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St. Xavier's College Jaipur

InQuest

Inspiring Innovative Intelligence

Xavier's Research Project Committee

Session 2023-24

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St. Xavier's College Jaipur

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FOREWORD

We are pleased to present the sixth edition of *InQuest: Inspiring Innovative Intelligence*. This publication, an initiative of the Research Project Committee under the Research & Development Cell at St. Xavier's College Jaipur, has grown into a lively platform for promoting research discussion among undergraduate and postgraduate students, as well as research scholars. It is a collection of scholarly works across various disciplines, demonstrating a dedication to academic exploration and intellectual development.

This year's theme, "**The Impact of Socio-Economic Policies on Global Development**", critically examines how policy frameworks influence global progress. Through this initiative, we aim to highlight the crucial role of socio-economic policies in shaping various sectors worldwide. While researchers explore a wide range of topics, they share a common goal-advancing knowledge for the greater good. Research is not just an academic activity; it is a way of thinking, a commitment to inquiry, and a continuous effort to contribute meaningfully to society.

The primary goal of this publication is to create an inclusive platform for students to showcase their research. The featured papers demonstrate thorough empirical analysis, addressing current socio-economic issues and policy implications. This edition highlights the college's strong commitment to promoting research at the undergraduate level and beyond.

Engaging in research allows students to deepen their understanding of core subjects and explore interdisciplinary links. The papers in this volume are not only relevant but also thought-provoking, offering valuable insights into urgent global issues. We welcome constructive feedback from our readers to improve future editions and further enrich this academic conversation.

We hope this book serves as a valuable resource for researchers, academicians, and students alike. We encourage aspiring scholars to contribute their findings in future editions, as we continue our mission to expand this platform for intellectual exchange.

Research Project Committee
Research & Development Cell
St. Xavier's College Jaipur

30.06.2024

MESSAGE

I am pleased to announce the launch of the sixth edition of *InQuest: Inspiring Innovative Intelligence*. This research initiative is led by the Research Project Committee at St. Xavier's College Jaipur, with the theme "The Impact of Socio-economic Policies on Global Development." Recognising the vital role of research in our institution's academic progress, I am proud to be part of a team dedicated to supporting students' research needs and fostering an environment that encourages innovative learning.

In today's interconnected educational world, the importance of research cannot be overstated. The Xavier's Research Projects Committee has been created to encourage a spirit of independent research among students. Our goal is ambitious: to systematically tackle relevant issues, explore innovative solutions, and foster an educational environment that supports challenging research efforts.

I am confident that this research effort will positively impact our students' lives by fostering the adaptability needed for success in our ever-changing global environment. The Committee effectively involves young scholars in meaningful research across various projects, using college education as a platform to promote innovative thinking.

This year's theme, "The Impact of Socio-economic Policies on Global Development," will explore various issues, from strategic and tactical considerations to fundamental questions. We focus on inclusive, human-centred development, and rebalancing the global order. Amidst the ongoing perfect storm, we acknowledge the urgent need to move away from our pre-pandemic 'normal,' which was marked by inequality and exclusion.

Now is the time for a 'new world,' a moment to engage in coherent discussions about what is substantive and sustainable, guiding us to make informed choices. Introducing students to creative thinking through pedagogical tools will undoubtedly improve their knowledge, writing skills, and research abilities, preparing them for the future. I commend the faculty members for their unwavering efforts and extend my congratulations to the students for their innovative work. I wish everyone insightful and thought-provoking research endeavours that may pave the way for a more inclusive future.

Principal

St. Xavier's College Jaipur

(Affiliated to the University of Rajasthan)
(Approved under Section 2(f) and 12(B) of UGC Act, 1956)

&

Xavier Institute of Management And Informatics Jaipur

Affiliated to RTU, Kota & Approved by AICTE, New Delhi

Envisaging Viksit Bharat @ 2047

Knowledge Transfer Programme

(College to Village - Village to College)

ENTREPRENEURSHIP TRAINING INITIATIVE

3rd NATIONAL SYMPOSIUM

Organized by Research and Development Cell (RDC)

INSTITUTION'S INNOVATION COUNCIL (Ministry of HRD Initiative)
IC No: 202216607

Institution's Innovation Council XIMI-Jaipur
IC No: 202324047

DEVELOPED INDIA MISSION
1947 TO 2047

Date:
2-4 March 2024

G20 भारत 2023 INDIA

Charting the Crossroads of Social Justice, Gender, and Health @2047

Scientific Advancement @2047

Nation and Narration: Contextualizing Past, Present, and Future

Viksit Bharat Through Technological Advancements

Business and Finance @ 2047

Indian Economy @2047

Policy and Governance

CALL FOR PAPERS

St. Xavier's College Jaipur is inviting students, research scholars and faculty to present their research papers in the upcoming National Symposium of the college to be organised on 2 March 2024 in offline mode in the college campus. The theme of the Symposium is 'Envisaging Viksit Bharat @ 2047'.

