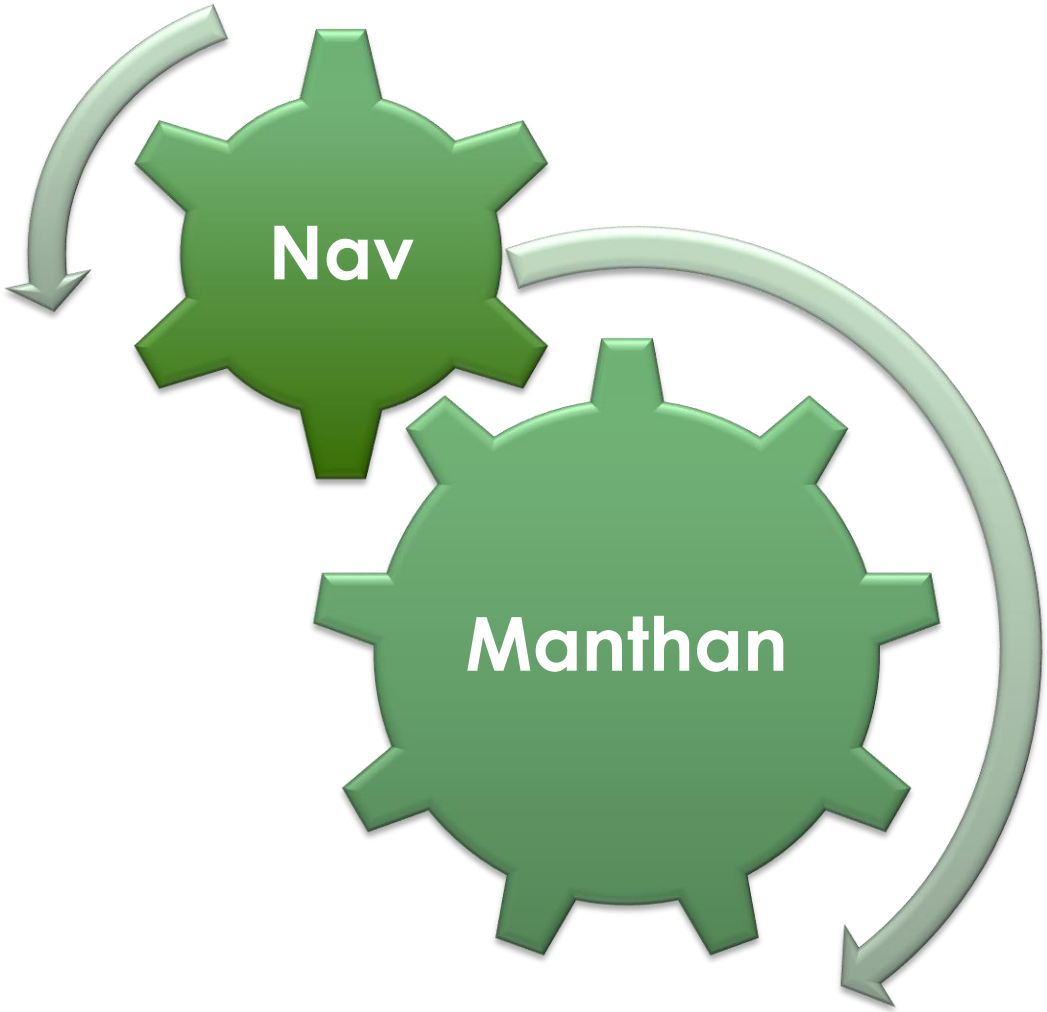
ISSN: 2349 - 7327



Nav Manthan

A Peer Reviewed Research Journal

August 2024 Volume- 11, Issue- 1

SVKM's Narsee Monjee College of Commerce and Economics.
JVPD scheme, Vile Parle (W), Mumbai 400 056.

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Nav Manthan

A Double Blind Peer Reviewed Annual Research Journal

Volume - 11, Issue – I, August 2024

Editorial

Nav Manthan is an annual peer reviewed interdisciplinary journal and ascends a maiden flight across the globe as an academic Journal, distinctive in its experimental area. This is inclusive of a broad spectrum of leading schools of thought. It is independent of its kind that inspires up-to-date research endeavour from research territory, deliberation, and latest nuances in the field of Commerce, Economics, Psychology, Law, Finance and other field of academics. We encourage all categories of learners and learned from different areas for a cross cultural exploration and subsequent innovation of subjects concerned.

We express our sincere gratitude to all the renowned contributors for this special issue who all had participated and presented papers in the International Conference on 'Navigating The Future With Sustainability And Growth', organised by IQAC and Conference Committee of SVKM's Narsee Monjee College of Commerce & Economics (Autonomous) held on 22nd August, 2024. The selected papers are published in this issue, which were in terms of the policy of Nav Manthan journal publication.

The basic objective of the conference was to study and analyse experiences of various sustainability and growth issues with a practical approach by academic fraternity, industrial experts and professionals.

We appreciate all the paper presenters for their worthy inputs during the conference and taking Nav Manthan to greater heights.

Best Wishes!

Guidelines for Authors

'Nav Manthan' is a national level interdisciplinary double blind peer review journal focusing on research articles in the field of commerce, accountancy, management, economics, law, social sciences and humanities.

The research article in only of the original research work will be published. The authors are required to give an undertaking that the work is original and not published or sent for publication elsewhere. The authors are advised to submit their details on a separate page along with the article. The article once sent for Peer Review will not be returned back. The reviewer's instructions will be sent to the main author to make the necessary amendments in their article. The revised article should be sent back within 15 days to the editor for publication. The Editor reserves the rights of editorial amendments required to be made in the article in order to meet the standard of the journal. The papers with more than 10% plagiarism and AI contents will not be accepted for publication.

The research article should be sent through a soft copy in MS-WORD at nmcconfer@gmail.com and follow APA style of references. The authors are requested to follow the format for research articles as-

1) For general research-
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   - Aims and objectives of the research
   - Methodology used
   - Data and interpretation
   - Conclusion
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   - Scope
   - Aims and objectives
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Once the article is accepted by Peer Reviewer the main author will be informed about its publication along with the necessary instructions, if any.

Nav Manthan

A Double Blind Peer Review Research Journal

ISSN: 2349 - 7327

Year - August 2024, Volume - 11, Issue – 1

Contents

THE ROLE OF SUSTAINABLE FINANCE AND TECHNOLOGY AT INDIAN BANKS IN SUPPORTING THE "SUSTAINABLE DEVELOPMENT GOALS

***Dr. Reshma Udhani**

****Dr. Sunita Ramchandani**

Abstract:

Sustainable Finance is a recent trend in the Banking sector. Financial institutions are giving preference to industries which have already transitioned to a greener economy or are actively working toward doing so, and they also promote eco-friendly investments. Fundamental and essential, sustainable finance enables us to set up the framework for achieving the Sustainable Development Goals effectively. Technology-driven banking solutions encourage financial inclusion by giving the direction to serve the unreached populations, encouraging economic growth and solidity. The basic purpose of this research is to explore the ways in which technology is supporting the long-term feasibility of the banking industry. When it comes to using technology to encourage sustainability, the banking industry is the foremost Player. Banks can help achieve sustainable development goals (SDGs), lessen their environmental impact, and improve operational efficiency by utilizing cutting-edge technologies. The study concluded that India can work on improving its position as a global leader in sustainable development by expanding green finance, improving regulatory support, applying technological advancements, and reassuring public awareness and engagement.

Keywords – Sustainable Finance, Technology, Sustainable Development Goals, UN Environment Programme, Climate change, Responsible Banking

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Background:

The recent years have seen a remarkable shift in the global financial sector towards aligning business activities with varying societal goals including Sustainable Development Goals (SDGs) of the United Nations. Therefore, this paper examines how banks integrate sustainability into their operations as well as support to the country's development objectives and state the status of regulatory compliance by Indian banks with regard to Sustainable Development Goals (SDGs)

As of 2023, temperature highs are unprecedented; yearly carbon emission growth is at a rate of six percent. For instance, in February there was an all-time high average maximum temperature recorded in India since record keeping started in 1901 across the national territory which stood at 29.5 degrees Celsius.

It is therefore important we take quick actions against these disadvantages that contribute towards global warming because from such data it can be observed that it's getting worse every day. the discussion will focus on green banking and sustainable financing as workable steps that organizations may take to lessen the effects of climate change.

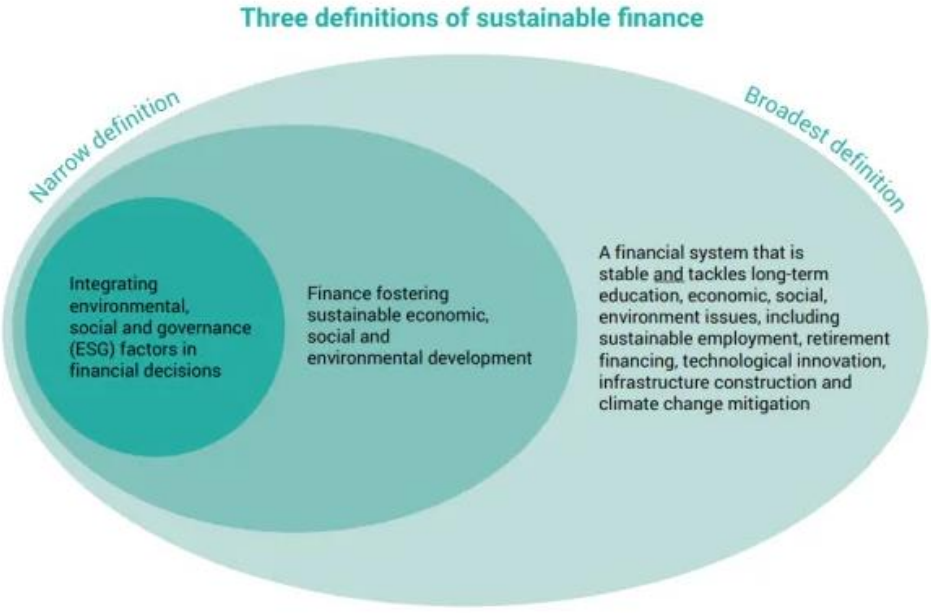


Fig 1 – Source: - European commission

The term "sustainable finance" defines how financial decision-making processes integrate environmental, social, and governance (ESG) contemplations. It seeks to balance social inequality, lessen environmental stress, and advance sound governance with bolstering economic growth. By integrating sustainability principles with financial practices, sustainable finance aims to provide long-term value.

India's banking industry plays an important role to the nation's economic growth. Indian banks have realized the value of coordinating their operations with the Sustainable Development Goals (SDGs) in order to tackle social and environmental issues, as responsible finance becomes more and more important.

Literature Review:

Abhishek Ranjan (RBI Bulletin January 2021) Public policy has started prioritizing green finance. He had studied the developments made in India and around the world in green finance. He has evaluated the level of public awareness (Google Trends) and the available financing choices (bank loans and bond issuances) for green proposals using a range of data sources. Although there has been an improvement in public awareness and financing options in India, his findings indicated that longer-term, more sustainable, and environmentally friendly economic growth could be made possible by reducing asymmetric information through enhanced stakeholder coordination and improved information management systems.

Sisodia, A., and Maheshwari, G. C. (2023) Sustainable finance is crucial for achieving sustainable development goals under the 2030 agenda. It involves investment decision-making and monitoring climate change. However, there is no universally applicable definition. This paper examined a study on sustainable finance conducted between 2002 and 22 and examined the extensive Scopus and Web of Science databases. The goal of the study was to close the knowledge gap on sustainable finance by emphasizing its significance for corporate governance and its influence on the expansion of the industry.

Singh, Kuldeep and Abraham, Rebecca and Kolar, Prasanna. (2023) The fintech industry has revolutionized financial services, transforming transactions and transactions. It does, however, also offer chances to advance social responsibility and sustainability. The

Sustainable Fintech Revolution investigates the ways in which fintech might enhance sustainable development objectives, lessen economic inequality, and promote financial inclusion.

Kishore Kumar and Ajai Prakash (2020), The Indian banking sector has been slow to adopt sustainable practices, with public sector banks focusing on social dimensions and private sector banks addressing environmental care. They concluded with the need to integrate sustainable banking, the industry needs to be more practical and promote established codes of conduct, as public sector banks are very much active for working on social dimensions and environmental care.

According to the Centre for Financial Accountability (CFA) study, project finance credit for coal power plants has not been granted for the second year in a row, marking a significant change in India's energy financing landscape. Based on a recent estimate, renewable energy projects received 100% of India's project financing loans in 2022, totalling ₹ 18,577 crore ($2.36 billion).

Rationale:

The union of technology and sustainable finance in the Indian banking sector offers a stimulating field of inquiry because of the substantial consequences it has for social welfare, environmental sustainability, and economic development. Legislators, financial institutions, and other participants can benefit significantly from an understanding of how these two components are incorporated into banking operations.

Research Method:

This study uses secondary data and a descriptive research design to investigate how sustainable finance and technology help achieve the Sustainable Development Goals. The study uses secondary data from a range of reliable sources, such as government publications, websites and databases, reports and publications, academic journals, and reports and publications. The procedure entails methodically locating, compiling, and arranging pertinent

sources. Both qualitative and quantitative methods are used in the analysis of secondary data to combine and analyse the data.

Problem:

Global warming is a direct result of the severe environmental concerns posed by industrialization, which also led to massive environmental deterioration throughout the world. This might put the globe in serious trouble if it keeps on this way. Therefore, in order to save future generations, environmental preservation and sustainable development are of utmost importance today. The business environment has awoken to address the environmental concerns and hazards that the business sector is causing, both domestically and internationally. Hence Sustainable Development is need of an hour which could be solved with by following sustainable process and methods.

Innovation of SDGs in Banking Strategy:

Top State Bank of India (SBI) practices are aligning SDGs across business operations. It consists in, among other things, narrowing areas of impact for banks to financially include financing renewable energy and sustainable agriculture.

Green Banking Initiatives:

Indian banks are also leading some of the green banking efforts, they have been offering financial products and services that help in bettering our environment. These loans are for green energy infrastructure, eco-friendly businesses and subsidies encouraging sustainable practices.

Socially Inclusive Banking:

Financial inclusion is an integral part of sustainable development. Indian banks are reaching out to the most vulnerable and underserved sections of society, rolling out innovative inclusive financial products linked with technology access for banking services in rural areas. The different ways banks can support sustainability are emphasized by the typology of banking and sustainable development. Together, these strategies strengthen the role of banking in advancing

sustainable development. They range from the environmental focus of green banking to the emphasis on social impacts and transparency of socially responsible and ethical banking, and from development banking's support of economic growth in developing regions to sustainable investment banking's integration of ESG criteria.

