

- (i) Calculate whether the searching number without refinement exceeds the limit value.
- (ii) If the reject case exists, the food origins are changed to the scouts.
- (iii) Send scouts to randomly find new food origins in the whole searching range by:

$$S_{ij} = S_{min,j} + \text{rand}(0, 1)(x_{max,j} - x_{min,j}), \quad (6)$$

Where $i = 1, 2, \dots, N_p$ and j is the dimension.

- (iv) The food origins derived from scouts are substituted for rejected food origins directly. In each phase, the ABC algorithm creates a new population in the searching area. Generally, the best solutions can be derived from the optimal method of the ABC algorithm during the iterations.

IV. Proposed Work

The general algorithmic structure of the ABC optimization approach is given as follows:

Initial solution Phase

While (Cycle = Maximum Cycle Number or CPU time){

Employed Bees Phase

Onlooker Bees Phase

Scout Bees Phase

Memorize the best solution reached.

}

1. In the initial solution Phase, the population of food origins is initialized scout bees and control parameters are set.
2. Find for an executable state and calculate the test node.

3. Initialize the current path as cycle=1
4. Repeat
5. Produce initial food origins randomly that correspond to solution using:

$$x_{i,j} = x_{\min,j} + \text{rand}(0, 1)(x_{\max,j} - x_{\min,j}),$$
6. DFD paths are generated from conversion of source code to CFG.
7. Greedy selection process is concerned on generated DFD paths.
8. Pass the generated DFD paths to SUT and evaluate the fitness value.
9. DFD path with highest fitness value are selected by onlookers' bee phase and leave the rest.
10. Same process is repeated till a particular DFD path with 100% fitness value and 0% fitness value is produced.

$$\text{probability}_i = \text{fit}_i / \sum_{i=1}^{N_p} \text{fit}_i$$

The probability function which signifies the probability with which the i^{th} DFD path traverses an independent test path successfully.

11. Store the DFD path to the optimal.
12. New DFD path generated by scouts bee phase in next iteration and go to step 5.

V. Result Analysis

We consider the following JAVA program as an example for the given method to be applied on it. We generate the Control Flow Graph (CFG) using the Eclipse CFG Generator is a plug-in for the Eclipse IDE for Java code. It generates the graphs based on the evaluation and McCabe results of the source code shown in Figure 4 (a), (b), (c) and (d).

```

1  GreatestOfThree_No.java
2  /* JAVA program for finding the greatest among three numbers */
3  import java.util.Scanner;
4  public class GreatestOfThree_No {
5      public static void main(String[] args) {
6          int a, b, c, i;
7          Scanner sc = new Scanner(System.in);
8          System.out.print("\n Enter the values of a, b and c");
9          a = sc.nextInt();
10         b = sc.nextInt();
11         c = sc.nextInt();
12         if(a>b)
13         {
14             if(b>c)
15             {
16                 t=a;
17                 System.out.print("\n The greatest number is " + t);
18             }
19             else if(a>c)
20             {
21                 t=a;
22                 System.out.print("\n The greatest number is " + t);
23             }
24             else
25             {
26                 t=c;
27                 System.out.print("\n The greatest number is " + t);
28             }
29             else if(b>c)
30             {
31                 t=b;
32                 System.out.print("\n The greatest number is " + t);
33             }
34             else
35             {
36                 t=c;
37                 System.out.print("\n The greatest number is " + t);
38             }
39         }
40     }
41 }

```

Figure 4(a): Displayed the Source Code of JAVA.