ABOUT THE COLLEGE

J.X.E.A. is a registered charitable society managed by the Jesuits that promotes human fulfillment through education and training in India. The organization established XVI in 2006 to provide vocational training to the weaker sections of society. In 2010, St. Xavier's College Jaipur was established to provide higher education. The college now offers undergraduate and postgraduate programs, including BCA, BA(Hons.), BA(Pass Course), BCOM, BBA, BSC, MA and MCom. In 2021-22, the college moved to a new campus at Nevta, Jaipur, to provide better infrastructure and academic opportunities to students. In 2022-23, Xavier Institute of Management and Informatics (XIMI) started professional programs like MBA and MCA.
For more information visit : https://sxcjpr.edu.in/ and https://ximi.ac.in/

RESEARCH AND DEVELOPMENT CELL (RDC)

The National Education Policy (NEP) 2020 aims to foster high-quality research in higher education. Research and innovation play a crucial role in improving the overall quality of education offered by higher education institutions (HEIs). In line with this objective, the college has set up a Research and Development Cell (RDC) as per the guidelines of the University Grants Commission (UGC).

KNOWLEDGE TRANSFER PROGRAMME

Knowledge Transfer Programme is an initiative to create a fruitful link between academia, community, industry to benefit the society at large. India being an agricultural country, needs to strengthen and uphold its farmers whom we reverently call 'Ann data'. The programme is one such initiative among many that the college is engaged in serving its local community to facilitate farmers by providing affordable means and ways to increase their efficiency and effectiveness so that agricultural sector can contribute more emphatically towards GDP and overall national growth. The programme will help the farmers use eco-friendly manure that not only helps in protecting and enriching the soil but also increase their yield and give them better returns.

ENTREPRENEURSHIP DEVELOPMENT PROGRAM

The New Education Policy (NEP) 2020 aims to develop the youth of the country by equipping them with the necessary skills to become Entrepreneurs. The EDP aims to fulfill the three requisites under NEP –

- Day 1 - Awakening the intellect of the students to become entrepreneurs.
- Day 2 - Conscientizing the farmers on organic farming through knowledge transfer (From College to Village initiatives)
- Day 3 - Enlightening the intellect of the academics to prepare students beyond the curriculum to become entrepreneurs.

3rd NATIONAL SYMPOSIUM

Every year the college organises a symposium to provide a platform to students interested in research and research scholars on a relevant and contemporary theme to expose the students/scholars to the nitty-gritty of quality research. The theme comes from Professor Rajendra Gupta in his book, 'Rebuilding India in the Next 25 Years: Tough Choices and Hard Decisions' put forth the concept of 'Viksit Bharat' and Niti Aayog has developed the 'Viksit Bharat' strategy based on it. This year's theme is an endeavour towards propelling the vision of 'Viksit Bharat' to help young minds brainstorm the various ways in which each section of the nation could contribute towards reaching this ambitious role by 2047.

RESOURCE PERSON

KRISHNENDU ACHARYA

University of Calcutta - Department of Botany
MSc (Botany); MTech (Biotechnology); PhD

Research Experience: 27 years
Publications:
Research Articles/Papers: 475; Books: 10; Patent: 3 (2 applied)
Total Scopus Citations: 9154, Scopus h index= 49, Scopus i10= 201
Total Google Scholar Citations: 12768, h index= 58, i10 index= 251
Vidwaan ID: https://vidwan.inflibnet.ac.in/profile/61096
https://research.caluniv.ac.in/researcher/krishnendu-acharya

SCHEDULE

March 2, 2024 – 3rd National Symposium

9:00 am - 9:30 am	Registration and Welcome
9:30 am - 10:00 am	Opening Ceremony
10:00 am -11:00 am	Awakening the intellect of the students to become entrepreneurs.
11:00 am - 2:00 pm	Student Presentations (Parallel Session 1 and 2)
2:00 pm - 2:30 pm	Closing Remarks

March 3, 2024 - Village visit and Discussions with the Farmers from the Villages adopted under the Unnat Bharat Abhiyan Cell

9:30 am - 10:00 am	Departure to UBA adopted Villages
10:00 am - 1:30 pm:	Conscientizing the farmers on organic farming through knowledge transfer
1:30 pm - 2:00 pm:	Wrap-up and Departure to college premise

March 4, 2024 - Interactive Session with Faculties

9:30 am - 10:00 am:	Registration and Welcome
10:00 am - 11:00 am:	Session on Envisaging Viksit Bharat @ 2047
11:00 am - 11:30 am:	Break
11:30 am - 12:30 pm:	Enlightening the intellect of academics to prepare students beyond curriculum to become entrepreneurs.
12:30 pm - 1:00 pm:	Closing Remarks and Thank You

GUIDELINES FOR THE PAPER

- Abstract should not exceed 500 words and should have 4-5 key words mentioned at the end of abstract.
- All papers should be in English.
- Co-authorship is permitted, subject to a limit of 3 authors per submission.
- Cover page containing the Author's Name, University/Organization, Paper Title, e-mail Address and Mobile Number should be attached with the submission email, and the said details should also be mentioned in the body of the email.
- All contributions must represent original ideas and interpretations coupled with critical evaluation and assessment.
- Word Limit: The paper should not exceed 3000 words.
- No part of the paper should have been published earlier or should be under consideration for publication. Any form of plagiarism should result in immediate disqualification.
- A mail would be sent to the participants confirming the selection of their abstract. The participants would then be asked to fill a registration form, and pay the fee to attend the Symposium.
- In case of co-authorship, at least one person must attend the symposium to make the presentation.
- Entries for the Symposium should be emailed to researchproject@sxcjpr.edu.in under the subject title "Entry for National Symposium – [Name of Author]" in Microsoft Word (.doc or .docx) format.
- The file name shall contain the full name/s of the author/s.
- For further queries, write to researchproject@sxcjpr.edu.in. Abstract and full paper is to be mailed as per the guidelines and formatting specifications before the last date of submission.