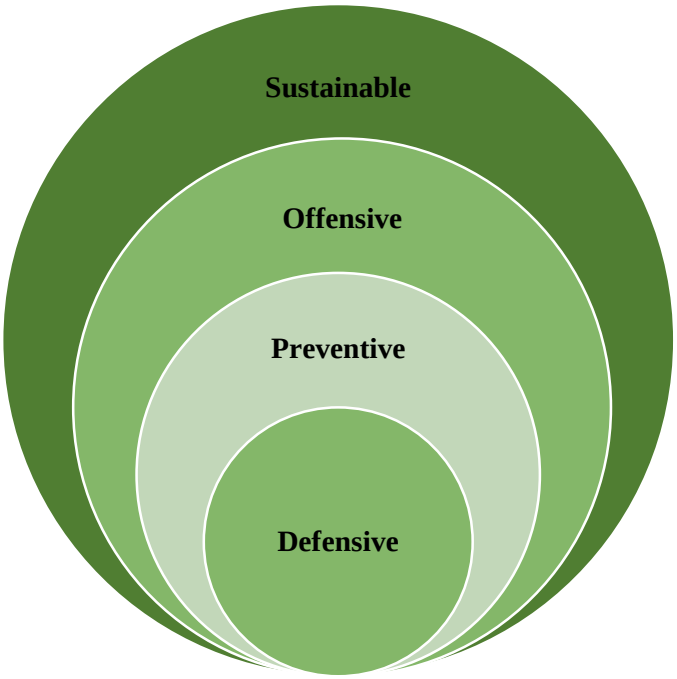


Fig 2 - Typology of banking and sustainable development. Source: Jeucken (2001)

Contributions of Sustainable Finance and Green Banking towards SDGs: -

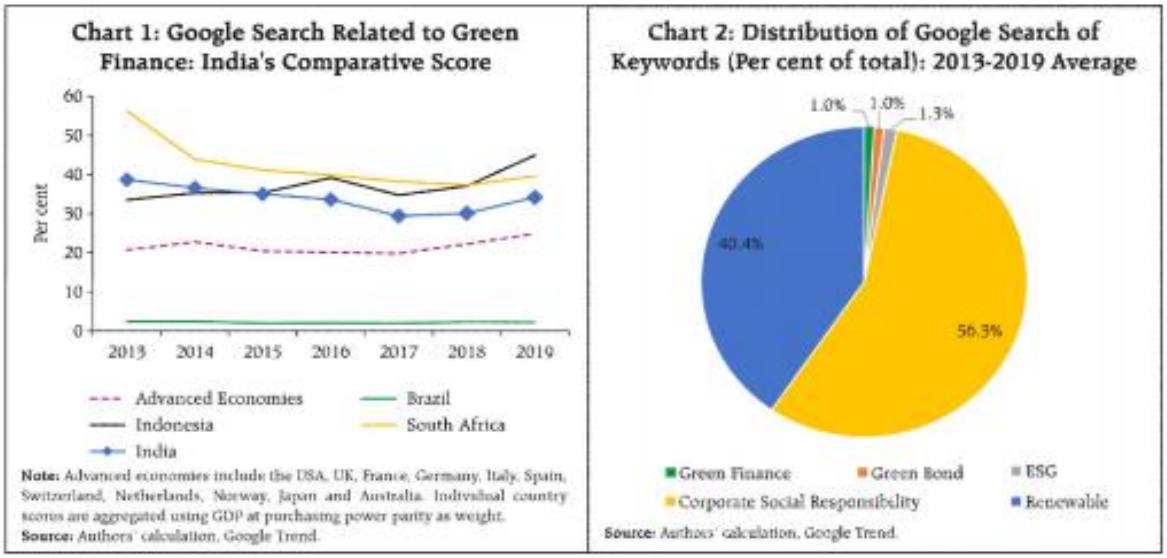
SDG 2 - Zero Hunger: Agricultural Development and Banks invest in sustainable agriculture and rural development to enhance food security, improved nutrition, promote sustainability of farm practices.

SDG 4 - Quality Education: Financial institutions are investing in targeted loans and investments to support educational endeavours, working for high-quality education as well as advancement of lifelong learning prospects.

SDG 5 - Gender Equality: Financial inclusion plays a key role in driving gender equitable financial products and services through banks, enabling economic empowerment further contributing to the cause of bridging the gender gap.

SDG 7 - Affordable and Clean Energy: Renewable energy projects in India are receiving funding from Indian banks itself, thereby considerably supporting one of the 17 sustainable development goals: guaranteeing access to reasonable, consistent, sustainable and modern Energy for all.

India's comparative score is significantly greater than that of the advanced economies (including the United States, Japan, France, Australia, Germany, Netherlands, Norway, Switzerland, Spain, and Italy) as seen in chart 1. Chart 2 illustrates that Renewable energy sources and corporate social responsibility are the main topics in India. Additionally, the data makes clear that web searches, which are connected to environmentally friendly financial products like green bonds, green finance, and ESG procedures are still scarce.



(Fig: 01) Source: RBI report of Green Finance in India: Progress and Challenges (2021)

Contribution of Blockchain Technology towards achieving Sustainable Goals: -

Transparency and Security: By offering a decentralized, safe method of recording transactions, blockchain improves transparency and lowers fraud. Establishing confidence is crucial in evolving SDG 16 (Peace, Justice, and Strong Institutions).

Effective Procedures: Blockchain lowers transaction costs and environmental impact by eliminating the need for middlemen and automating and safeguarding transactions.

Finance for a Sustainable Supply Chain: Blockchain technology makes it possible to trace the origin and path of goods, guaranteeing their sustainable sourcing. SDG 12 (Responsible Consumption and Production) is supported by this.

The Reserve Bank of India has established guidelines for banks and non-bank financial institutions (NBFCs) to take "green deposits" in light of the government's goal for sustainable development and the growing desire among investors and businesses to have strong sustainability credentials. The goal is to guarantee that funds are allocated for green buildings, sustainable water and waste management, clean transportation, energy efficiency, climate change adaptation, and the conservation of aquatic and terrestrial biodiversity.

Important statistics about sustainable finance and green banking in India:

a) Issue of Green Bonds

i) Yes Bank: In 2015, the bank raised ₹1,000 crore, or roughly $160 million, by issuing the first Green Infrastructure Bond in India.

ii) Axis Bank raised $500 million by launching a Green Bond in 2016.

iii) State Bank of India (SBI) issued green bonds in 2018 worth $650 million

b) Funding for Projects using Renewable Energy

i) As of 2023, HDFC Bank had financed more than ₹10,000 crore, or almost $1.4 billion, for renewable energy projects.

ii) ICICI Bank: Provided loans for wind and solar energy projects totalling ₹8,000 crore, or roughly $1.1 billion.

c) Green Deposits

i) Yes Bank: Bank has welcomed over ₹500 crore, or roughly $70 million, in green deposits till 2022.

d) Sustainable Development Goals (SDGs) Alignment

i) IndusInd Bank has reported reducing CO2 emissions by nearly 100,000 metric tons through funded projects.

ii) HDFC Bank: Provided funding for SDG-related initiatives totalling more than ₹25,000 crore, or roughly $3.4 billion.

e) Integration of ESG

i) Kotak Mahindra Bank: Considering over ₹20,000 crore (about $2.7 billion) in assets, the bank incorporates ESG principles into lending and investment choices.

ii) ICICI Bank: ESG risks were evaluated for projects worth more than ₹15,000 crore, or almost $2 billion.

f) **Green Ratings and Certifications**

i) IndusInd Bank was able to obtain LEED certification while cutting its energy usage by more than 30%.

ii) Axis Bank: Achieved a 20% decrease in energy consumption and a 25% reduction in water usage by obtaining green building certification for its corporate offices.

Future Scope of Sustainable and Green Finance: -

I) Expansion of Green Finance:

The development of new financial structures and products, like green mutual funds, green insurance, and loans tied to sustainability, has the capability to significantly increase the volume of green finance in India. Green finance availability may be increased by enlisting the support of development banks and foreign investors.

II) Regulatory Authority Support:

It will be essential to strengthen the regulatory environment in order to offer precise directives and incentives for green financing. This covers risk-reduction strategies, tax breaks, and subsidies for eco-friendly initiatives. Implementing ESG reporting requirements on all publicly traded establishments can encourage better acceptance and investments in sustainable practices.

III) Technological Advancements:

It can be innovative to use technology to expand green finance. The efficiency of green banking can be greatly amplified by using blockchain technology for translucent green bond tracking,

AI for ESG risk calculation, and IoT for environmental impact monitoring. By reaching a varied audience and sponsoring more extensive acceptance, digital platforms and fintech resolutions can upsurge green finance access.

IV) Public Participation and Awareness:

It is possible to promote participation by increasing public awareness while educating individuals on the benefits of sustainable development, as well as green finance. Campaigns, seminars, and workshops can play a very important role in this context. Financial literacy initiatives focusing on sustainability could help individuals and organizations to make informed choices about how they spend their money or where they invest it.

V) Promoting Entrepreneurship and Innovation:

By promoting entrepreneurship and innovation in the green finance industry, new business models and solutions can be created. New business models and solutions can be developed in the green finance industry through innovation and entrepreneurship promotion. For instance, he argued that start-ups focusing on clean technology, sustainable agriculture and circular economy could accelerate sustainable growth. To scale sustainable ideas, green start-up incubators and accelerators could provide tools as well as guidance needed necessary for that purpose.

Conclusion:

Indian banks are playing a crucial role in supporting the Sustainable Development Goals through sustainable finance and technological advancements. By maintaining their innovation efforts and collaborating with one another, they would be able to increase further the impact of their contributions to sustainable development both in India and elsewhere. Industries that pollute will find green finance as an effective deterrent designed beforehand against them as it has no relation to any other institutional rules. So, for maintaining a sustainable banking sector Indian banks must necessarily embrace green technology.

Tackling global issues such as social inequality, governance issues, climate change among others can be done by sustainable finance which acts as an important tool for this

purpose. The conversion towards wider sustainability inclusive economy is encouraged by financing institutions embracing responsible investment decisions with respect to ESG criteria. Integrating sustainable finance with technology in Indian banks is critical for supporting Sustainable Development Goals all over the country. Though remarkable progress has been achieved much still needs to be done through research and continuous policy backing if these undertakings are needed to fully be maximized. In future research, empirical studies are supposed to be carried out that will measure how direct finance and technology on specific SDGs influence them as well as looking at new ways of relieving the present obstacles.

The study concludes that despite the significant departure India is making in terms of green banking and sustainable finance, there is still a need for additional development in order to bring it up to the level of many other industrialized nations. For these programs to progress further, a greater degree of corporate and public participation, better regulations and continual government support are required.

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NAVIGATING THE NEXUS: RESPONSIBLE MANAGEMENT AND SUSTAINABILITY

***Dr. Aashish S. Jani**

****Mr. Darshan Panchal**

Abstract:

This research studies the relation between responsible management and sustainability and attempts to gauge its importance. It briefly principles the central principles of responsible management. It takes into account the practices of companies to understand the importance and relation of responsible management and sustainability. It considers the hurdles and obstacles that exist in the way of sustainable progress and attempts to provide suggestions to make improvements.

Keywords: Responsible Management, Sustainable, ESG, Green Skills, Triple Bottom Line

1. Introduction:

Any achievement is futile if it is going to fade away in a fleeting time. It becomes meaningful when it continues for a longer period, when it is sustainable. Taskmasters impose onerous workload on their subjects believing that the end result justifies the means by which they are achieved. In such a scenario, the suffering of employees while being inevitable will have a

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butterfly effect which will eventually lead to a crumbling economy including the corporations in which such employees work, and to a climate in crisis. Some may call it a doomsday prediction, but it is not implausible given the way things are in general. Responsible management could be the hero who saves all and leads the way to a sustainable future.

Responsible management entails a commitment by management and business leaders to consider the ethical and moral significance of their everyday decisions. At its core, responsible management is a holistic approach that merges business practice with ethics, social, and environmental concerns. In essence, it calls for more than mere maximization of profits; it also engages the well-being of employees, customers, the community, and even the planet. They are allowed to be the engine of sustainable development by applying responsible management strategies in such a way that their activities do not significantly reduce natural resources, much less negatively impact the environment. On this very point, this approach is regarded as a source of long-term business success through the rise of stakeholders' trust and loyalty, improvement of brand image, and decline of risks associated with negative environmental and social impacts. Furthermore, responsible management drives innovation and efficiency in housekeeping and optimization of resource usage, as firms strive to cut down on wastes. In essence, it aligns business objectives with the universal goal of establishing a sustainable future for everybody. This paradigm shift comes when the world is faced with three major challenges: dangerous climate change, resource scarcity, and social inequality—thereby making responsible management a core value in contemporary business strategy.

2. Objectives:

The objectives of this research are as follows:

a. To discern the concept of responsible management
b. To analyse the influence of responsible management over sustainability
c. To investigate the importance of responsible management and sustainability
d. To identify the obstacles that exist for an organization to achieve sustainability goals

3. Research Methodology:

This research is built on qualitative analysis which is achieved by using exploratory and

descriptive methods consisting of data chiefly from secondary sources. This research explores various studies conducted in the recent years along with the information placed by the companies in the public domain.

4. Literature Review:

(Rao and Pradhan, 2024): In their paper concluded that responsible management benefits society through ethical leadership and sustainable practices. Their research also highlighted that planning and organizing are key tasks for responsible managers.

(Janaswamy et al., 2024): The study found out that responsible leadership plays a crucial role in advancing sustainable development by considering social, economic, and environmental aspects, and that Developing globally responsible leaders and managers is a significant challenge, especially in navigating unexpected roles and domains effectively.

(Findikli, 2024): Their research focuses on the structural components of business ethics to promote responsible management in organizations. It highlights the necessity for businesses to embrace responsible management practices that encompass ethical considerations, sustainability, and continuous learning and innovation.

(Naz et al., 2024): Their study suggests that Green HR practices enhance ecological stewardship and organizational performance in SMEs, and also that integration of Green HR practices cultivates a culture of sustainability.

(Zu, 2023): It suggests that organizations should adopt a holistic and sustainable approach to management and leadership, potentially by collaborating with stakeholders to prioritize sustainability and social responsibility. It highlights the significance of a cooperative, systemic, and sustainable management and leadership approach to address wicked problems effectively.

5. Discussion and Implication

The key principles of responsible management are constructed to integrate ethical, social, and environmental considerations into business practices. Below are the five from

amongst the core principles:

a) Ethical Leadership: Basically, responsible management starts with ethical leadership, whereby leaders set the tone through integrity, transparency, and accountability in all business dealings.

b) Stakeholder Engagement: This tenet concerns taking into consideration all stakeholders' interests and well-being, including employees, customers, suppliers, the community, and the environment.

c) Sustainability: Business must integrate sustainability into the strategy and operations; that is, practices that reduce the impact on the environment while enhancing resource efficiency to promote long-term ecological balance.

d) Triple Bottom Line: The conventional financial bottom line is extended to social and environmental performance. It offers a way for businesses to measure success by their profits that have positive outcomes for people and the planet.

e) Transparency and Accountability: Business practices should be transparent, and the organization should be held responsible for its acts, which is important for gaining stakeholders' trust.

The collective ability of these principles is believed to be able to put business operations in line with the broader goals of sustainable development and social responsibility. As mentioned above, principles are not merely a theory; few companies have been able to implement some of the principles, if not all, in real life. Few notable international examples are as follows:

a) Patagonia: This outdoor outfitting brand is probably at the top of most individuals' minds when they think about environmentally sustainable companies. Patagonia donates 1% of its sales to environmental groups and has had a few other initiatives to decrease carbon emissions, like using recycled materials and ensuring fair labor.

b) Unilever: Their Sustainable Living Plan de-couples the growth of the business from the use of natural resources while increasing the positive social impact. It includes

objectives pertaining to improving health and well-being, reducing environmental impact, and improving livelihoods.

c) Who Gives a Crap: This company manufactures toilet paper and donates 50% of its profits toward building toilets and improving sanitation in developing countries. Moreover, their products include environmentally friendly materials and processes.

d) TOMS: TOMS Shoes has become rather well-known for its "One for One" model, whereby for every pair of shoes sold, a new pair is donated to a child in need. Since then, the company has gone forward to replicate this exact model in such businesses as eyewear, clean water, safe birth, and bullying prevention services.

The following examples show how companies have been able to incorporate responsible management practices into their activities while remaining profitable and creating benefits for society and the environment. This is not all about global companies; even at the local level, companies have been recognized for their responsible management and sustainability initiatives. Some of these examples include:

a) Tata Group: With powerful CSR and sustainability, Tata Group runs different campaigns in the field of education, healthcare, and environmental sustainability.

b) Infosys: It has been involved with a number of sustainability practices like energy efficiency, water conservation, and waste management. Infosys also brings out an annual sustainability report detailing its effort.

c) Mahindra and Mahindra: It has a robust framework of sustainability that ranges from renewable energy to water conservation, and finally, community development.

d) ITC Limited: Its entire business strategy is founded on such principles as sustainable agriculture, water stewardship, and recycling of waste for ITC.

e) Wipro: Wipro's sustainability initiatives stretch from energy efficiency and waste management to community development.