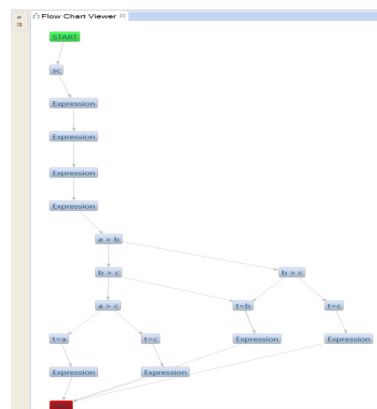


Figure 4(b): Displayed CFG from the Source Code of JAVA.

```

Problems Javadoc Declaration Console Progress
<terminated> Greatest_of_Three_Nos [Java Application] C:\Program Files\

Enter the values of a, b and c
12
44
2
The greatest number is =44

```

Figure 4(c): Displayed Result of the Source Code of JAVA.

```

Outline
Flow Chart Generator
MacCabe results
24 - 21 + 2 = 5
*Satisfied : true
Nodes: 2..
Connect... 2..
Limit: 2..
*Whether the MacCabe result is
under the limit or not, it depends
on the limit itself.

```

Figure 4(d): Displayed MacCabe Result from drawn the CFG.

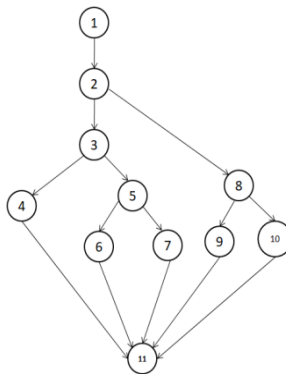


Figure 5: The DFD for above JAVA program.

The cyclomatic complexity (CC) = $E - N + 2$. Where N is number of nodes and E is number of edges. In the figure, the $CC = 14 - 11 + 2 = 5$. So, the number of paths in figure is 5. All the paths are start/begin from node number 1 and end/exit at node number 11. These are given below.

Path 1: 1->2->3->4->11. Path 2: 1->2->3->5->6->11. Path 3: 1->2->3->5->7->11. Path 4: 1->2->8->9->11. Path 5: 1->2->8->10->11.

To generate random test cases initially within the input domain, like scout bee searches the food origin. Now, we take each test case as x_{ij} and the three integers of the test case as the parameters a, b, c. After that, execute the JAVA program with test case values and then check which paths are satisfied, and which are not satisfied. Here, the paths 1, 3, 5 are classified into Set: 01 and 2, 4 are classified into Set: 02. By the above randomly generated test cases the satisfied DFD paths in the set: 01 are

Path 2: 1->2->3->5->6->11. Path 4: 1->2->8->9->11.

Similarly, the satisfied DFD paths in Set: 02 are

Path 1: 1->2->3->4->11. Path 3: 1->2->3->5->7->11. Path 5: 1->2->8->10->11.

First, we calculate solved path of DFD paths, the fitness values (applying the formula, in proposed method) are as shown in table III.

TABLE III: The fitness values from proposed ABC algorithm.

Path No	Fitness Values of DFD Paths				Probability
	With Respect to Path 1	With Respect to Path 3	With Respect to Path 5	Total	
2	0.66	0.83	0.5	1.99	0.52
4	0.66	0.5	0.66	1.82	0.47

Now, we calculate final fitness values, calculate the probability values, using on the formula given in the proposed algorithm. Then the probability values are, for path 2 is 0.52, for path 4 is 0.47 shown in table III. Hence, the average probability value is 0.49. Only one independent test path (path 4) has below average probability value.

VI. Conclusion

Generally, ABC is sustainable to handle complex problems i.e., evolutionary hardware and software, complex network analysis, large data clustering, cluster robot and cloud computing. Here, this study tries to examine particularly to generate test cases in a unit test for object-oriented programming. We implemented the generation of test cases in Java programs and covered all code paths using the ABC algorithm where the results of the experiments indicates that the ABC algorithm obtains the optimum path cost and the independent path consumes less power for automated testing in sustainability software. In future, this will be implemented to compare to the bat algorithm, the cuckoo algorithm, the firefly algorithm and the differential evolution algorithm.

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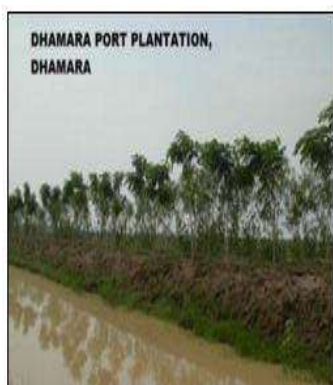
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