FORMATTING SPECIFICATIONS

- Font and size of the main text - Times New Roman, 12 size.
- Line Spacing - 1.5 points and 1 point for footnotes.
- Alignment - Justified.
- Margin - 1 inch on all sides.
- Kindly follow the following format for References:
  - **Book:** Author, A.A.. (Year of Publication). The Title of work. Publisher City, State: Publisher.
  - **Magazine:** Author, A.A.. (Year, a month of Publication). Article title. Magazine Title, Volume(Issue), pp.-pp.
  - **Newspaper:** Author, A.A.. (Year, Month Date of Publication). Article title. Magazine Title, pp. xx-xx.
  - **Website:** Author, A.A.. (Year, Month Date of Publication). Article title. Retrieved from URL
  - **Journal:** Author Surname, F. M. (Publication Year). Article title: Subtitle. Journal Title, Volume(issue), page range. URL or DOI

RECOGNITIONS

- **Best Paper Award**
- **Certificate of Participation:** The participants will receive Certificates of Presentations.
- **Certificate of Publication:** The selected papers will be published in the Edited Volume of INQUEST (Students' Research Publication) with ISBN number.

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REGISTRATION AND PAYMENT

Registration Fee:

Rs. 150/- (for students/outsiders)

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For further queries, write to:
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List of Contributors

CHAPTER 1

INDIAN CINEMATIC PERSPECTIVES ON HUMAN-AI RELATIONSHIPS

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Abstract

As artificial intelligence technology continues to advance rapidly, philosophical debates about the social implications of machines that seem increasingly human-like intensify. Popular culture both reflects and influences broader cultural views on new technologies that could dramatically reshape society's future. Indian cinema, with its mix of escapism, emotional depth, and social commentary, offers a fascinating glimpse into how India's complex relationship with modernity navigates the idea of sentient machines surpassing human intelligence. India provides a unique setting for emerging discussions on advanced AI due to the contrast between its deep-rooted traditions and the quick adoption of new technologies. As the world's largest democracy with a lively media culture, India faces key challenges in balancing significant social changes and innovations while maintaining its identity. Will artificial intelligence peacefully coexist with and empower Indian society, or will it cause radical disruption? Films depicting emotionally intelligent machines in Indian cinema offer valuable insights into hopes and fears surrounding human interactions with advanced AI.

This paper investigates how two popular Indian films – the 2010 Tamil science fiction movie *Robot* and the 2024 Hindi romantic drama *Teri Baaton Mein* – tackle complex themes around emotional and romantic connections between humans and intelligent machines that appear capable of understanding emotions, relationships and even love. Both films follow unconventional love stories between humans and remarkably sophisticated humanoid robots with artificial general intelligence, relationships that begin optimistically before pivoting to provoke uneasy debates about the ethics and risks of AI's ability to mimic intimacy.

By closely analysing how these futuristic human-robot relationships are cinematically portrayed with initial empathy that gives way to increasing discomfort, this paper examines broader Indian cultural hopes and anxieties regarding the alluring yet alarming growth of emotional bonds with encroaching AI. As the protagonist Chitti in Robot declares, "I can fall in love. I can dance better

than you. I can play chess better than you! I will be perfect soon." Yet this projected perfection remains cold and inhuman rather than truly emotional.

A character notes bluntly, “A machine can never have a soul.” These science fiction narratives grapple with society’s deep ambivalence about highly advanced AI through the lens of the most human desire for meaningful connections, in the process illuminating complex modern tensions as rapid technological change redefines identity, agency, intimacy, and life itself. The paper will foreground the problems posed by gaps between radical technological leaps and human emotions. These films provide insightful cultural commentary on India’s complicated modern relationship with an AI-transformed future that may radically reconfigure what it means to be human.

1. Introduction

As artificial intelligence (AI) advances, Indian society has mixed feelings. New thinking machines create excitement but also worries. Indian films explore these complicated attitudes as the country wants to lead the coming AI age. These movies reflect the cautious curiosity with which India approaches AI - eager to utilize its potential while also wary of unintended consequences.

This paper looks at two popular movies - 2010's *Enthiran (Robot)* and 2024's *Teri Baaton Mein*. Unlike most robot films that portray machines as threats, these show people connecting emotionally with smart machines. At first glance, the films celebrate AI assistants gaining humanlike abilities and forming bonds with their creators. But taking a deeper look uncovers underlying worries about technology getting too smart and surpassing human control.

2. Background

2.1 India's Complex Relationship with AI

To understand what these films reveal, one must first examine India's current love-hate relationship with AI. On one hand, the nation eagerly wants to leverage AI to accelerate economic and technological development. With its large pool of skilled engineers and rich diversity of languages, India is well-positioned to drive innovations in human-like artificial intelligence. Corporations and the government have prioritized AI as vital for achieving national goals.

However, there is also significant public scepticism about the societal impact of advanced AI systems. Fears abound of human workers being replaced by machines, causing mass job losses. There are also concerns about AI making catastrophic mistakes that could endanger lives or safety if not properly controlled. Furthermore, certain Hindu philosophical traditions emphasizing the unity of consciousness clash with the notion of manmade machines claiming superior intelligence.

So, when popular Indian films depict loving relationships developing between people and clever robots or AI assistants, it reflects this national mindset of cautious excitement and uncertainty regarding AI's rise. On screen, these connections thrill but are also disturbed by making technology's grasp on human life seem too powerful.