These companies come to act as role models in India by making responsible management practices an intrinsic part of core operations. However, responsible management practices are hard to implement within a company for several reasons:

a. Regulatory and compliance issues: Businesses typically become challenged with not fully understanding the many environmental and social regulations and meeting their requirements.
b. Financial Constraints: Adopting sustainable practices generally represents a massive investment. For example, smaller companies might not have the resources to invest in sustainability initiatives.
c. Supply Chain Complexity: It is at times difficult to ensure the sustainability practices within the supply chain are implemented. Businesses have to collaborate with suppliers and partners to ensure that sustainability standards are met.
d. Measurement and Reporting: The measurement and reporting of sustainability can be complicated. Companies require proper systems and processes to track progress and report results on achievements.

Despite all the challenges, a lot of companies in India are really leading from the front with regard to responsible management.

6. Conclusion:

This study discovers that responsible management possess a great deal of influence over sustainability. As it is the management that has the decision-making authority to allocate the vital resources of their company towards such activities and goals that are not only ethical, socially beneficial, environmentally aware but also sustainable in the long run. All it takes is the will to do the right thing.

In the current global scenario of climate degradation and vast socio-economic disparity it is overbearing to bring significant corrections in our ways. Constructive and concrete actions have to be taken to not only reduce environmental degradation but make it regenerative. This cannot be achieved without the adequate and continuous resources which can be navigated in the right direction only by those who wield the power of decision making. Inevitably, it can be through responsible management only.

7. Suggestions:

- Training programs aimed at developing hard, soft, green, and power skills in managers to address ESG challenges can be introduced at early stages of business schools to better prepare future professionals for the demands of the green economy and the ESG culture.
- Effectiveness of these training programs should be monitored at periodic intervals using appropriate methods.
- Standard policies for measurement and reporting may be formulated to ensure accurate and reliable information is generated.
- Regulatory framework could be designed that influences the development of managers' skills for responsible and sustainable management.

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SUSTAINABLE SPORTS AND PHYSICAL EDUCATION: A TIMELY NECESSITY FOR SHAPING A BETTER FUTURE

***Dr. Milan Purushottam Patel**

Abstract:

The contribution of Physical Education and Sports to societal well-being is very important as it helps in developing physical health, maintaining mental health and social coherence. Rooted in history Physical Education and Sports help in mastering various life skills like character development, decision making, confidence development, emotional balance, and relationships with other people so that individuals can be better equipped to voyage through life challenges.

The present article has explored the sustainability and growth strategies in consideration of Physical Education and Sports. The article has highlighted the recent trends in Physical Education and Sports like reform in Finland, the Project Play initiative in the USA, and the Khelo India program in India, which shows that globally efforts are being made to increase participation in sports and physical activity.

Sustainable practices in sports, from eco-friendly infrastructure designs exemplified by stadiums like Mercedes-Benz Stadium and Golden 1 Center to managing large-scale events with minimal environmental impact, are critical. The future direction for sustainability in Physical Education and Sports can include sustainability in Sports programs, making use of technology and collaboration of the private sector, industries, government sectors, and sports associations for a better environment-friendly future.

Keywords: Sports, Physical Education, eco-friendly sports events, Sports policies

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Introduction:

The contribution of Physical Education and Sports to societal well-being is very important as it helps in developing physical health, maintaining mental health and social coherence. Most importantly, regular physical activity can help in promoting health, fitness, and well-being and improve quality of life(Better Health Channel, 2023). Physical Education and Sports have long been recognised as pivotal in fostering holistic development and well-being. Historically, physical activities have been integral to societal norms, from the ancient Greek Olympics to traditional cricket. These activities were not only seen as a means to enhance physical prowess but also as a way to cultivate discipline, teamwork, and strategic thinking (International Olympic Committee., 2016).

In the modern era, the significance of Physical Education and Sports is not limited to physical fitness only but it also emphasises mental health, social well-being and overall quality of life. Regular participation in sports or physical activity can help to fight against diseases created due to modern lifestyles like obesity, diabetes, and cardiovascular issues (Harmandar Demirel and Yildiran, 2008). Also, Physical Education and Sports can help in the reduction of stress, depression and anxiety in individuals which can contribute to mental well-being, and further, can foster the sense in the community (Martin-Rodriguez et al., 2024).

Day by day suitability and growth are gaining more attraction as they are the need for better future which is also being relevant in Physical Education and Sports area. When it comes to sports it can be increasing participation in physical activity among individuals, ensuring the long viability of sports facilities and programs, and promoting eco-friendly sports events (Lindsey, 2008). The organisers of the sports events should ensure that the natural resources are used efficiently, and reduce the environmental footprints leading to the promotion of sports to achieve sustainable development goals (sportanddev, 2023).

Growth in Physical Education and Sports refers to expanding the sports programs so that they reach to more people by increasing participation in sports or physical activity. Also, the training methods should be advanced which can be done by integration of modern technology with equal distribution of facilities and resources so that everyone has equal opportunity across the world (WHO, 2018).

In the modern era when the world is grappling with the challenges related to the environment and sustainable development, there is a need to reexamine Physical Education and Sports policies so that it meets the global priorities. In this article, an attempt is made to explore how Physical Education and Sports can incorporate suitability to make a healthy future for all.

Global Trends in Physical Education and Sports:

Globally, due to the increase in awareness of health, the rise in participation rates in physical activity has gone higher. In developed countries, a significant engagement of youth and adults in physical activity has been seen whereas developing countries are gradually recognizing the importance of physical activity, leading to more initiatives aimed at increasing participation (Hulteen et al., 2017).

Finland's Physical Education Reform: Finland has successfully reformed its Physical Education curriculum to emphasize daily physical activity and holistic well-being. Schools incorporate movement into everyday routines, resulting in improved academic performance and overall health among students (Yli-Piipari, 2014).

Project Play (USA): Project Play, an initiative by the Aspen Institute in the USA, focuses on increasing youth sports participation. By providing resources and support for community-based sports programs, Project Play has successfully engaged more children in physical activity, promoting lifelong health and fitness (Youth Sports Facts: Participation Rates - Project Play, n.d.).

India's Khelo India Program: India's Khelo India program aims to revitalize the country's sports culture at the grassroots level. It provides financial assistance to young athletes, builds sports infrastructure, and encourages community participation in sports. The program has significantly increased youth engagement in sports and identified emerging talent for national and international competitions (Khelo India, n.d.).

Sustainability and Physical Education and Sports:

In the context of Physical Education and Sports, Sustainability refers to practices that

ensure the long-term health of the environment, economy, and society. This involves reducing negative environmental impacts, promoting social well-being, and ensuring economic viability.

When we talk about sustainability in Physical Education and Sports it should aim to reduce the use of natural resources, reduce carbon footprints due to sports events, and increase the use of eco-friendly equipment (Bacsne-Baba et al., 2021).

Sustainable Practices:

A few practices that can adopted for sustainable Physical Education and Sports are as follows:

- **Eco-Friendly Infrastructures**:

Sustainability should be kept in mind while developing sports infrastructure which includes using renewable energy resources and materials in construction that are sustainable and energy efficient.

One of the best examples of sustainable design of sports infrastructure is in Georgia Atlanta, the Mercedes Benz Stadium which has designed a roof in such a way that it allows ventilation and natural light inside which reduces the use of electricity. Also, the roofs are covered with solar panels so it makes energy efficient lighting and Heating, Ventilation, and Air Conditioning (HVAC) systems. The stadium is planned in such a way that it does rainwater harvesting to fulfil the need for toilet flushing and irrigation (Sustainability at MBS, n.d.).

One more example is of California, the Golden 1 Center in Sacramento, which is the world's 1st arena to be 100% solar powered. It also collected rainwater to meet non-potable water needs like toilet flushing and irrigation. Also, 90% of the food and beverages used are brought within 150 miles to reduce transportation emission (Golden 1 Center, 2023).

Recent stadiums designed, particularly those constructed for the 2022 Football World Cup in Qatar, have incorporated groundbreaking new technologies to maintain comfortable temperatures for spectators in open-air settings. The stadiums in Qatar have successfully

demonstrated the effectiveness of these systems, maintaining temperatures of 26°C on the pitch and in seating areas, even when external temperatures exceed 40°C. These innovations comply with relevant legislation and best practices (Fenwick, 2023).

These examples illustrate the significant impact of sustainable construction practices and green design in sports facilities. By adopting these strategies, sports venues can reduce their environmental footprint and serve as models for eco-friendly development.

- **Sustainable Sports Event Management**

Major sports events, such as the Olympics or World Cup, have substantial environmental footprints, highlighting the need for sustainable practices to mitigate these effects. Sports events and Physical Education programs can have significant environmental impacts:

- **Resource Usage**: Large quantities of water, energy, and materials are often consumed in the construction and maintenance of sports facilities, as well as during events.
- **Waste**: During the Sports tournaments lots of waste is generated due to the use of single-use plastic, lots of food waste and promotional materials using plastics etc.
- **Carbon Footprint**: Travel for participants, spectators, and logistics, along with energy consumption at venues, contributes to carbon emissions (Warren, 2020).

Organizing Sports events with a Sustainability focus involves several key practices, such as reducing waste through recycling programs, minimizing the use of single-use plastics, and sourcing local, sustainable food options. The London 2012 Olympics set a notable benchmark in this regard by aiming to be the first zero-waste Games. The event incorporated extensive recycling and waste management systems, resulting in significant environmental benefits. The Olympics organised in London in 2012 had for the first time measured its carbon footprints over the entire tournament and simultaneously was committed to ‘zero waste’. They were able to divert 100% of waste to be landfilled with 62% of the waste reused or recycled. The organisers were able to save 4,00,000 tonnes of carbon dioxide with this practice. Additionally, 99% of the waste from installing and decommissioning the Games venues was reused or recycled (Olympic News, 2013).

These measures demonstrate the positive impact of Sustainability initiatives in large-scale Sports events and serve as a model for future events aiming to minimize their environmental footprint.

- **Promoting Active Transportation for Sports Events**

Encourage participants and spectators to use active transportation methods, such as walking or cycling, to reduce the carbon footprint associated with travel. Providing incentivizing public transport can help achieve this. Many Sports organizations have started providing public transportation for fans to and from events and they also encourage carpooling among fans. These measures help to reduce the environmental impact of these events and also serve as a model for other industries (Morne Carette, 2024).

FC Barcelona a professional Football Club promotes the use of public transport to its fans and athletes for reaching the stadium by providing options like free shuttle buses. The club has received double Biosphere certification for its sustainable practices (FC Barcelona, 2019).

- **Athlete Advocacy and Fan Engagement**

Athletes can play a crucial role in promoting sustainability by raising awareness and advocating for environmental causes. For raising awareness among the general public and sports fans regarding sustainability educational programs can be conducted. Many sports organizations have started initiatives to educate fans which includes hosting workshops and seminars related to waste reduction and climate change effects and a few sports organizations have started online webinars and courses by inviting experts (Linkedin Page, 2024).

Futbol Club Barcelona a professional football club has begun a ‘Green Camp Nou’ project which involves fans to minimize waste for reducing environmental impact. It has also published ‘Guide to a Green Office’ which encourages employees to promote suitability. Such initiatives taken by the professional club show how they are concerned about the conservation of the environment (FC Barcelona, 2019).

Future Directions:

Vision for the Future -

A comprehensive approach is needed in Physical Education and Sports for sustainability and growth. This includes developing a lifelong physical activity culture, giving equal opportunities and facilities to all, creating an eco-friendly infrastructure, and efficient management of natural resources. A global network can be created that involves the engagement of the community, sports associations, and educational institutions for environmental preservation and increasing physical fitness (Froberg and Lundvall, 2021).

Strategic Approaches -

Some of the strategic approaches can be developing a sustainable sports infrastructure, like making use of renewable energy sources, rainwater conservation, and strategies to reduce waste, encouraging recycling programs for sports equipment and uniforms, encouraging walking, cycling, or using public transportation to sports events and practices instead of relying solely on private vehicles. Such initiatives can promote physical activity and simultaneously help in the reduction of carbon emissions caused by vehicles (Yang, 2023).

Collaborative Efforts -

To integrate sustainability in Physical Education and Sports collaboration among Sports associations, educational institutions, the private sector and the government is very important.

Over here the government can play a crucial role by formatting policies, standards, and regulations which promote sustainability. Also on the other hand, the government can provide grants and incentives for the development of sustainable sports infrastructure, offer tax benefits for those who are using eco-friendly infrastructure, and fund research in this regard.

Educational institutions like schools and universities play a key role in shaping the future of the next generation, they can include sustainable practice in the curriculum of Physical Education so that students get knowledge and become responsible for conserving the

environment. Also at the university level research opportunities can be provided to explore innovative opportunities in the context of sustainable sports (Lindsey and Chapman, 2017).

Sports organizations have significant influence over athletes, fans, and sponsors. By adopting sustainability initiatives, sports organizations can reduce their environmental footprint through green facility management, ethical sourcing of sports equipment, and promoting sustainable practices among athletes and fans (Baena-Morales et al., 2021).

Education and Awareness -

Education and awareness are also very important in promoting sustainable practices and encouraging participation in Physical Education and Sports. Awareness campaigns to raise public consciousness about sustainable initiatives in sports are very much necessary. Awareness empowers individuals to advocate for sustainable policies and practices within sports organizations and communities. It fosters community engagement through volunteerism, participation in clean-up drives, and support for eco-friendly sports events. Workshops, seminars, and awareness campaigns on sustainability topics for coaches, athletes, and sports administrators should be conducted. Such moves can lead to creating a sustainability culture among sports organisations (Lawson, 2005).

Research and Development -

Research is important for improvement and continued innovation in Physical Education and Sports. The ongoing researchers focus on studying the benefits of physical activity on physical and mental health, they are trying to develop new training modules for better performance, and they are trying to integrate the use of technology for better analysis and increasing performance, in addition to these researchers can come up with new sustainable and energy-friendly technologies in infrastructure, equipment, and sports. Over here the collaborative efforts between the private sector, sports associations and educational institutions can bring up new insides (Lohmann et al., 2024).

Conclusion:

Physical Education and Sports can play a crucial role in assembling a community for sustainability which can offer benefits to individuals beyond physical fitness to mental and social well-being. The inclusion of sustainable practices in Physical Education and Sports can lead to reductions in the environmental impact. To build a better future with sustainable sports facilities engagement of communities in collaboration with sports associations, educational institutions and government is very crucial. Awareness drives regarding sustainable practices can play a pivotal role in shaping a healthy and environment-friendly planet.

In the modern era where climate change is becoming a problem that needs immediate action, Physical Education and Sports have an important role to play in encouraging sustainability. The road map of Physical Education and Sports concerning a sustainable future is both difficult and necessary. By inculcating sustainable practices, collaborative efforts and investing in growth it can lead to a better future with health, wellness and environmental conservation.

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ECOLOGICAL WISDOM: EXPLORING SUSTAINABLE PHILOSOPHY IN INDIAN THOUGHT

***Ms. Geeta Desai**

Introduction:

In many of the philosophies in Indian thought, we find the roots of ecological wisdom, manifested through various traditions, rituals and cultural principles followed from generations.

This philosophy and practices promote harmony and sustainability. It takes into consideration the environmental stewardship, ecological growth and co-relation of human societies with the nature.

The objective of this paper is exploring the environmental ethics and values, that are deeply rooted in Indian philosophical thoughts building the ecological wisdom, as foundation of Indian culture, leading to sustainable harmonious growth of the society.