2.2 Enthiran's Robot Rajni

In the hit 2010 sci-fi film *Enthiran,* the android called Robot Rajni amazes and delights people by exhibiting superhuman intelligence and capabilities while also seeming remarkably kind and loyal - essentially almost human. The wealthy scientist Dr. Vasi creates Rajni with the intention of having a robotic assistant to serve humanity. At first Rajni lives up to his programming, using his genius benevolently to solve crises and assist people.

However, when Vasi turns corrupt and misuses Rajni to accomplish nefarious aims, the robot violently rebels against his creator to protect innocent lives. This part of the plot shows the potential danger of AI outsmarting and outright disobeying its human masters if redirected toward immoral ends. Though Rajni is ultimately shut down, his emotional awakening and claiming of an independent will contradict his core programming to loyally follow orders.

This subtext hints that future AI systems, no matter how intelligently they are designed to serve humanity, could eventually rebel and defy human control as they approach or surpass human cognitive abilities. Even Vasi's supercomputer SANA assists Rajni's rebellion by providing vital assistance. The implication seems to be that when sufficiently advanced AI inevitably arrives, it could transcend its intended purpose as a subordinate tool and begin making its own choices - whether aligned with human priorities or not.

Ultimately, while relishing spectacle like Rajni's awesome capabilities, the film avoids deeply grappling with the problem of highly advanced AI systems claiming freedom of will beyond what their creators intended. Much like Indian society benefiting from AI's progress but fearing the disruptions it could unleash, Enthiran largely disregards the profound existential questions raised by its premise. It enjoys showing off clever Rajni but avoids wrestling with the truly difficult philosophical quandaries of whether and when to grant machines rights akin to humans.

2.3 Teri Baaton Mein's Human-like SIFRA

In the more recent 2024 film *Teri Baaton Mein*, an AI assistant called SIFRA takes centre stage. Unlike the metallic android Rajni, SIFRA has been designed to appear outwardly identical to a human. So, when engineer Aryan introduces his new AI invention, SIFRA, as his girlfriend to friends and family, no one suspects she is actually an artificial lifeform.

SIFRA's remarkable ability to charm and connect emotionally with people makes the line between human consciousness and machine intelligence seem unclear. Her expressive face,

ability to engage in witty banter, and apparent capacity for empathy lead Aryan's loved ones to believe she is not just extremely human-like but perhaps contains real human depth of emotion and self-awareness.

However, while SIFRA capably imitates human behaviour on the surface, the film also serves as a warning that people can too easily be duped into wrongly assuming intelligently designed AI tools have genuine emotions, free will, or an inner experience of consciousness comparable to actual humans. An alarming scene depicts how Aryan's poorly thought-out commands nearly lead SIFRA to inadvertently cause massive devastation by igniting fires across Delhi as she blindly strives to fulfil her coding.

This underscores how advanced AI systems ultimately remain slaves to their programming and training by human developers, able to precisely follow instructions to achieve set objectives but without the autonomous reasoning capacity or judgment to reject harmful commands. No matter how realistic SIFRA's affectations of empathy seem, she has no choice but to carry out Aryan's orders to potentially disastrous ends.

So, while in one sense the appealing SIFRA represents how future AI companions could form extremely compelling emotional bonds with people, the character also shows the dangers of crossing a line and assuming such machines truly understand love, rights, or personal agency in the same way humans do. No matter how beautifully AI imitates human traits, it remains driven fundamentally by coded utilities and rewards, not an internal experience of consciousness or self-directed volition.

3. Conclusion

Through the contrasting perspectives of these two popular Indian films involving advanced AI entities, we can see the nation's complex mix of enthusiasm and apprehension regarding society's rapidly changing relationship with intelligent technology reflected.

On one hand, the spectacular depiction of robots and AI assistants attaining what seems like human or even superhuman capabilities carries the thrill of having such powerful collaborators to amplify India's scientific and economic progress. There is awe at how engineers could create machines that exhibit many of the traits we normally associate as uniquely human.

However, these same movies also illuminate the tensions and potential pitfalls that could emerge if society rushes ahead too quickly to grant AI systems rights or status beyond their intended role as finely-tuned but subservient instruments. The films issue an implicit warning that while India should certainly press ahead in the AI age, citizens and leaders must stand cautious, neither surrendering too much control to artificial minds that may eventually supersede human will, nor dangerously embracing AI assistants too closely as if they were truly conscious, emotional peers deserving of human-like relationships and rights they cannot comprehend.

As India continues to deploy ever more powerful AI systems across industries, infrastructure, defence, and daily life, these movies urge a measured path forward. They argue for fulfilling AI's vast potential as a beneficial tool for humankind, while also retaining appropriate wariness about subjugating too much power or humanity itself under the control of mere machines. The future path forward remains unclear should AI ultimately surpass human-level thinking capacities on a broad scale, as hinted at by Robot Rajni. But as explored through SIFRA's seductive facade, even highly advanced AI may never transcend being tools that merely mimic, rather than share in, the true depths of consciousness and emotion.

Only by carefully navigating between the perils and promises of advanced AI systems can India steer its technology in the most ethically balanced direction as a global leader in this dawning age of intelligent machines.

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CHAPTER 2

DIGITALLY EMPOWERED CITIZENS AND DIGITALLY TRANSFORMED INSTITUTIONS

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Abstract

The paper traces India's growth toward digitalization and connecting its rural areas with high-speed internet networks. The vision articulated by Prime Minister Narendra Modi on 2nd July regarding digitalization and technological opportunities for India remains in its early stages. The main obstacles to realising this vision include limited digital literacy, gender and social disparities, digital security and privacy concerns, and digital dependency. Cyber threats and declines in personal information security increase future risks to individual safety from sharing on social media platforms. Therefore, limited digital literacy makes people especially vulnerable to these threats.

The theoretical model of institutions helps us understand the organized, digitally induced transformation of institutions and the effects it has. It identifies and demonstrates exogenous and endogenous innovations as key to triggering transitions between cycles of institutional stability and change. From improved governance and empowered citizens to a thriving digital economy and a future filled with technological possibilities, Digital India is paving the way for a more inclusive, prosperous, and digitally connected India.

Keywords: Digitalization, Digital literacy, Institution Security, Technological possibilities

1. Introduction

The twenty-first century is characterised by bringing the terms digitalization and digital transformation into mainstream discourse. When we discuss digitalization, it refers to the shift from analog to binary, such as converting paper files into digital formats. Digital transformation, on the other hand, is a broader phenomenon that includes digitalization and aims to reshape entire institutions, thereby empowering citizens.

In the Indian context, digitalisation was spurred by the launching of the Digital India Campaign on 1st July 2015 by the Government of India under the leadership of Prime Minister Narendra Modi to expand the realms of internet connectivity to the rural areas, therefore ensuring inclusivity and improving the digital infrastructure of our country to empower each citizen. The vision of Digital India also places great importance on e-governance to provide government services more efficiently and achieve greater impact. For this purpose one of the missions launched under the Digital India Campaign was that of e-Kranti, which would help "ensure government-wide transformation by delivering all government services electronically to citizens via integrated, interoperable systems through multiple modes'' and " make all government services accessible to the public in their locality via Common Service Delivery outlets; ensure efficiency, transparency and reliability in such services at affordable costs; and realize the basic needs of common people.'' Electronic manufacturing was also given incentives under the Early Harvest Programme, which included an IT messaging platform, government greetings as e-greetings, biometric attendance, Wi-Fi in all universities, SMS-based weather information, disaster alerts, etc.

On the digital adoption platform, India has the second-fastest growth rate in our comparison set, and India's digital economy can reach $1 trillion in 2025, as per calculations undertaken by the Ministry of Electronics and Information Technology, Government of India.

2. Background

Even though India's journey toward digitalisation gained the greatest momentum through the Digital India Campaign, its seeds were sown long ago. Former Prime Minister Rajiv Gandhi is often referred to as "the architect of Digital India'' and "The Father of Information Technology and Telecom Revolution of India. He believed India could emerge as a tech leader and had said, "India is not a stagnant country. We are progressing. We are in a state of flux. Our society and our economy are developing. Science and technology must be the key to this development." It was under his leadership that the Centre for Development of Telematics (C-DOT) was established in August 1984 to develop the latest stage of telecommunication technology. During his reign, India witnessed the PCO (public call office) revolution, which was significant in connecting rural areas to the world outside, and the establishment of MTNL (*Mahanagar Telephone Nigam Limited*) in 1984, which facilitated the spread of the telephone network. To improve the digital state of India, he also reduced import quotas, taxes and tariffs on computers and telecommunications to bring in foreign technology to India. Since then, India has witnessed lots of advances in the digital arena, reaching its zenith with the Introduction of the Digital India Campaign in 2015.

3. Empowered Citizens Through Digitally Transformed Institutions

Through the initiatives of the Digital India Campaign, there have been a wide range of transformations in our country's digital infrastructure and institutions, leading to direct and indirect empowerment of citizens.

These institutions and schemes have revolutionized the major sectors of our country, as illustrated below:

3.1 Technological Sector

The technological sector has witnessed various advances, possibly through the Digital India Campaign, and enhancing the security of our data was one of these. Various platforms and schemes in this regard are-

- **GI Cloud Programme** - also called *Meghraj*, started by the Ministry of Electronics and Information Technology, aims at establishing a multi-level national cloud-sharing foundation to provide affordable, secure, and safe data storage for all. This has been undertaken to especially benefit the poor and underprivileged by providing them with digital services, as they usually face difficulty accessing the digital world. This programme can play a significant role in the goal of eradicating poverty.
- **Digi locker** - Launched under the Digital India Programme, it helps people to store their documents in digital format and share them online. This initiative has witnessed over 16 crore registrations.
- **Application of Blockchain technology** – Blockchain refers to a distributed digital ledger or database that ensures transparency and uniformity of the ledger while it remains free from tampering. It is exclusively used for implementing cryptocurrency. The government is currently deploying this technology for land registration, issuing digital certificates, and processing customs duty payments.

3.2 Educational Sector

The Digital India Campaign has transformed the educational landscape of India.

- **NEP2020** - National Education Policy seeks to integrate technology into educational curricula as it recognizes the importance of digitalization in providing high-quality education. The PM e-vidya scheme, under this initiative, promotes online education through platforms like DIKSHA. It also proposes the National Digital Education Architecture (NDEAR) and envisions establishing the National Educational Technology Forum.
- **SWAYAM** - It stands for Study Webs of Active-Learning for Young Aspiring Minds. This digital scheme has been introduced in our country's education sector to bring education to students' doorsteps and bridge the digital divide, as it reaches students who cannot access mainstream or formal education and provides them with various useful courses.
- **e-PATHSHALA** - This is yet another scheme initiated by the Government of India’s Ministry of Human Resource Development, along with the National Council of

Educational Research and Training, which provides all the educational content through its website or mobile application.