Historical foundations of ecological wisdom:

Vedas are ancient sacred texts composed in Sanskrit. It has knowledge of Gods, rituals, healing practices etc. There are four main Vedas, namely Rigveda, Samveda, Yajurveda and Atharvaveda. Rigveda focuses on cosmic principles and rituals, Samveda mainly focuses on musical chants, rituals and Yajñās (sacrifices), Yajurveda contains prose mantras, Atharvaveda includes spells and incantations for daily life. (Doniger, 1981)

Yajnas or sacrificial rituals were central to Vedic practices, which involved offerings to

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natural elements like fir (Agni), water (Varuna), wind (Vayu), earth (Prithvi). Many Vedic rituals contribute to sustainability; and are deeply rooted in their spiritual and philosophical outlook on life, promoting a balanced and respectful interaction with nature.

Some of the hymns from Vedas expressing sustainability principle as stated as follows:

Rigveda 1.164.51:

समाने व्रजिनि वयां स्यावः सप्रथो वसुतातये।

पर मे पृश्निर्वति जनं तं वयं सं हवन्तः॥

Meaning: "Let us be united in our aims, let us be united in our hearts, let us be united in our thoughts, so that we may live together in harmony and be able to sustain our world."

Rig Veda 10.121.10:

हिरण्यगर्भः समवर्तताग्रे भूतस्य जातः पतिरेक आसीत्।

स दाधार पृथिवीं द्यामुतेमां कस्मै देवाय हविषा विधेम॥

Meaning: "In the beginning, there was the Golden Embryo, the sole lord of all that is born. He upheld the earth and the heavens. To which god shall we offer our oblation?"

Yajur Veda 36.17:

आ पृथिव्यै नमः। वायवे नमः।

ज्योतिषे नमः। आपो नमः॥

Meaning: "Salutations to the earth, to the air, to the light, and to the waters."

Atharva Veda 12.1.12:

माता भूमिः पुत्रोऽहम पृथिव्याः। पार्जन्यः पितरं मामवीत्विति॥

Meaning: "The Earth is my mother, and I am her son. Let the invigorating rains from the sky foster me."

Concept of Rta[1] and Ṛna[2]:

[1] Ṛta (ऋत) - The cosmic order

[2] Ṛṇa (ऋण) - Debts or obligations

Rna means Debt or obligation, it represents moral duties and responsibilities that an individual has towards others and the universe. There are three types of Rna. (Sharma, (1991)), namely
1. Deva Rna (debt to the Gods), which is to be repaid through worship, rituals and sacrifices.
2. Rishi Rna (debt to Sages), this is to be repaid by gaining and sharing knowledge.
3. Pitru Rna (debt to the Ancestors), which is to be repaid through procreation and fulfilling the responsibilities to one's family.

Fulfilling these debt is considered as an essential prerequisite for the achievement of liberation.

Rta is a Vedic concept that represents cosmic order that governs the universe. It encompasses physical and moral laws that maintains harmony in cosmos. It states that cosmic and moral order are interconnected, so one has to follow Dharma, (moral righteousness) to be aligned with maintenance of cosmic order like cycle of nature, seasons, movement of celestial bodies etc.

Thus these concepts of Rna and Rta, provide a framework for the ethical living, emphasizing interconnectedness of cosmic order with human actions or deeds.

The concept of Purushartha[3], given in Hindu philosophy also brings out the sense of duty that one has to realise at different stages of life which ultimately culminates in the achievement of the highest goal, namely moksha or liberation.

Dharma, Artha, Kama and Moksha are the four Purusharthas. Dharma means fulfilment of one's responsibilities, Artha involves acquisition of resources that are necessary for fulfilling the responsibilities. Artha is to be acquired through moral means and it should be spent for moral purposes. Karma refers to pursuit of desires that guide our objective, so desires are required to be satisfies with moral means.

Thus, Dharma (morality) is needed to be observed while fulfilling all the goals of life. Which automatically will lead to the ultimate goal of life that is of 'Moksha' (self-realisation

[3] Purushartha - The four aims of human life

or liberation). So this concept of Purushartha provides a holistic approach to life and teaches us to think about our responsibilities towards others, and the moral means to fulfil them.

Vedas and Upanishads, thus emphasised the interconnectedness of all the living beings and environment and harmonious living with the nature. It also gives importance to conservation of natural resources. Rigveda contains some hymns praising rivers, stating the importance of maintaining their cleanliness.

Ancient Indian practices of agriculture, water management, architecture also manifest the objective of keeping harmony with nature. Some of the examples of such practices are:

- Organic Farming, which involves the use of natural fertilizers like cow dung, compost, that enhances the soil fertility without harming the environment.
- Use of Canals, stepwells which were constructed to store the rainwater and ground water, ensuring water availability in dry season. Ancient texts like Arthashastra provide detailed guidelines on managing watersheds and maintaining waterbodies. (Sinha, 2008)

For example:

1. ‘Dhanvanām upavana-vanakastha-vṛkṣa-rakṣā’ (Arthashastra by Kautilya (Book 2, Chapter 24)

Meaning: "The protection of forests, groves, and gardens" emphasizes the importance of conserving natural resources and maintaining ecological balance, which aligns with the principles of organic farming.

2. जलेन हि सदा दीव्यादेकं स्वल्पं तु यत्।
स्थापयेत् स्त्रोतसाम्राज्यं च प्रधावयेत्॥ (**Arthashastra, Book 2, Chapter 1, Verses 10-11)**

Meaning: "One should always manage water resources, even a small quantity, by maintaining water channels and ensuring their proper flow."

- Ancient Indian architecture emphasised the use of locally sourced, sustainable material like wood, stone, clay, bamboo. Most of the constructions are still present intact after so many years, due to eco-friendly architecture and their adoptability to local climatic conditions. (Sharma R. , 2011)

- Ayurveda is one of the prominent ancient Indian systems of medicine that emphasizes balance and harmony between human and nature, promoting the use of natural herbs, plants, minerals for healing encouraging sustainable practices.

Indian Philosophical Roots of Sustainability:

Yoga philosophy inherently supports sustainable practices by promoting compassion, ethical responsibility towards all the living beings. It also emphasizes the meditative practices for achieving inner peace highlighting the importance of mental and spiritual well-being. It encourages the pursuit of knowledge and self-awareness, that leads to more mindful and sustainable interactions with others in social and natural atmosphere. The principle of Aparigraha emphasises the judicious and moderate use resources, preventing over exploitation and sustainability.

Thus, our rich ancient Indian culture, custom and philosophies had given importance to interdependence of humans and nature, advocating sustainable and respectful attitude towards environment.

- Yogic diet prescribes fresh, organic, sattvic (pure) food, conducive to health and spiritual growth
- Asanas (postures), Pranayama (breathing exercises) are important aspects of Yoga, that takes into consideration the importance of physical and mental health, through sustainable, disciplined lifestyle leading to stress-free, stable mind, enhancing community involvement and environmental activism.

Indian religious thoughts promoting sustainability:

Hinduism promotes belief or faith in the ultimate reality considering knowing that reality leads to achievement of the ultimate goal of life namely Moksha or Self-realisation, being one with the consciousness. It believes the prevalence of this divine element in all the living and non-living beings, for example many rivers like Ganges, Yamuna are revered as Goddess.

Many teachings and principles of Hinduism give the message of sustainable leaving,

for example, Bhagwad Gita, the sacred text of Hinduism, promotes the concept of 'simple living and high thinking'. It also talks about quality of food, values, and inculcation of balanced attitude though many verses. (Easwaran)

For example:
Chapter 17, verse 7 states the quality of food to be consumed, which will be nourishing, fresh, juicy, easy for digestion, and seasonal, thus it also supports the sustainable agricultural practices.

The integral message of Bhagwad Gita is 'Nishkama Karma', that is explained in chapter 2. Verse 47 states the principle of 'Duty for duty's sake', that one has to perform his duty, responsibility towards others without expecting anything in return and with the non-attachment to the fruits of our action. Building this attitude can be considered as a pre-requisite to sustainable development, leading to personal as well as social development.

Verse 70 of chapter 2, emphasises the attitude of 'Sthitaprajna', that is being mentally and emotionally stable in any situation, thus it promotes achievement of healthy mental state that is capable of taking good decisions, guiding others and leading to progress.

Buddhism: Ahimsa (non-violence) and Karuna (compassion), are the important teachings of Buddhism. It also promotes the principle of 'Pratitya-Samutpada' (dependent organisation), which states that all phenomena are interconnected. Thus, ecological consciousness is deeply rooted in the Buddhist thoughts and philosophical principles. (Hanh, (2008))

Jainism also prescribes Anuvratas and Mahavratas (ethical principles), to be followed, that give the importance to Ahimsa (Non-violence) to be observed in totality, physical, mental emotional non-violence that is extended to all the living beings, including microorganisms. (Chapple, (2002)).

It also promotes the principle of Aparigraha (Non-accumulation of wealth, non-possession). It encourages limiting possessions and consumptions, promoting sustainable lifestyle.

Sikhism: The holy book 'Guru Grantha Saheb', contains hymns that praise the natural world. It promotes the principle of 'Seva' (selfless service), that includes community service. The practice of Langar (sharing of food), expresses the attitude of sharing of resources. (https://www.ecosikh.org)

Islam has the concept of Khalifah (stewardship) that considers human as stewards of the earth, responsible for maintaining the balance and health of the environment. (Izzi Dien, 2000).)

Thus we can see that the Indian philosophical tradition reveals profound ecological wisdom, and it emphasizes a harmonious relationship between humans and nature. It makes us aware of our ethical responsibility of living in balance with the environment, fostering a sustainable and respectful approach to natural resources.

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A SUSTAINABLE DIGITAL FUTURE: AWARENESS AND UTILIZATION OF DIGITAL INFRASTRUCTURE AMONG RESIDENTS OF MUMBAI

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Abstract:

The role played by India's digital infrastructure in achieving SDG 9, the ultimate goal of building infrastructure that is resilient, promoting inclusive - sustainable industrialization, and innovation, among others in turn, is affected since India is moving fast towards digitization due to various factors like broadband penetration, technological advancements, and the thrust that the government is putting into the process of building digital infrastructure. The main purpose of this research was to gather data on citizen awareness and use of digital infrastructure in India. This being the case, the research therefore took the form of a data collection method from 83 respondents based in Mumbai via an online questionnaire. The results indicated that citizens in India are increasingly becoming aware of the digital infrastructure. But the study has not shown any relationship between gender and qualification with that of the awareness level of digital infrastructure services in India. The research recommends that the government and the private sector work on public-private partnerships to ensure good infrastructure that protects citizens' privacy and security while allowing access to a wide range of services, create awareness through community centers, and strengthen the banking system.

Keywords: SDG 9, Digital Public Infrastructure (DPI), Digital India, India Stack.

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Introduction:

Digital infrastructure entails the hardware, software, networks, and other services that enable digital technologies, starting with computers and servers to data centers and cloud computing platforms. It also comprises communication systems, such as mobile communications, internet access points, satellite links, and wireless networks.

The infrastructure in SDG-9 is mainly based on environmental considerations and global commitments, and it is also powered by scientific research and innovation. In this respect, the goal of SDG 9 is to build infrastructure that is resilient, promote sustainable industrialization, and foster innovation. All these elements are essential for businesses operating in a digital world that needs to be developed with sustainability if long-term viability with minimum environmental impacts has to be achieved, and also the achievement of SDG 9 is realized.

The key services embedded under the digital infrastructure of India are: Cloud computing services, Networking solutions, and Internet connectivity providers. Growth of digital infrastructure in India has been phenomenal during the past one decade, for a variety of reasons, including: Development and reach of high-speed internet digital service providers across the length and breadth of the country. This is easing the access of people to digital services like online banking, e-commerce, and even social networking sites from any part of the country. Government initiatives taken to build up its digital infrastructure have encouraged private investment in this sector.

It encompasses several schemes, such as Digital India, BharatNet Initiative, and Smart Cities Mission, that the Government is implementing to spread very broadband connectivity in all the rural areas by the year 2022. These programs emphasize the creation and maintenance of infrastructure by utilizing renewable energy sources, energy-efficient technologies, and sustainable practices.

India Stack is the suite of digital services extended by the government of India to citizens for accessing and using various online services. Major services offered under India Stack: Aadhaar, Unified Payment Interface (UPI), eSign, Digi Locker. The acceptance of India

Stack by the citizens is increasing due to several reasons. Two of the foremost would be: Increased government campaigns and initiatives on awareness, adoption, and usage of digital platforms in general and India Stack in particular. Collaboration between private sector organizations such as banks, telecoms, governments etc., towards building a secure and accessible platform for individuals' transactions using Aadhaar enabled electronic payment systems (AEEPS). The Indian Government has been advocating for the use and adoption of India stack for several years now, and this increased push from the government has helped to increase public awareness.

Objectives:

1. To comprehend the concept of Digital Infrastructure in India.
2. To find out the awareness and usage among the citizens of India regarding the various digital services offered by Government of India.
3. To find out the relation between gender and awareness level
4. To find out the relation between education and awareness.
5. To analyze the benefits availed after using the digital services.

Review of Literature:

(Dutta, A., et.al. 2023) have emphasized that digital infrastructure faces barriers in India due to high digital illiteracy, urban-rural divide, inadequate funding for rural infrastructure, and the need for localized digital solutions. Challenges also include lack of AI expertise, awareness, digital divide, and security concerns with digital currency. (Saran, S., et.al. 2023) discusses three types of institutions that will lead to DPI's success. It talks about a sturdy foundation that will manage DPI. India has developed a Modular Open-Source Identity Platform which has been adopted by nine nations. The second requirement to DPI's success is to create a global standard which will captivate the smaller countries. Lastly, we will require a sustainable financing model to develop DPI for the world. The aim is to build trust and fulfill specific needs of the people. The economic survey 22-23 concluded that during the pandemic, digital infrastructure helped in continuous transmission of information which further helped in building the digital divide. There was a 200 per cent increase in the subscription of rural internet between: 2015-2021. The survey observed that the digital economy built by India has

empowered individual and businesses to enter paperless and cashless transactions. (Agarwal, N., et.al. 2021) pointed out that COVID-19 pandemic has underscored the critical importance of digital infrastructure, which has emerged as a cornerstone of modern society alongside traditional necessities like power and roads. Globally, economies are prioritizing the resilience and agility of their digital infrastructure to navigate crises effectively. Digital infrastructure facilitates proactive responses to challenges like the pandemic and is integral to societal functioning and citizens' quality of life. India, as a populous nation, holds significant potential to lead in the evolving global landscape, emphasizing the pivotal role of robust digital infrastructure in addressing future adversities and shaping the new world order. (S. 2019) Digitalization is a great tool for economic, social, and environmental development. The challenges faced in implementation are lack of education, infrastructure, financial, technical issues, inflated costs etc. A digital empowered country will ace speedily and will place our economy in the top developed ones. (Dua, B., 2018) has provided suggestions for successful implementation of the Digital India Programme include addressing digital literacy, bridging the digital divide, fostering partnerships with the private sector, exploring PPP models for infrastructure development, enhancing cyber security measures, introducing cyber security courses, and amending legislation to support technological growth. (Malarvizhi, J., et.al. 2017) Digital India aims to upgrade India's economy by prioritizing ICT infrastructure. It suggests allocating a portion of GDP to this purpose and integrating technology into various sectors like governance, banking, healthcare, and education. Highlighting the importance of strong ICT infrastructure, it emphasizes the need to expand fiber networks nationwide to ensure connectivity for all. The World Economic Forum defines ‘Good Infrastructure’ as that which protects the privacy and security of the citizens and ensures transparency in its implementation. Users should get access to a wide range of services like healthcare, insurance etc. The implementation can be a collaboration between the government and the private sector through PPP (Public Private Partnership) mode. This will allow competition and innovation with the focus on DPI to deliver benefits in terms of paperwork, cost, distance, etc. A survey by EY India@100 talks about how digital public infrastructure will give India an edge by reducing the cost of business, creating new business opportunities, improving the ease in doing business. India's volume of real-time digital payments in terms of businesses is the highest in the world. This will move the economy towards financial inclusion.