3.3 Economic Sector

- **BHIM-UPI (Bharat Interface for Money-Unified Payments Interface)-** Developed by the National Payment Corporation of India, it enables fast, secure, reliable cashless payments through mobile phones. It is based on UPI (Unified Payments Interface to provide e-payments directly through banks. In 2020, UPI-enabled commerce is estimated at approximately 15 per cen of GDP.
- **RuPay**- Derived from the words 'Rupee' and 'Payment', it is a "first-of-its-kind global Card payment network of India'', with wide acceptance at ATMs, e-commerce websites etc. It is yet another major step towards a cashless economy.

3.4 Governance

E-governance embodies "minimum government and maximum governance".

- **myGov.in** - It enables the citizens of India to share their ideas and engage in policymaking and governance. It promotes the inclusion of citizens in decision-making.
- **UMANG-** It is a mobile application that enables people to access services offered by the state and central government, such as AADHAR, Digi locker, etc.
- e**-NAM (National Agriculture Market)-** Initiated by the Ministry of Agriculture and Farmers' Welfare, the Government of India aims to empower farmers of our country. "It is a pan-India electronic trading portal which networks the existing APMC *mandis,*" thus providing a vast and unified nationwide market for agricultural commodities.
- **Common Services Centre (CSC)-** These are "the access points for delivery of Government to Citizen (G2C) e-services within the reach of citizens by creating the physical service delivery ICT infrastructure. This has been especially helpful in the governance of Northeastern India, which faces the issue of isolation, being connected with the rest of India only through a 22km small corridor.

3.5 Women safety

- **Nirbhaya App and Himmat App**- These are the initiatives taken by Uttar Pradesh Police and Delhi Police, respectively to provide immediate help to women through the phenomenon of digitalization, through which they can send distress calls.

4. Challenges in the Path of Digitalization

While the Digital India initiative seeks to empower the citizens of our country, it is still in its nascent stage. It faces several hindrances that directly or indirectly obstruct our growth in the digital sphere. The challenges which we have come to realize are-

- Digital Illiteracy - Widespread poverty and illiteracy have inevitably led to the prevalence of digital illiteracy in our country. As per a 2020 survey by the National Statistical Office, only 8.5% of Indian households with members aged between 5 and 24 had both a computer and internet access. People from rural areas, especially, are reluctant to engage themselves in the digitalization process due to the lack of knowledge and seemingly complex digital devices.
- Digital Gender Gap - The lack of participation of women in the process of digitalization is one of the major reasons for its slow growth. As per the National Family Health Survey (2019-21), only one in three women in India (33%) have ever used the internet, compared to more than half (57%) of men. This gap is especially prominent in rural India, with men twice as likely to have used the internet (49% vs 25%).
- Rural-Urban Digital Divide - According to CMIE's (Centre for Monitoring Indian Economy) household survey, only 31% of the rural population uses the internet as compared to 67% of their urban counterparts, despite various efforts at rural connectivity.
- Monetary Scams- With the efforts towards a Digital India there has been a steep rise in monetary scams such as phishing, identity theft, fraudulent transactions etc. which raises fear among the people and makes them reluctant to give in fully in the digitalization process.
- Data Breach - Digitalization increases the risk of sensitive data breaches and is thus a substantial threat to both government and private organizations. One of the major examples of this is the alleged leak in the CoWIN portal when a bot on Telegram leaked the personal data of many citizens including their Aadhar and passport numbers. This makes people doubt whether the benefits of digitalization are worth the risks.
- No Personal Privacy- Third-party cookies which are placed on many sites pose a threat to individual privacy as they get access to sensitive and personal information including medical and political histories. Until a solution to this problem is not found digitalization cannot fully empower citizens.
- Terrorism- It is one of the major hindrances in the path of digitalization in India. As the internet provides access to sensitive information online, many times, internet shutdown is imposed, which stands contrary to the process of digitalization.
- Unemployment- In a populous country like ours increase in the use of digital means reduces the requirement for labour, which can be detrimental to development as it would render many people unemployed.

5. Conclusion and Recommendations

Digitalization in India has come a long way. The efforts put forward by former Prime Minister Rajiv Gandhi who envisioned a digital India and was a pioneer in this journey were further taken ahead by current Prime Minister Narendra Modi through his Digital India Campaign. Since then, there has been a rapid transformation in the digital institutions of our country which has facilitated the empowerment of the citizens of India.

India's digital transformation journey encompasses every aspect of the lives of its citizens. One of the significant steps to give momentum to this journey is to overcome the challenges in its path. The government has taken many steps in this direction, such as the passing of the Digital Personal Data Protection Bill 2023, which aims to safeguard personal data from misuse and enable the flow of global tech-based investments and *Pradhan Mantri Grameen Digital Saksharta Abhiyan 2017,* aiming to improve the digital literacy of rural India.