Research Methodology:

This research paper is based on secondary and primary data. Secondary data was collected from government websites, research papers, journals, and news articles. Primary data was collected from 83 respondents from Mumbai region only using a questionnaire (Google Form). Convenient Sampling method was adopted.

Hypothesis 1

H0: There is no relation between gender and awareness level of digital infrastructure services.

H1: There is a relation between gender and awareness level of digital infrastructure services.

Hypothesis 2

H0: There is no relation between education qualification and awareness level of digital infrastructure services.

H1: There is a relation between education qualification and awareness level of digital infrastructure services.

Limitations:

1. Due to time constraint, sample size was restricted to 83 respondents.
2. The sampling method is convenient and limited to the region of Mumbai.
3. Rural population was not targeted while collecting the primary data.

Data Analysis:

As per the survey conducted, responses were collected from 83 individuals residing in Mumbai. Among the respondents, 65% were female (approx. 54 individuals), while the remaining 35% were male (approx. 29 individuals). The survey found that 70% of participants (approx. 58 individuals) were aware of the term 'Digital Infrastructure', with a significant portion of them, 51 individuals, falling within the age group of 18-30.

The survey also identified the top four digital services utilized by respondents, which included UPI, Digi Locker, Aarogya Setu, and CO-WIN, each being used by over 65% of

respondents. UPI emerged as the most utilized digital service among the respondents.

Upon further analysis, it was observed that the major benefits derived from these digital services varied. For UPI users, the primary advantages were identified as timesaving and convenience. Digi Locker users appreciated its role in reducing paperwork and facilitating easy access to government services. Similarly, Aarogya Setu users highlighted its convenience and time-saving features, along with easy access to government services. CO-WIN users also emphasized its convenience and easy access to government services.

Overall, respondents expressed a consensus that digital services, on average, offer time-saving benefits and enhanced convenience. However, it is noteworthy that out of the 70% of respondents who were aware of the term digital infrastructure, only 58.8% (approx. 34 individuals) recognized digital services as a component of digital infrastructure. This indicates a gap in understanding among a significant portion of the surveyed population regarding the broader concept of digital infrastructure.

Data Interpretation:

Hypothesis 1

H0: There is no relation between gender and awareness level of digital infrastructure services.

H1: There is a relation between gender and awareness level of digital infrastructure services.

Chi square test was applied to interpret the data collected from 83 respondents.

Observed Values			
Gender/Awareness	Aware	Not Aware	Total
Male	20	10	30
Female	28	25	53
Total	48	35	83

Expected Values = (row total* column total)/grand total			
Gender/Awareness	Aware	Not Aware	Total
Male	17.3494	12.6506	30
Female	30.6506	22.3494	53
Total	48	35	83

Chi-Square Table = (O-E)^2/E			
Gender/Awareness	Aware	Not Aware	Total
Male	0.404953	0.555364	0.960317
Female	0.229219	0.314357	0.543576
Total	0.634172	0.869721	1.503893

Degrees of Freedom = (r-1) (c-1) = 2

P value	0.471448	Significance Level	0.05
Test Statistic	1.503893	Critical Value	5.991

Since our test statistic is less than the critical value and p value is greater than the significance level, we do not have enough evidence to reject our null hypothesis and accept alternate hypothesis.

There is no relation between gender and awareness level of digital infrastructure services.

Hypothesis 2

H0: There is no relation between education qualification and awareness level of digital infrastructure services.

H1: There is a relation between education qualification and awareness level of digital infrastructure services.

Observed Values			
	Aware	Not Aware	Total
12^{th} pass or below	12	7	19
Graduate	19	21	40
Post Graduate	17	7	24
Total	48	35	83

Expected Values			
	Aware	Not Aware	Total
12^{th} pass or below	10.98795	8.012048	19
Graduate	23.13253	16.86747	40
Post Graduate	13.87952	10.12048	24
Total	48	35	83

Chi Square Table			
	Aware	Not Aware	Total
12th pass or below	0.093215	0.127838	0.221052632
Graduate	0.738259	1.01247	1.750729167
Post Graduate	0.701567	0.962149	1.663715278
Total	1.533041	2.102456	3.635497076

Degrees of Freedom = (r-1) * (c-1) = 2

P value	0.162391	Significance Level	0.05
Test Statistic	3.635497	Critical Value	5.991

Since our test statistic is less than the critical value and p value is greater than the significance level, we do not have enough evidence to reject our null hypothesis and accept alternate hypothesis.

There is no relation between education qualification and awareness level of digital infrastructure services.

Conclusion:

Digital Infrastructure encourages connectivity through a centralized communication system. But Digital Infrastructure needs the support of the people of India for a greater economic impact. In addition, government institutions need support by getting their own digital transformation strategy up and running -- leveraging AI (Artificial Intelligence) and machine learning based decision-making capabilities. It can transform the Indian Economy with the focus on not only making technologies in India but being the owners of such technology.

The focus on technological advancement and sustainable practices will help to build a strong digital infrastructure for India that shall support economic growth and environmental conservation and help the path toward social equity. Moreover, building the awareness of citizens about the merits of using digital services, like avoiding paperwork and providing greater convenience, can help enable their wider and more efficient usage.

The development of digital infrastructure in India must meet another global agenda, the United Nations SDG 9, dealing with the construction of resilient structures, the promotion of inclusive and sustainable industrialization, and the fostering of innovation. Bringing the significant concern for SDG 9 into the digital strategy guarantees that the country's digital infrastructure enables economic growth but also serves sustainable industrialization, innovation, and a reduction in inequalities. The approach will strengthen communities, increase opportunities, and ensure that the benefits of digital developments are equitably distributed across the members of society to achieve a more sustainable and inclusive future.

Suggestions:

1. Awareness about digital services used under digital infrastructure is limited to the top four services, i.e., UPI, DigiLocker, Aarogya Setu, and CO-WIN. There lies a plethora of services offered under digital infrastructure. The same can be enhanced by way of online courses, social media campaigns, and other forms of advertising targeting various demographic segments.

2. Increased investment in public access points, such as rural Wi-Fi hotspots, will increase countrywide internet speeds and further facilitate people living outside major cities to connect.

3. Partnering with local businesses, the government can come up with innovative solutions to connect the gaps between the physical infrastructure, technology systems, policy frameworks, and the skills required for the proper functioning of technologies; of course, targeting separate regions/geographies should also be considered lest certain parts of the population get overlooked who might have low access or few resources available at their disposal, either domestically or regionally.

4. Building dynamic tech communities where developers from all backgrounds innovate on developing products for a better digital literacy while ensuring they create much needed job opportunities, especially within underdeveloped communities which face much of the brunt from excluded immigration policies among example countries like India itself.

5. Making educational campaigns and materials on these benefits aimed at different age groups.

6. Provide grants or other incentives for businesses and institutions to improve their digital infrastructure or subscribe to services, such as cloud storage or encrypted data networks.

7. It would facilitate the development of specific initiatives that would promote a sharing of knowledge, inspire innovation, and foster collaboration between diverse sectors of various industries across the country.

Further Research:

Data were collected only in an urban area, but to understand awareness and usage of digital infrastructure among citizens in India, it is very necessary to collect data from its rural population as well, and the sample size should increase for appropriate results.

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ASSESSING AWARENESS OF JAN SURAKSHA SCHEMES IN MUMBAI: ALIGNING SOCIAL SECURITY WITH SUSTAINABLE DEVELOPMENT GOALS

***Dr. Rabia Khatun**

****Ms Iqra Khatri**

Abstract:

This research study aimed to evaluate awareness of the John Suraksha schemes in Mumbai, identify reasons for lack of awareness, and suggest effective promotion methods. Using quantitative and qualitative methods, the researcher analyzed awareness and perception among residents, both profitable and non-profitable. Findings showed a significant lack of knowledge about Jan Suraksha, with men more informed than women. Education and income level influenced awareness, highlighting the need for targeted interventions. Despite low awareness, efforts to promote Jan Suraksha generated positive responses due to its cost-effectiveness and benefits. The study suggests targeted interventions and comprehensive outreach programs to address disparities and promote participation in economic protection programs. Policy makers and organizations can use these insights to increase awareness and social benefits of Jan Suraksha. By aligning with Sustainable Development Goal (SDG) 1: No Poverty and SDG 3: Good Health and Well-being, this integrative study enriches the literature on social security issues and provides practical recommendations to bolster the impact of Jan Suraksha programs, contributing to social and economic prosperity in Mumbai.

Key words: Jan Suraksha Scheme, Awareness level, PMJDY, PMSBY, APY

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Introduction:

The concept of social security has evolved over time. The Beveridge Committee Report (1942) defined it as "freedom from want". Social security is further described as protective measures against sudden reductions in income due to sickness, maternity, work injuries, unemployment, disability, old age, death, and the provision of medical care (ILO, 1952). The ILO's (International Labor Organization) concept of social security was limited to the organized sector. However, developing countries like India have much larger unorganized sectors, higher poverty levels, and lower industrialization. Therefore, there was a need to define social security in a way that suits developing countries. In such countries, social security should be viewed more broadly as pro-poor measures implemented through public means (Sen and Drèze, 1989).

In India, social security is best understood as pro-poor measures such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Provident Funds (PF), and protective measures to provide relief from certain external shocks, like compensation through insurance schemes in the event of injury or death of a primary breadwinner (Sarkar, 2004). Around 80 percent of people in India work in the unorganized sector. Ensuring financial security for low-income individuals, especially in the unorganized sector, is both a challenge and a responsibility of the Government of India.

Providing social security for all citizens is a primary responsibility of any government. To achieve this, the Government of India has introduced the Jan Suraksha Scheme, which covers the insurance and pension sectors, particularly for the poor and underprivileged.

Jan Suraksha Scheme under Social Security comes under the national mission for 'Financial Inclusion' titled the Pradhan Mantri Jan Dhan Yojana. It aims to cover every household, be it urban or rural, to facilitate access to financial services universally, and to make available Bank Accounts with RuPay Debit cards having no minimum balance requirement. The PMJDY will further provide access to various financial services like basic savings bank account, need-based credit, remittance facilities, insurance, and pension to these excluded sections at an affordable cost with effective use of technology.

The social security scheme is comprised of three schemes tending to the welfare of citizens, taking cognizance of the necessity of rendering coverage to human life from unforeseen events and financial insecurity. These are the Pradhan Mantri Suraksha Bima Yojana (PMSBY), Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY), and Atal Pension Yojana (APY). These schemes are meant to offer life and accident insurance and pension coverage at a low cost to people in the unorganized sector.

These schemes fall under the umbrella of SDG 1: No Poverty and SDG 3: Good Health and Well-being, which aims to decrease poverty and lead to better well-being by offering some monetary protection from some sudden disasters. As of April 26, 2023, the cumulative enrolment under the scheme crossed 341.8 million, and the amount disbursed for 115,951 claims stood at Rs. 2,302.26 crores. The present study has attempted to assess the level of awareness amongst people for the three social security schemes and further aims at spreading awareness amongst the targeted low-income and unorganized sector populations of Mumbai. In doing so, this would further help the policymakers understand the perception of the enrolled population and make appropriate changes in order to meet the requirements of the excluded sections.

Literature review:

The three schemes under the Jan Suraksha initiative are crucial steps towards enhancing life insurance and pension coverage and penetration in India, contributing to inclusive growth. In 2016-17, India's insurance penetration was only 3.49%, and insurance density stood at $59.7, significantly lower than the global averages of 6.28% and $638.3, respectively. Nath (2017) highlighted the decline in life insurance penetration and suggested that offering ease of claim settlement, as provided by the Jan Suraksha schemes, could improve penetration among lower and middle-income groups. However, Parida and Ghosh (2018) expressed concerns that the low premiums might challenge effective claim servicing. Issues in claims settlement and post-policy service handling could also arise.

Kumar and Harsolekar (2019), through an extensive survey, found high awareness levels for PMJJBY and PMSBY but significantly lower awareness for APY. The study emphasized the need to raise awareness among the youth regarding retirement products,

particularly as the majority of the surveyed population was young. Respondents with higher education levels and income backgrounds showed interest in schemes offering higher returns. Kumar and Pandian (2020) suggested introducing joint policy options or concessional premiums for renewal to increase social security scheme penetration.

In a more recent study, Kumar and Harsolekar (2021) underscored the importance of schemes like Jan Suraksha, especially during times of sociological and financial distress, such as the Covid period. The schemes, offering insurance at reasonable rates, had a profound and lasting sociological and economic impact. Data from the Press Information Bureau (PIB) showed a 438% increase in claims disbursed under PMJJBY in 2021-22, largely due to the higher number of deaths during the second wave of Covid. Sharma and Bijli (2021) highlighted the role of banks in executing these schemes, noting that banks have struggled to effectively communicate the details to the target population, raising concerns about their adequacy in this role.

Sachdev et al. (2022) found that while awareness of newly announced social security schemes is higher in rural areas compared to earlier government-sponsored initiatives, participation remains limited. Singh and Singh (2022), in their study in Himachal Pradesh, concluded that although the social security schemes have met some objectives, the awareness level is still moderate, requiring government action to reach eligible individuals and contribute to the state's social development. Despite positive feedback from scheme applicants, challenges persist.

Pushpa and Vishwanath (2022) focused on the applicability of the pension scheme in urban India, finding it less feasible for urban residents, including unorganized workers, due to the minimal guaranteed returns. The government of India has faced numerous challenges in providing social security coverage to marginalized groups, both before and after the Covid pandemic. While these schemes offer benefits, increasing their awareness and reach remains a significant challenge for the government.

Research Methodology:

The research approach included a survey of Mumbai citizens, both beneficiaries and

non-beneficiaries of the Jan Suraksha programmes. A sample of 125 people from various households, including bank representatives, were surveyed, producing 117 responses. Although the study's intended goal was stratified random sampling, practical restrictions forced convenience selection, which ensured different perspectives. Data gathering included surveys and interviews, with a mixed-methods approach that combined quantitative analysis with chi-square testing and qualitative theme analysis. This technique gave detailed insights into the implementation and problems of the Jan Suraksha schemes in Mumbai. The hypotheses of the study are directly related to the Sustainable Development Goals (SDGs) sought by the Jan Suraksha initiatives.

Hypothesis of the study:

1) Relation between Income level and willingness to subscribe

H0: There is no significant relation between the respondents' family income level and their willingness to subscribe to the schemes.

H1: There is a significant relation between the respondents' family income level and their willingness to subscribe to the schemes.

2) Relationship between Occupation and willingness to subscribe

H0: The occupation of the respondents has no significant relation with their willingness to subscribe to the schemes.

H1: The occupation of the respondents has a significant relation with their willingness to subscribe to the schemes.

Data Analysis and Interpretation:

The present study examined the relationship that existed between the level of income and the inclination to participate in the Jan Suraksha program. This was done to establish whether their decisions to participate in the plan were based on their income levels. The results showed that those with low and medium incomes up to INR 5 lakhs had a higher likelihood of subscribing compared to those with higher incomes. It means that the level of income and participation choices are highly correlated, with the low-income earners willing to subscribe, and the high-income earners being overtly sceptic. These findings from the literature show that

the need exists for establishing specific solutions to surmount hurdles and problems that vary based on income levels. Greater participation at all economic levels will be harnessed if clear information is given that erases doubt and touts the benefits of the Jan Suraksha initiative. More research and discussion are needed to fully understand what drives the decisions of middle-class and upper-class individuals regarding financial protection schemes. A chi-square test was applied to test these findings.