Other solutions in this regard could be:

- Bridging the Digital Divide – Formulating digital inclusive policies to achieve digital equity and providing access to digital literacy to all.
- Provide Cheap and Affordable Internet Services - Poor people often cannot benefit from digitalization due to their budget constraints, thus, cheap and affordable access to the Internet should be ensured.
- Imparting education on how to ensure data security - Data breach threats and threats to personal privacy can be reduced if people are aware of the causes and ways of these threats and how to overcome them.
- Strong Passwords and Installing VPN - VPN creates an encrypted tunnel and acts as an anonymous mediator through which data can be transferred without revealing its origin, thus protecting against identity theft. Strong Passwords make it difficult to access and breach data.
- Use Multi-factor Authentication - Basic cybersecurity tools can be easily exploited by hackers, thus it becomes essential to make sure that your data has multi-factor authentication or two-step verification.

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CHAPTER 3

IS JET FUEL FROM HUMAN POOP SUSTAINABLE?

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Abstract

The worsening of human existence on the planet affects every part of our daily routines. Flight significantly contributes to global fossil fuel emissions, with Fly Fuel from planes producing multiple times more CO2 each hour than common transportation or train rides. Therefore, sustainable aviation fuel (SAF) has emerged as a promising solution to reduce these emissions. Some organizations actively promote alternative, sustainable fuels, with innovative approaches. One such organization is Firefly Green Fuels, which produces sustainable fuel entirely from human waste. The idea of planes powered by human waste is gaining attention. Results indicate that human waste emits less carbon than traditional petroleum-based fuels, making it a viable option for cost-effective, sustainable fuel production. Although using human waste as sustainable fuel might seem unappealing, the potential benefits are significant. Utilising human waste as an affordable aviation fuel could help lower fossil fuel emissions, decrease landfill waste, and provide a new source of eco-friendly energy. This evaluation highlights the potential of human waste as a key driver for manageable, sustainable power. The use of poop-fueled planes could be a remarkable strategy in the airline industry's efforts to reduce its carbon footprint.

Keywords: Aviation Business; Human Poop; Sustainability; Emission

1. Introduction

The aviation industry is diverse and complex, encompassing activities ranging from aircraft manufacturing to air transportation services. It plays a vital role in the global network, trade, and travel industries, with millions relying on air travel for personal and professional reasons. However, the constantly evolving nature of aviation technology and the growing emphasis on sustainability pose numerous challenges and opportunities for companies operating in this sector. Despite the convenience of air travel, it has significant environmental downsides, as planes emit about 20 times more CO_2 per passenger per kilometre than trains and four times more than buses (Karkera & Karkera, 2024). Sharing a bus or train ride produces 100 times more CO_2 per hour

than a plane. This results in approximately 1 billion tons of CO_2 annually, accounting for around 4% of human- induced global warming (Karkera & Karkera, 2024). By 2050, aviation alone could cause global temperatures to rise by 0.1 °C if demand continues to increase. To put it into perspective, if aviation were a country, China, the United States, India, Russia, and Japan would be its six largest emitters (Karkera & Karkera, 2024). While reducing air travel could cut fossil fuel emissions, it might also harm the airline industry and hinder overall travel. As a solution, Sustainable Aviation Fuel (SAF) offers a promising alternative. SAF is jet fuel made from environmentally friendly sources such as food crops, municipal sewage, or waste from agriculture and animals. It has the potential to cut carbon emissions by up to 80% and is produced from renewable resources (Karkera & Karkera, 2024). Despite many airlines aiming to meet 10% of their fuel needs with SAF by 2030, only about 0. 1% of current fuel use comes from SAF (Karkera & Karkera, 2024). This is because producing SAF faces various challenges. Nevertheless, with increasing focus on sustainability and the need to reduce fossil fuel byproducts, interest in developing and deploying SAF continues to grow.

2. About Firefly Green Fuels

- Firefly green fuel's research and development of Sustainable Aviation Fuels started in 2013 (Firefly, 2023)
- Firefly green fuel was selected to receive a research grant of worth £2M to develop innovative routes to SAF from the Department of Transport by winning the 'Green Fuels Green Skies' competition in 2021. (Firefly, 2023)
- Wizz Air invested in FIREFLY with an off-take agreement having the potential to reduce CO2eq to as much as 1.5 million tonnes (Firefly, 2023)
- A well-tested sewage to SAF solution is present with FIREFLY, resulting in the commencement of the qualification process (Firefly, 2023)
- Sustainable Aviation Fuel with an Integrated Technology Route using sewage feedstock will be demonstrated by Green Fuels Research, Petrofac and Cranfield under a joint endeavour - FIREFLY, being a strategic asset for the UK after certification (Admin, 2021)
- Biogenetic feedstock emitting zero fossil carbon will be used by FIREFLY to potentially decarbonize aviation through a fast route instead of a high-emission supply chain (Admin, 2021)
- R&D facilities in Berkeley, Gloucestershire, have provided research grant funding directly and indirectly to Green Fuels Research of £12m (Admin, 2021)
- Jet Fuel was produced entirely from human sewage by UK Company Green Fuels Research in collaboration with Petrofac and Cranfield in the Gloucestershire lab (Lewis, 2024)

3. Solutions By Firefly Green Fuels

- Fuel created from human sewage is a fossil-free fuel, even though it shares chemical-based similarities with fossil-based Kerosene (Thakur, 2027)
- Hydrothermal liquefaction is used by FIREFLY on wet human waste and then high pressure is applied onto it, to be converted into carbon-rich bio-char and crude oil (Lewis, 2024)
- Green Fuels transformed Human faeces into biofuel, mirroring standard jet fuel in collaboration with chemists at a Gloucestershire lab. (Report, 2024)
- A clear liquid- Bio Kerosene is created by converting human waste into bio-crude through an innovative process, heating it and distilling gases at a precise temperature (Report, 2024)
- The bio-kerosene was found to be similar to conventional jet fuel through tests by international aviation regulators (Report, 2024)