Observed Frequency Total Family Income (per annum)/Willingness to subscribe	Yes	No	Total
Less than 250000	52	9	61
250000-500000	22	8	30
above 500000	14	12	26
Total	88	29	117
Expected Frequency Total Family Income (per annum)/Willingness to subscribe	Yes	No	Total
Less than 250000	45.88	15.12	61
250000-500000	22.56	7.44	30
above 500000	19.56	6.44	26
Total	88	29	117
Chi-Square Total Family Income (per annum)/Willingness to subscribe	Yes	No	Total
Less than 250000	0.82	2.48	3.29
250000-500000	0.01	0.04	0.06
above 500000	1.58	4.79	6.37
Total	2.41	7.31	9.72
Test value	9.72	Critical value	5.99
P value	0.008	Significance level	0.05

The analysis revealed that there was a significant relation between the income levels and subscription willingness with p-value less than 0. 05 hence rejection of the null hypothesis. This information is also important in tailoring the strategies to improve the impact of social security programs.

This paper has explored the relationship of occupation variable and willingness to subscribe for better understanding of the coverage and impact of the Jan Suraksha program. The results showed that there were significant differences in willingness across occupational categories. A higher percentage was willing to subscribe to the occupational groups of self-employed, daily-wage workers, and private sector workers, while students and government servants were relatively less willing to subscribe. This variation does show a higher probability of programme enrolment based on type of occupation. These programs are more familiar to government employees and students because they have greater access to official channels and educational resources. Employees of the private sector and those paid on a daily basis however might encounter difficulties accessing information. According to the findings targeted outreach initiatives for particular professional groups are crucial. The Jan Suraksha schemes awareness and participation rate can be raised by taking into account the distinct informational needs and communication preferences of different professions.

Observed Frequency Occupation/Willingness to subscribe	Yes	No	Total
Daily Wage worker	25	3	28
Self-employed	12	6	18
Salaried-Govt	4	3	7
Salaried-Private	29	3	32
Student	18	14	32
Total	88	29	117

Expected Frequency Occupation/Willingness to subscribe	Yes	No	Total
Daily Wage worker	21.06	6.94	28
Self-employed	13.54	4.46	18
Salaried-Govt	5.26	1.74	7
Salaried-Private	24.07	7.93	32
Student	24.07	7.93	32
Total	88	29	117

Chi-square Occupation/ Willingness to subscribe	Yes	No	Total
Daily Wage worker	0.74	2.24	2.97
Self-employed	0.17	0.53	0.71
Salaried- Govt	0.30	0.92	1.23
Salaried-Private	1.01	3.07	4.08
Student	1.53	4.64	6.17
Total	3.76	11.40	15.16

Test value	15.16	Critical value	9.49
P value	0.004	Significance level	0.05

The null hypothesis was rejected by the chi-square test which indicated a significant relationship (p-value 0. 05) between occupation and desire to subscribe. In accordance with the Sustainable Development Goals for socioeconomic wellbeing and financial protection this emphasizes the importance of developing targeted strategies and interventions to raise subscription rates and grant equitable access to social security programs.

Conclusion and Suggestions:

This paper elaborates on the relationship between occupation, income level, and the desire to participate in the Jan Suraksha initiative of Mumbai. The results obtained are that people belonging to low and middle-income backgrounds have a desire to be covered under the program as compared with high-income groups. This means that subscription behavior was

heavily based on the income level, with the higher-income earners less willing to subscribe while the lower-income groups were proving to have a clear willingness to subscribe. From the survey, among the people subscribed, it emerged that self-employed making a daily wage and private sector workers all had higher subscription rates than students and workers for the government. That is to say, exposure to the work environment and availability of information are major factors of participation. Customized interventions are therefore called for, as brought out by the high correlation coefficients obtained in chi-square tests between occupation, income level, and preparedness to join. All of these results bring out the need to address barriers peculiar to different socio-economic and professional groups if indeed the scope and outreach of the Jan Suraksha scheme are to be broadened. Targeted Outreach Initiatives: Formulate focused outreach initiatives for specific audience segments based on specific income ranges and professional categories. Create awareness among unorganized sector workers and low-income earners of the benefits accruable from Jan Suraksha with easy understanding and availability.

Improved Communication Strategies: Address the misunderstanding or misunderstanding of the system through the facilitation of better channels of communication, particularly among government employees and high-income groups. Create awareness through multiple channels, including social media, neighbourhood gatherings, and educational seminars.

Tailored Educational Initiatives: Implement educational initiatives focusing on the particular information needs of different professions. Workshops and training programs, for instance, can be carried out to help workers in the private sector and those paid on a daily basis understand the system.

Such greater financial inclusion and social welfare could be created if these recommendations were put into practice, while more effective linking of the Jan Suraksha plan to the SDGs on eradication of poverty, enhancing health and well-being would be possible, and this would ensure economic security.

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SUSTAINABLE DEVELOPMENT: A MANAGEMENT PERSPECTIVE

***Dr. Sriram Deshpande**

Abstract:

This paper examines sustainable development from a management perspective, highlighting its essential role and the strategic methods needed for effective implementation. The Brundtland Report defines it as such development which seeks to put economic growth, environmental protection, and social equity in right balance so that both current and future needs are well met. The paper underscores the importance of sustainable development in reducing risks, achieving competitive advantage, engaging stakeholders, and driving innovation. It outlines key strategies for incorporating sustainability into organizational practices, including leadership commitment, sustainable strategy formulation, eco-efficient operations, stakeholder engagement, sustainable innovation, and performance measurement. Despite its numerous advantages, organizations face serious issues like short-term financial emphasis, several complications, resource restrictions, regulatory pressures, and cultural resistance. Case studies of Unilever and Patagonia demonstrate successful implementation of sustainable practices. This comprehensive approach aims to guide organizations toward sustainable development.

Introduction:

Sustainable development has surfaced as one of the key concepts in the discourse on economic development, environmental conservation, and social justice. It represents a paradigm shift from traditional development models, emphasizing the requirement to balance economic goals, environmental objectives, and social targets with an intention to fulfil the present needs without giving in the ability of coming generations to fulfil their own

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requirements. From a management perspective, sustainable development entails the integration of sustainability principles into organizational decision-making, strategies, and work environment. This paper explores sustainable development from a management perspective, highlighting its importance, strategies for implementation, challenges, and upcoming paths.

Sustainable Development:

The term "sustainable development" gained prominence when the Brundtland Report by the World Commission on Environment and Development was published in the year 1987 . This report explained sustainable development as such effect that fulfils the present requirements without having to adjust for future availability of these resources.

Importance of Sustainable Development:

Sustainable development is critical for management for several reasons:

- **Risk Management:** Integrating sustainability assists organizations in reduction of risks that are associated with environmental degradation, regulatory changes, and social instability.
- **Competitive Advantage:** Companies that implement and follow sustainable practices often gain a competitive edge by distinguishing themselves in the market. Such companies attract conscious consumers, and achieve cost savings through efficient resource use.
- **Stakeholder Engagement:** Sustainable development fosters stronger relationships with various stakeholders and communities, by demonstrating a commitment to ethical practices and long-term value creation.
- **Innovation and Growth:** Sustainability facilitates innovation as organizations try to come up with new ways to reduce their environmental footprint and create social value, leading to new products, services, and markets.

Strategies for Implementing Sustainable Development:

Implementing sustainable development would need a holistic approach that would bring together sustainability into every aspect of the business organization.

Important Strategies like follows can assist organization:

- **Sustainable Vision and Leadership:**

  Creating a futuristic perspective via vision for sustainability and tying it with the culture of organization are crucial activities for leaders. This shall include clarifying precise objectives or goals of sustainability, integrating these objectives with the mission of the company, and showing the commitment by actions.

- **Developing a Sustainable Strategy:**

  Creating his will include identification of improvement areas, drafting identifiable and quantitative goals, and assessing the social and environmental impact of the organization. Incorporation of this strategy into broad business plan would be essential to ensure that this procedure is in line with corporate objectives.

- **Sustainable Operations:**

  Sustainable operations are aimed at reducing the adverse environmental and social impact throughout the value chain. This shall include implementation of such procedures which are eco-friendly like reducing the waste, using energy efficient equipment and ethical acquisition of products. It also will include encouraging diversity and inclusion and ensuring that organizations follow fair practices.

- **Stakeholder Engagement:**

  If organizations want to know what stakeholders expect, how to resolve their complaints and how to encourage trust, organizations must understand that all this depends greatly on engaging with these stakeholders. This will include open reportage of sustainability performance, consistent effective external communication, involvement of stakeholders in decision-making.

- **Sustainable Innovation:**

  Innovation affects the process of achieving the sustainable development. The business organizations need to spend more money on research and development to produce eco-friendly products. Organizations also need to embrace cutting-edge technology that lessens its harmful impact on the environment. And lastly, organizations shall implement such business strategies which will support the circular economy.

Challenges in Implementing Sustainable Development:

Organisations are likely to face a number of problems while putting sustainable development into practice, despite the growing awareness of its importance. Following are some of the challenges:

- **Short-term Focus:**
  Prioritising financial goals can clash with the long-term objective of sustainable development. It takes a significant change in the mindset and outlook to strike a proper balance between contradictory goals like these. Striking this balance is a challenge.

- **Complexity and Uncertainty:**
  Many complex and interconnected problems like social injustice, resource depletion, and climate change are often encountered during sustainable development. Holistic strategies are essential to manage these complications. Getting these strategies is a challenging task.

- **Resource Restrictions:**
  To implement practices which are sustainable, heavy investments in technology, processes and training and development is necessary. Availability of limited resources may deter organizations from implementing such useful practices. Making available such resources is another challenge.

- **Cultural Resistance:**
  One of the biggest obstacles to sustainability may be found in organisational culture. Adoption of sustainable methods can be hampered by established behaviours, lack of awareness, and resistance to change. Establishing a culture that prioritises sustainability calls for constant leadership commitment, communication, and education. Management Case Studies on Sustainable Development Analysing actual cases can give important insights into how businesses are effectively incorporating sustainable development into their management strategies.

Case Study 1: Unilever

Unilever, a global operator in FMCG, is a leader in sustainability through its Sustainable Living Plan which it launched in 2010. This plan aimed at three unique outcomes viz., helping more than a billion people in taking steps towards improving their health and well-being, doubling the progress from the environmental impact of the organization and improvement in the livelihoods of thousands of vendors in supply chain.

Following are the key initiatives of Unilever in the area of sustainable development:

- **Sustainable Sourcing:**

  By 202, Unilever had committed to sourcing 100% of its agricultural inputs in sustainable manner. This involved collaborating with suppliers in the long supply chain to implement sustainable farming practices and enhance livelihoods. As a reference to the success of this initiative, it is hereby pointed out that in 2023, company sources 79 % of its agricultural inputs sustainably.

- **Waste Reduction:**

  In the year 2022, company reported that it recycled 4,82,000 metric tons of waste which was generated from its global manufacturing operations. Committing itself to sustainable future, organization has targeted to lessen food waste by half by the year 2025. Further, the company also has the target of reducing virgin plastic packaging footprint to 3,50,000 tons by 2025.

- **Health and Well-being:**

  Unilever encourages health and wellness through efforts such as nutritional improvement in its products, improving access to safe drinking water, and increasing awareness about hygienic practices. The consequences of this Sustainable Living Plan have been highly impressive, with Unilever reporting significant reductions in greenhouse gas emissions, water usage, and waste, alongside higher revenue and market share growth.

Case Study 2: Patagonia

Outdoor clothing firm Patagonia has centred its brand around social and environmental responsibility.

Important sustainability programs include: •

- **Environmental Activism:**
  Patagonia supports grassroot environmental organisations and donates 1 % of its sales to environmental causes. Additionally, the business participates via lobbying for causes like protecting lands for publis and fighting climate change.

- **Circular Economy:**
  Company implements an initiative called “Worn Wear Initiative”. Under this initiative, the company encourages users to recycle their old goods and buy used products. Also, the company has achieved integration of sustainability into designs of the product.

- **Supply Chain Transparency:**
  Company is committed to encouraging transparency in its supply chain to ensure ethical sourcing of its resources and equitable treatment of its labour force. On the website of the company, the organisation provides details about its audits and suppliers.

Conclusion:

Sustainable development is surely the need of the hour. However, the same does come with many issues and challenges. But, with proper planning and strategic approach, it is possible to implement sustainable practices in the business organizations.

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ANALYZING THE ROLE OF ARTIFICIAL INTELLIGENCE IN SUPPORTING CIRCULAR ECONOMIC PRACTICES FOR SUSTAINABLE DEVELOPMENT

***Dr. Naresh Sukhani**

Abstract:

Artificial intelligence (AI) is rapidly enhancing the role of a critical strategic ingredient for organizations across different industries to accelerate the delivery of state-of-the-art products and services, to satisfy customers' expectations and thus drive the business growth. It is a roller-coaster frontier in technology that simulates the humanoid intelligence in machines by investigating the vast amount of information, identify configurations, and make conclusions thus unlocking the unprecedented opportunities. From machine level algorithms that predict future trends to deep learning systems that understand natural language, AI has encompassed a spectrum of advanced process driving innovation across industries like healthcare, banking, finance and the chemical Business. Artificial Intelligence (AI) is thus changing the way how businesses can operate across various industries, along with the new products and services and thus enhancing a boisterous competitive edge. In today's new era of technology-driven arena, companies are increasingly using AI to gain customer know-how, optimize operating efficiency, and provide personalized results oriented solutions.[1] AI's capability to calculate huge amount of data, predict trends, and make complex tasks automated, allows businesses to be ahead of competition and respond rapidly to the changing market dynamics. From refining policymaking processes to restructuring supply chains and improving marketing strategies, AI is becoming an crucial tool for businesses seeking to maintain and reinforce their competitive edge. This research paper explores the multifaceted ways in which businesses are using AI to achieve their goals and transform the impact its having, across several industries.[2]

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Our Interest in AI and its usage stems from a connected passion for both technology, chemistry, finance, management and health. I have always been enchanted by how the advancements in technology can augment our daily lives. AI represents a cutting-edge tool with the potential to revolutionize our fitness and wellness as well. My desire to create a business in this sector further energies my desire to comprehend how AI can be advantageously implemented to provide extraordinary significance to customers. By exploring the integration of AI in fitness, I aim to gain insights that will help me build a business that stands out in a competitive market, offering innovative and personalized fitness solutions that cater to the unique needs of individuals. Through this exploration, I seek to understand the potential AI holds in transforming the different economical industries and practices to create a truly impactful and successful business adhering to Sustainable development goals.

Keywords: Sustainable Development, Circular Economy, Operational Efficiency, Artificial Intelligence(AI), Sustainable Development Goals(SDGs), Ethical AI, Data Privacy, Bias in AI, AI and Industry, AI and Climate Change, Environmental Impact, Machine Learning, Green AI, Sustainable Technology, Digital Transformation, Industry 4.0, Deep Learning.

1. Introduction:

While AI offers substantial benefits and modest advantages, it also faces several key challenges. Ethical and privacy concerns associated with the assemblage and use of huge amount of private data are foremost among these issues. AI systems need enormous datasets to function effectually, thus leads to latent breaches of secrecy and abuse of delicate information.[3] Moreover, prejudice in AI algorithms creates a substantial challenge, resulting in partial and biased outcomes if not correctly handled. The complication and price of creating and preserving AI systems also create significant blockades, chiefly for minor companies. Furthermore, the fast pace of AI growth has outpaced the regulatory structures, leading to doubts and possible abuse. Safeguarding transparency, liability, and objectivity in AI systems is perilous to comprehend AI's latency entirely.

AI in healthcare practices cutting-edge procedures and machine learning to advance patient care and effective competence. It improves infection identification through medicinal image examination, which streamlines the occupational procedures, identifies medication

through prognostic analytics, enhances drug sighting and detection, thus increases the patient contact with computer-generated assistants and chatbots which creates AI healthcare extra precise, well-organized and reachable.

2. Literature Review:

AI and Operative Effectiveness in Sustainable Development

1. ***Personalized Fitness Experiences***

   AI is transforming the health business by providing exceedingly tailored health experiences for people. Contrasting outdated health programs that offer general exercises plans, AI-assisted applications and devices detects and analyses the user's fitness level, objectives, inclinations, and chronological data to mould workout practises specifically for them. This people suitability ensures that each consumer receives the maximum real and appealing training plan, exploiting their latency for attaining their fitness goals.

   a. ***Higher Performance and Injury Prevention***

   AI's competence to practise and detect large amounts of heuristic data enables huge improvements in presentation improvement and wound deterrence. By nonstop observing indicators such as heart rate, movement arrangements and effort levels, AI can deliver parallel response and comprehensions. This assists the users in optimizing their ability to perform and reduce the possibility of injury. For instance, AI-powered instrumnets like digital strap watches can detect irregular form of exercises and movements and immediately highlight the same to the users to correct their Exercise or Posture, thus eliminating the occurrences of a potential injury. Subsequently, AI detects the possibility of injuries on the basis of historical data and current physical state of body, assisting sportsperson and fitness fanatics to alter their exercise courses proactively. This prognostic competence is vital for sustaining long-lasting health and evading impediments due to injuries.[9]

   b. ***Operational Efficiency and Business*** Acumen

   AI can significantly improve operations of fitness business and understanding the needs of their customers. AI algorithms analyze client data to identify patterns, preferences and

behaviors, enabling businesses to curate their services to satisfy customer needs. This could include targeted marketing campaigns, better class schedules and individualized promotions, all of which enhance customer happiness and engagement. Additionally, AI can manage inventory more efficiently by forecasting the demand for fitness gear, ensuring that businesses have the ideal amount of stock and avoiding over-stocking or running out. Overall, using AI helps businesses make wiser decisions, smooth operation, customer satisfaction, increase profits, making them a strong competitor in the market.

2. Limitations of AI in Sustainable Development

While AI brings numeros benefits and helps businesses stay ahead of the curve, it also faces several limitations. Primary issue is the ethical and privacy concerns relating to collecting and analyzing large amounts of personal data. AI systems depend on extensive datasets to function efficiently, which may lead to breach in privacy or misuse of sensitive data. Another major challenge is bias in AI algorithms, leading to unfair and discriminatory results if not addressed carefully. Furthermore, developing and managing AI systems can be heavy and bring in a lot of complications, especially for smaller businesses. The fast pace of AI development often puts off ethics, laws and regulations, causing uncertainty and potential misuse. To fully unlock AI's potential, it is important to ensure AI systems are transparent, fair and accountable.

The need for AI in the healthcare system tackles significant issues protecting patient data from breaches and unauthorized access. It is necessary to ensure that AI just doesn't add to existing issues in healthcare by introducing bias, prejudice and unfairness. Handling the complicated legal and ethical issues is also crucial, while also making sure that AI integrates well with current healthcare technologies and processes. Being clear and open about how AI makes decisions helps healthcare providers and patients understand it better. Additionally, removing financial limitations and providing fair access to AI technologies is key for successful and efficient use in healthcare systems.

3. Advancing Trends and Prospective Opportunities

New trends and advancements are constantly emerging to tackle the challenges and limitations in AI. A key advancement is to tackle the problem of data privacy and security methods, including techniques like differential privacy and federated learning, which protect personal data while still allowing AI to progress. There are also multiple efforts taken to

reduce the bias in AI, with research focusing on creating more transparents and accountable AI systems that can be reviewed and corrected. Organizations like OpenAI are creating guidelines and ethical standards to use AI responsibly. Another positive trend is making AI more accessible through cloud- based platforms and AI-as-a-Service models, which reduce entry barriers for smaller businesses and developers. Furthermore, Governments and international organizations are working on making new regulations to ensure that AI is used safely and ethically. These emerging trends and solutions are crucial for tackling AI challenges and ensuring its benefits are shared mutually and inclusively.[4]

To deal with the major challenges of AI in healthcare, stronger data security measures are being developed to keep patient's personal data safe. Efforts to minimize bias involve refining data sets and ensuring AI gives fair and consistent results. Recent regulatory guidelines aim to oversee AI usage and give ethical guidelines for the same. There are also efforts to better integrate AI solutions with Electronic Health Records (EHRs) to boost performance. Additionally, strategies are being made to enhance transparency, making AI decision-making process clearer and easier for healthcare providers and patients understanding. [4]

Generative AI and Retrieval-Augmented Generation (RAG) models:

Generative AI revolutionized artificial intelligence, with Large Language Models (LLMs) playing a major role. However, LLMs struggle when they have limited information. This is where Retrieval- Augmented Generation (RAG) comes into play. By combining LLMs with retrieval systems, RAG can pull relevant data from and information from large databases and documents like PDFs and DOCs, making their creative outputs more relevant, accurate and based on solid information. (Dong et al., 2023).

Multimodal AI:

It is the following edge of artificial intelligence, giving Equipments the ability to

[4] Davenport, T., and Kalakota, R. (2019). "The Potential for Artificial Intelligence in Healthcare." Future Healthcare Journal, 6(2), 94-98.

comprehend the world through multiple senses like humans. **By training on extensive datasets of text, images, and sounds, Multimodal AI can recognize patterns and connections between them (Joshi, Walambe, and Kotecha, 2021).** This enables it to perform incredible tasks and revolutionizes how AI interacts with the world by **unlocking richer and more nuanced AI experiences.** E.g.: Future AI Cook

Explainable AI (XAI):

XAI sheds light on the decision-making process of AI models, enhancing transparency and trust. XAI uses many processes to reveal the internal contrivances of AI, such as highlighting significant evidences thus showcasing the full process glaringly to a precise conclusion (Angelov et al., 2021).

Investigation Gap

Even though the corpus of research on AI and CE is expanding, empirical studies that measure AI's influence on CE practices and sustainable development are still needed. By using exploratory analysis to look at the connection between AI adoption and the efficacy of CE practices, this study aims to close this gap.

3. Investigation Methodology

3.1. Investigation Design

Various industries are researched exploring the usage of Artificial Intelligence in different sectors and avenues is used in this study to look at the connection between AI acceptability and CE practices. These inquiries are in various sectors which have incorporated artificial intelligence technologies to rejuvenate the sustainable development goals and circular economy endeavors.

3.2. Data Collection

Information was gathered from a range of sources, such as academic journals, industry papers, and case studies of businesses using AI into their circular economy plans. Metrics

on AI adoption, resource efficiency, waste reduction, and economic performance are all included in the data

4. Analysis and Interpretation

The Role of AI in Sustainable Development

Industry Examples:

1. *Lululemon Studio*

   Lululemon uses AI to offer an interactive fitness experience through its smart mirror, displaying live and on-demand workout classes. The AI provides concurrent feedback on form and technique, ensuring correct exercises and analyzing user data to recommend personalized classes. This technology benefits users by providing convenient access to personalized workouts from home, improving form, reducing injury risk, and enhancing overall workout effectiveness. Additionally, the interactive and personalized nature of Mirror's workouts keeps users engaged and motivated, leading to better adherence to fitness plans.[5] For Lulu lemon, AI integration boosts customer satisfaction and loyalty, increases engagement, and offers valuable consumer insights, helping refine product offerings and marketing strategies. By leveraging AI, Lululemon also enhances its brand image as an innovator in the fitness industry, driving growth and competitiveness.

2. *Nike Mobile App*

   Nike leverages AI in its app to enhance user experience and optimize operational efficiency. One standout feature is Nike Fit, which uses AI to scan and measure users' feet through a smartphone camera, providing accurate size recommendations. This significantly reduces returns and exchanges by ensuring customers receive the right size initially, improving satisfaction and cutting costs.[6] Additionally, Nike's AI-driven predictive analytics forecast product demand, optimizing inventory levels and ensuring popular products are available. Personalized marketing within the app analyzes customer data to deliver targeted ads and recommendations, enhancing engagement and increasing conversion rates. Through these AI applications, Nike improves the shopping experience and operational efficiency, maintaining market responsiveness.

3. *Google Health* is using AI to enhance medical imaging and diagnostics through its DeepMind subsidiary, which has developed systems for more accurate diagnosis of eye diseases and cancers Google Health is also focusing on AI integrating tools to improve communication with existing electronic health records, aiming to streamline workflows and improve patient care.[5]

4. *Siemens Healthineers* uses AI in its imaging solutions, such as the AI-powered syngo.via platform, which reduces radiologist workload by automating image analysis and increasing diagnostic accuracy. Their focus on integrating AI into existing imaging systems addresses the challenges associated with existing workflows while its security protocols ensure patient data protection.[6]

5. *Tempus* uses AI to analyze clinical and molecular data to develop personalized cancer therapies. Their platform helps discover actionable insights from datasets, addressing biases by including complete patient data. Tempus also implements robust patient confidentiality measures to protect sensitive patient information, and handles data privacy issues effectively.

   These companies are examples of how AI is being integrated into healthcare to address challenges such as data privacy, bias and collaboration, delivering innovative solutions that improve clinical outcomes and efficiencies.[7]

6. *Novartis* **connected inhalers for asthma patients exemplify how IoT** can improve disease management and patient adherence. Novartis uses IoT to improve patient obedience to medication routines and improve clinical trials. These initiatives by companies like Pfizer and Novartis highlight the transformative impact of IoT in enhancing healthcare delivery and patient outcomes.

7. *BASF: AI-Powered Catalyst Optimization* - Catalyst improvement is a long and

[5] Google Health. (n.d.). Google Health.
[6] Siemens Healthineers. (n.d.). Siemens Healthineers.
[7] Tempus. (n.d.). Tempus.

affluent process, frequently involving expensive experimentation. With the usage of AI, BASF has fast-tracked the catalyst improvement and optimization process of catalyst.

8. *Xarvio Digital Farming:* **AI-powered Weed Identification and Targeted Herbicide Application** - The benefits of this application are reduced herbicide usage, improved crop yields, and a more sustainable approach to weed control in agriculture.

Leading Vendors in Fitness Company:

1. ***Peloton***

   Peloton is a leading fitness tech company known for its high-end stationary bikes, treadmills, and app, featuring interactive touchscreens that offer live and on-demand classes powered by AI for personalized workout recommendations and concurrent feedback. Peloton's offerings include strength training, yoga, meditation, and cardio classes. In fiscal year 2023, Peloton reported $2.8 billion in revenue, maintaining a strong market position with advanced technology, high-quality equipment, and engaging content that emphasizes community and user engagement through leaderboards.[7] Key offerings include the Peloton Bike and Bike+ for live and on-demand classes, the Peloton Tread and Tread+ for running, walking, and strength workouts, and the Peloton App for a wide range of fitness classes on various devices. Peloton supports customers in achieving fitness goals through personalized plans and community support, with many success stories highlighting significant health improvements. These stories can be found on Peloton's Member Stories blog.

2. ***Fitbit***

   Fitbit offers a range of fitness trackers and smartwatches, such as the Fitbit Charge series and the advanced Fitbit Versa and Sense smartwatches, which monitor health metrics like heart rate, sleep patterns, and stress levels. These devices integrate with the Fitbit app to provide personalized insights and recommendations. Before its acquisition by Google, Fitbit generated over $1.4 billion in annual revenue, maintaining a strong market share in the wearable fitness device sector. Positioned as a leading brand, Fitbit is known for its comprehensive health tracking and user-friendly interface, appealing

to a broad audience. By providing actionable health insights, Fitbit helps users improve their fitness and overall well-being. For example, users have reported significant health improvements through personalized sleep tracking and recommendations, as shared on the Fitbit Community page. The integration with Google is expected to enhance Fitbit's technological capabilities and market reach, solidifying its position in the health and fitness wearables market.[8]

Leading AI Vendors in the Healthcare Industry:

NVIDIA:

- Products: The NVIDIA Health Clara platform provides AI-enabled imaging and genomics tools, enhancing medical imaging, drug discovery and genomic analysis through advanced GPU-based computing.
- Revenue/Market Share: NVIDIA, a leader in AI hardware, does not isolate healthcare revenue but maintains a significant market share in widely used AI and machine learning technologies in healthcare.
- Market Positioning: NVIDIA is a key enabler of AI systems in healthcare, leveraging its state-of-the-art computing expertise to support complex AI applications and research.[8]

Philips Healthcare:

- Products: Philips Healthcare offers AI solutions through IntelliSpace Precision Medicine and Health Suite Insights, which provide advanced image analysis and data integration for advanced diagnosis and personalized care.
- Revenue/Market Share: Philips Healthcare generates more than $20 billion annually, with the bulk of its revenue coming from AI-powered imaging and healthcare IT solutions.
- Market Positioning: Philips is a leader in the integration of AI into medical imaging and data analytics, focused on increasing the accuracy of analytics and patient outcomes.[9]

[8] Lai, J. (2021). "NVIDIA's AI Platform Accelerates Drug Discovery and Medical Imaging." Forbes.

[9] Philips Healthcare. (2022). "Philips AI and Data Analytics in Healthcare." Healthcare IT News.

Philips Healthcare and NVIDIA are leaders in innovation in AI-powered healthcare solutions that enhance diagnostic accuracy and patient outcomes through advanced imaging and data analysis advancing in personalized medicine and streamlined medical workflows.

Relevance of Artificial Intelligence:

1. **GE Healthcare –**
   a. *Enhanced diagnostic accuracy:* The AI Revolution at GE Healthcare optimizes diagnostic accuracy with advanced imaging systems such as Apex CT that use AI to perform functional and innovative imaging analysis. This capability ensures radiologists to make accurate assessments and improve patient outcomes.
   b. *Improved patient management:* The AI in GE Healthcare's patient monitoring systems enables concurrent analysis of patient data, predicting potential health problems before they become critical. This proactive approach enhances patient safety and enables timely intervention, directly affecting the quality and efficiency of care.
   c. *Improved operational efficiency:* At GE Healthcare, AI-driven solutions, such as predictive medical device maintenance, increase operational efficiency by automating routine tasks and optimizing resources.

At GE Healthcare, AI improves diagnostic accuracy by streamlining image analysis, improves patient management through concurrent data and early detection, and increases operational efficiency. These innovations streamline patient outcomes and simplify operations. [10]

2. **Abbott Laboratories** is a leading player in the medical devices and diagnostics market, known for its innovative IoT-enabled solutions that enhance patient care, **FreeStyle Libre**: A continuous glucose monitoring system that provides concurrent glucose readings for diabetes management. **CardioMEMS HF System:** A heart failure monitoring system that allows for remote monitoring of patients' heart conditions. (Abbott, 2018)[11]

[10] GE Healthcare. (2023). "Artificial Intelligence in Healthcare." GE Healthcare.
[11] Abbott. (2018). *Abbott Laboratories*. Abbott.com. https://www.abbott.com/

Abbott's diagnostics segment, which includes IoT-enabled devices, generated significant **revenue, contributing to the company's overall revenue of $43.1 billion in 2022**

Market Positioning: Abbott is positioned as a leader in the medical devices and diagnostics market, known for its innovative solutions that improve patient care and outcomes. Customer Success. FreeStyle Libre: This system has transformed diabetes management by providing patients with a more convenient and less invasive way to monitor their glucose levels. It has been widely adopted globally, improving the quality of life for millions of diabetes patients. CardioMEMS HF System: This system has been shown to reduce hospital admissions for heart failure patients by providing early detection of worsening conditions, allowing for timely interventions.

IoT's Impact on Healthcare Industry:

IoT technology is transforming healthcare industry through various applications. Remote Patient Monitoring utilizes IoT-enabled wearable devices and sensors to provide concurrent health data, enhancing patient care with continuous monitoring of vital signs, medication adherence, and disease management. This approach reduces hospital readmissions, facilitates early intervention, and improves outcomes, particularly for **chronic disease management and elderly care.** (Kelly et al., 2020)[12] Predictive Maintenance for Medical Equipment ensures the reliability of critical hospital equipment through IoT-based monitoring, minimizing downtime and enhancing patient safety. By preventing unexpected failures, hospitals maintain smooth operations, avoid procedure disruptions, and bolster patient trust.

Telemedicine leverages IoT for remote consultations, crucially connecting patients with healthcare providers, especially valuable during the pandemic. It reduces travel, increases access to specialists, and ensures continuous care, particularly beneficial for rural areas and patients with mobility constraints.

Infection Control and Environmental Monitoring employs IoT sensors to monitor

[12] Kelly, J. T., Campbell, K. L., Gong, E., and Scuffham, P. (2020). The internet of things: Impact and implications for healthcare delivery. *Journal of Medical Internet Research*, *22*(11), e20135. https://doi.org/10.2196/20135

hospital environments, ensuring optimal conditions and compliance with hand hygiene protocols. This proactive monitoring reduces the risk of hospital-acquired infections and enables prompt responses to deviations, enhancing patient safety.

Public Health Surveillance utilizes IoT networks to gather data on disease outbreaks, environmental hazards, and population health trends. Early detection of disease clusters, monitoring air quality, and tracking vaccination rates enables effective public health interventions.

Smart Ambulances equipped with IoT transmit coexisting patient data to hospitals, enabling emergency responders to provide timely and informed care en-route.

Health Wearables and Lifestyle Monitoring devices track fitness metrics, sleep patterns, and stress levels, empowering individuals to proactively manage their health. This proactive approach reduces strain on healthcare systems and promotes preventive health measures.

ChemIntelligence: Official website

ChemIntelligence leverages AI to empower researchers in chemical RandD. Their platform excels in two key areas predicting properties and optimizing experiments. For property prediction **AI analyses vast datasets to predict characteristics of new molecules, such as reactivity or melting point.** Additionally, the AI can recommend efficient synthetic pathways (retrosynthesis) for targeted molecules. Furthermore, it optimizes existing experimental workflows by analyzing past data. The AI model suggests the most relevant experiments to pursue, eliminating unnecessary trial-and error approaches. It can also recommend adjustments to reaction conditions (temperature and pressure) to improve efficiency or yield.

Bayer uses ChemIntelligence tools to accelerate the innovation and to design safer and effective crop protection products. Company positions itself as a leader in applying AI to the complex world of chemistry and materials science. The key benefit of the platform is to accelerate the development of new chemicals and materials by reducing the need for time-

consuming laboratory experiments. By providing data driven insights to researchers and optimizing the RandD process for efficiency and cost-effectiveness.

General Electric (GE) - Asset Performance Management (APM): Official website

GE Digital has an incredible solution that's part of their Predix Asset Performance Management suite. It uses AI to take predictive maintenance in chemical production to a whole new level. It prevents equipment failures before they even have a chance to disrupt operations. **Advanced algorithms analyses concurrent data of sensors and identifying subtle patterns and deviations from normal operating conditions.** The AI predicts potential equipment failures that help customers improve their operations and achieve their business goals.

Wacker Chemical Corporation uses GE's APM suite to connect hundreds of assets across multiple sites to determine the optimal time to take equipment offline and recommend planned maintenance. It will significantly reduce the downtime and maintenance cost. On the other hand, predictive maintenance minimizes the risk of sudden equipment malfunctions, enhancing overall safety in the production environment.

The solutions mentioned above are just the tip of an iceberg. The effective use of AI will facilitate a more efficient chemical industry in terms of both research and operations.

The Future of AI in Sustainable Development:

1. **Disruptive Technologies**
   Disruptive technologies can significantly impact markets and spur growth. Firms must recognize impending disruptions and respond timely and effectively.

2. **Internet of things (IoT):**
   IoT connects devices to automate and collect concurrent data, enabling efficiency and innovation. Understanding IoT is key for roles in technology development as it allows me to use connected devices more efficiently.

3. **Technology as a source of innovation:**
   Embracing technology as a driver of innovation allows me to implement cutting-edge solutions and business models that enhance patient care and streamline healthcare operations.

4. **Blockchain:**
   Blockchain is applied in healthcare for secure storage of information, tracking the origin of products and integration. I could look at how block chain could be applied to the promotion of patients' health organizational performance.

Conclusion:

To sum up, business analytics skills allow me to turn data into actionable insights, allowing to make better decisions. IoT understanding enables me to leverage connected devices for concurrent analysis and automation, increasing operational efficiency. Blockchain expertise ensures me to implement secure and transparent data management solutions, increasing trust and integrity in all my projects.

IoT strategies optimize patient care, streamline healthcare operations, and bolster public health initiatives. Their adoption is crucial for building a connected, efficient, and resilient healthcare ecosystem.

In summary, this research has highlighted the profound impact AI can have on the chemical industry by outlining a range of solutions, challenges, and emerging trends. This exploration has deepened my understanding of how AI can address industry challenges and optimize processes. The knowledge gained not only enhances my expertise as a Product Owner but also fuels my enthusiasm for leveraging AI to drive future advancements. This journey has been both enlightening and inspiring, reaffirming the critical role of AI in shaping the future of the industry.

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ARTIFICIAL INTELLIGENCE IN THE BANKING SECTOR: TRANSFORMING CUSTOMER SERVICE AND ENHANCING RISK MANAGEMENT

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Abstract:

This respective paper signifies the AI and the role and importance of AI in overall customer experience through the quality services in banking sectors. The research provides a comprehensive review of existing literature on the various emerging applications of AI and its impact on the banking industry. After the detail examination in current studies, application of the artificial intelligence in banking is discussed in detail. Millions of customers and professionals in the banking sector are experiencing improved services due to artificial intelligence. With the advancement in digital technology, the bank requires to develop consumer experience which builds trust and devotion. In order to develop the powerful foundation in digital-banks, banks must simplify and accelerate their processes. The research aims to assess how effectively the working of the banks can make use of AI for improving consumer engagement as well as their satisfaction.

Keywords: AI Technology, Online Banking, Virtual Assistants, User Experience.

Introduction:

AI has been becoming go to business all around globe in order to enhance and personalized the customer experiences. As technology continues to progress and evolve, new

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areas for AI applications are emerging. Banks are the one who embrace the artificial intelligence at an early stage. In the same way like the other industry, banking sectors are exploring various applications of this technology. Common uses of AI in banking include smarter chatbots for customer assistance, personalized services for individual users, and the implementation of AI robots for offering self-services in various branches. Apart from these standard applications, all banks may make use of AI to improve the productivity in the backend operations and also to decline the chances of security and fraudulent issues.

Objectives:

1. To examine the ways in which banks are using artificial intelligence.
2. To research various application of the AI in banks.

Scope:

This report has been focused on technological progress within the context of banking sector in India.

Methodology:

Study is based on secondary information and data. Relevant information has been collected from different various sources lie websites, journals, publications and various banks and RBI portals.

India's Artificial Intelligence Industry: A Current Overview

An article from The Economic Times in October reported that funding for startups in India rose by 108% in 2018. The article highlighted that artificial intelligence was one of the sectors experiencing the fastest growth in industry adoption. Currently, around 400 startups are active in the fields of machine learning and artificial intelligence. Since 2016, respective investors had poured approximately 150 million dollars into Indian artificial intelligence market, with this figure consistently increasing. Despite this progress, comparative to other countries such as China and US, India remains behind in terms of investment. Along with youth

population and the large number of STEM talent, India is poised to use AI to enhance its economy and improve living standards for its citizens.

To enhance customer service, several start-ups located at various cities like Delhi, Hyderabad, Bengaluru as well as Mumbai are incorporating AI techniques. Their offerings include automated analysis of customer data, support for online shopping, and multilingual chatbots. These companies operate in various sectors; include finance, education technology, healthcare, and e-commerce. Although they are in their initial stages, the progress of these businesses has been promising.

Technology and Indian Banks

In integration of latest technologies, the factor important in Indian banking sector is the balanced perspective of RBI. It has been seen in recent year that at the time of leadership of Urjit Patel and Raghuram Rajan, Reserve Bank of India had too a careful yet practical approach to adopting latest technology. In order to improve the consumer experience and orderliness through specific technologies it has been often compelled banks to incorporate it via regulations. The RBI has actively encouraged the adoption of innovative technologies, going beyond just establishing policy frameworks. To enhance processes and improve effectiveness, it has merged advocacy, regulation, and alliance with industries.

A notable instance such that NPCI (National Payment Corporation of India) had significantly lowered expenses associated with digital transaction. Also, Institute of Development and Research available in the banking technology that serves as academic and research brand regulator is continually exploring with various limitations and opportunities in latest technology sector. The active participation of both organizations in testing the block chain evidence of concepts is intentional.

India has been occupied significant role in these contexts. It’s no doubt that India is a hub for the technology. It is not only favoured destination for outsourcing the technology but it also hosts suppliers that control a large share of the global core banking sector. The headquarters of TCS and Infosys, 2 of leading 3 providers in core banking solution are located in India. Recently, the Fintech sector has experienced considerable growth in the country,

solidifying its status as a global Fintech centre. While Fintech and traditional banks have often had a complicated relationship in many advanced economies, modern institutions in India, such as Axis Bank, HDFC Bank and ICICI bank have been collaborated with Fintech companies.

They have organized hackathons and competitions and made their APIs available to these Fintech companies. SBI, the largest bank in India, announced the launch of Bank Chain on February 8, 2017. The consortium, led by SBI, includes over thirty members such as banks, non-banking financial companies (NBFCs), and National payment corporate of India, which was formed through banks in India in order to support the payments in retail. In essence, Bank Chain is a network of banks focused on creating, testing, and implementing blockchain applications. Prime Chain Technologies, based in Pune, is assisting Bank Chain in developing these solutions. Currently, there are eight active projects and 37 members involved.

Impact and Role of AI in banking and finance:

Customized services in finance or financial services

As the automated financial planners and advisors gain expertise while guiding financial choices, personal connection will connect to the new levels. They do evaluate the market conditions and provide suggestions for stocks and bonds based on client's portfolio and their respective financial goal.

Digital Wallets or Smart Wallets

Companies such as Apple, PayPal and Google are having the payment system of their own, leading to the rise of digital wallets as the future of payment technology for everyday transactions. This shift reduces dependence on physical money and expands the versatility of financial transactions.

Underwriting

As the insurance sector moves towards increased automation, it is also facing significant changes. Companies now have access to more detailed information, allowing them to make better decisions by employing AI technology to streamline the underwriting process.

Banking with Voice Assistance

The need for physical interactions is diminishing as technology allows users to access financial services using touch screens and voice commands. Natural language processing can understand user inquiries to provide information, answer questions, and link with users to different financial service. Such advancement helps to eliminate human errors and improves overall effectiveness.

AI applications for data driven lending choices

Artificial intelligence apps are utilized in making data-driven lending decisions. Servers at financial institutions, personal devices, and end-user gadgets can all feature applications that process extensive data and create tailored financial forecasts, calculations, and recommendations. By exploring various personalized investment choices, loans, interest rates, fees, and related areas, such apps can be used to enlarge financial strategies and planning while tracking their progress.

Client Supports

Advancement in natural language and speech processing technology continues, we're approaching a time when computers can handle most customer service inquiries. These progresses will likely lead to greater customer satisfaction by reducing wait times.

Digitalization as a replacement for physical branches

Banking has traditionally involved lengthy processes, often hindered by long wait times and slow responses. The experience of opening a bank account was often frustrating, as busy customers hurriedly completed necessary paperwork while moving around the bank. By digitizing documentation, this frustration is alleviated, providing a comprehensive platform for interaction between service providers and customers.

Blockchain accelerating payments

The digital age, particularly with the rise of social media and smartphones, is leading to a notable change in purchasing habits of clients or consumers which bank serves. Customers are increasingly seeking more flexibility and control in their banking experiences. With Blockchain poised to enable real-time payment processing, outdated slow payment methods will soon be eliminated. This advancement will enhance the speed of transactions and boost customer satisfaction.

Banking with Artificial Intelligence in India:

In 2016, as per the Fintech trends report in the year 2017, the investment in the artificial intelligence was valued to 5.1 billion US dollars which is approximate to 4.3 billion (Euro). Many of the other financial institutions in India such as ICICI, SBI, HSBC and Axis bank were also adopted the artificial intelligence.

SBI organized nationwide codefest known as “Code For Bank” to motivate all students, various start-ups as well as the developers in order to generative creative solutions and ideas in banking covering the areas like electronic payments, block chain, Fintech, artificial intelligence, internet of things, automatic robotic process, machine learning and bots. Currently, various banks are implementing the artificial intelligence based solution which assists in understanding customer behaviour through the analysis of clients' facial expressions.

HDFC Bank, in collaboration with Senseforth based in Bengaluru, developed an AI chatbot named "Eva" (Electronic Virtual Assistance). So far, Eva has addressed over 2.7 consumer queries and interacted with approximate 5,30,000 unique clients including 1.2 million of consumer conversations. In the starting phase of its launch, chatbot handled approximate 1 lakh questions with numerous customers of around 17 countries by responding in an average of 0.4 seconds. Additionally, bank is also experimenting the in store robotic solutions known as IRAs.

The ICICI bank has introduced with a software robotics with two hundred business process in different departments within organization. Such technology was labelled by bank as “robotic software’ claiming that they have been the first in the country to utilize it for the automating and executing time intensive and large number of business task.

The Axis bank has launched a conversational banking application that utilizes artificial intelligence and speech processing technology which helps consumers for various non-financial as well as financial tasks, answer common questions, and facilitate loan applications.

The Difficulties India Encounters in Advancing Artificial Intelligence

1. The private sector has played a significant role in the development of AI applications so far, mainly focusing on consumer goods. Government entities need to pay attention to this technology because of its newness and potential effects.
2. India should consider private as well as public funding models for artificial intelligence research which have emerged from the success seen in China, United States, South Korea and various nations.
3. In the current economic environment, where job roles are rapidly evolving and skills can become outdated within a few years, the traditional pathway from education to employment is no longer adequate.

The benefits of AI in identifying fraud within the banking industry:

Using anomaly detection can enhance the effectiveness of fraudulent detection through credit cards and money laundering prevention measures.

Consumer supports and help desk: The interface for humanoid chatbot will help reduce expenses and enhance effectiveness in customer interactions.

Risk management involves analysing historical data, performing risk assessments, and minimizing human mistakes in manually created models to provide tailored products for customers.

- To prevent and possibly foresee security breaches, it is essential to examine unusual behaviour, analyze logs, and investigate fraudulent emails.
- Using OCR to scan document data can greatly shorten back-office processing times. Following this, AI or machine learning could be employed for gathering insights from extracted text information.
- To detect and prevent fraud and criminal activity at ATMs, it is important to have advanced artificial intelligence methods and the real time images of camera, like deep machine learning could be employed for image and facial recognition.

Wealth management for everyone: Robo-advisors can handle personalized portfolios for clients by taking into account expected investment returns, personal lifestyle, and willingness to take risks.

Conclusion:

In summary, the banking sector supports to attain number of benefits through application of AI. In perspective of banking sector in India, AI has been revolutionizing customer service and operational processes. It is also utilized to assess individual credit risks, detect fraudulent activities, and ensure compliance with regulations. The incorporation of artificial intelligence has capacity to streamline operation functions of business, provide tailored service and broader aims like inclusive finance. Certainly, traditional banking models are being significantly influenced by the on-going push towards digital formation. However, this shift increased organizations exposure towards rising electronic information security threats. To create a robust defence against cybercrime, banks are increasingly exploring advanced technologies such as Blockchain and data analytics.

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