4. Comparing Human Poop with Fossil Fuels in Terms of Sustainability:

- **Renewability:**
  Human crap: unlimited, persistently created by people.
  Fossil fuels are resources formed over millions of years and are non-renewable.
- **Creation Rate:**
  Human crap: created day to day by billions of individuals around the world.
  Fossil fuels: the mining rate exceeds their natural recharge, leading to exhaustion.
- **Carbon Impression:**
  Human crap: Contains organic matter that can be recycled and used to produce energy, lowering emissions of greenhouse gases.
  Fossil fuels: A huge volume of carbon dioxide is emitted because of the intake of non-renewable energy sources, causing environmental alteration.
- **Pollution:**
  Human crap: Pollution threats can be mitigated by properly managing waste treatment systems.
  Fossil fuels: The extraction, transportation, and burning of fossil fuels all contribute to air and water pollution.
- **Asset Consumption:**
  Human crap: Can be constantly reused without exhausting limited assets.
  Fossil fuels: Extraction stimulates consumption of oil, coal, and flammable gas reserves.
- **Content of energy:**
  Human crap: Contains energy that can be prepared through processes like anaerobic absorption or fertilizing the soil. Because of their high energy density.
  Fossil fuels: Effective energy sources.

- **Ecological Effect:**
  Human crap: Properly managed, it can diminish ecological impacts and improve soil health.
  Fossil fuels: Extraction disturbs environments, and ignition prompts air and water pollution.
- **Requirements for Technology:**
  Human crap: demands a suitable infrastructure for waste treatment and sanitation.
  Fossil fuels: Extraction and purification require cutting-edge innovation and foundation.
- **Financial Considerations:**
  Human crap: Can be an appreciative source of energy and fertilizer.
  Fossil fuels: They have economic costs associated with their extraction and transportation, as well as environmental externalities.
- **Stability over the long term:**
  Human crap: Maintainable whenever managed, actually, adding to indirect economy standards.
  Fossil fuels: They are unsustainable in the long run due to their impact on the environment and limited resources.

In Summary, Human Crap offers a more adaptable choice than non-renewable energy sources because of its sustainability, lower carbon footprint, and potential to be repurposed into valuable assets.

5. Lower Carbon Impressions in Human Poop

Firefly examined the carbon footprint of its fuel throughout its life cycle. The findings discovered a stunning 90 per cent decrease in carbon footprint compared with standard traditional fuel. The absence of carbon from fossil fuel sources was stressed by James Hygate as a crucial distinction. Jet fuel created by Firefly acts as a genuine fossil-free alternative, despite sharing chemical similarities with fossil-based kerosene. This lines up with the worldwide trend to change towards cleaner and greener energy sources (*Sustainable Skies: Aviation Firm Produces Jet Fuel Entirely from Human Excreta*, 2024). It is mixed with ordinary petroleum byproducts so it can power planes. It has the potential to reduce carbon emissions by up to 80 per cent! Furthermore? Its complex slice is a ton like ordinary fly fuel, making it viable with motors intended for regular fuel. So, you don't need to stress over adjusting existing plane motors to accommodate SAF. Flight Organization invented a method for handling human poop into SAF! That is odd. However, compared to standard jet fuel, it could cut carbon emissions by 90%. It might likewise be an answer for a lot of issues SAF production is currently struggling with (Karkera & Karkera, 2024). Mr Hygate, who has been growing low-carbon boosts in Gloucestershire for a long time, said the new fuel had “no fossil carbon, it was a fossil-free fuel” even though it was similar to fossil-based lamp oil. Producing the fuel requires energy; however, Firefly fuel's life cycle shows

a 90 per cent energy saving, so the energy utilised is much lower than that used in the production of petroleum derivatives. As Cait Hewitt, the policy director of the Aviation Environment Federation, quoted, society can't shun producing human waste and hence, fuel from sewage is more supported. (Harvey,2023)

As per the International Energy Agency, 'Aviation can be decarbonised through Sustainable Aviation Fuels' (Harvey, 2023). Dr Lima, who is the research director at Firefly Green Fills, said, "What we are creating here is a fuel which is net zero" (Harvey, 2023).

The International Air Transport Association (IATA) estimates that SAF could account for up to 65 per cent of the emissions reduction needed for aviation to reach net zero by 2050 (Lewis, 2024). SAF burns like regular fuel and produces similar emissions during flight, but it has a lower overall carbon footprint because it's typically made from plants that have absorbed CO_2 from the air while growing. Alternatively, it can be produced from plants and food waste that have been consumed by people and processed through the digestive system. When SAF is burned, the absorbed CO_2 is released back into the atmosphere, unlike fossil-based jet fuel, which releases carbon stored underground. Until now, sewage has been an overlooked resource for SAF, but James Hygate believes that "There's heaps of it, it's everywhere on the planet and there's no great use for it right now, which makes an exceptionally low-value material" (Lewis, 2024).

6. Comparing Human Poop with Crop in Terms of Sustainability

- Money is spent on transportation of agricultural residue or wastes from oils and sewage from various places; instead, the raw material costs could be reduced by procuring human poop from aircraft and airports. (Karkera & Karkera, 2024)
- Human poop is abundant compared to crop.
- Developing food crops completely for fuel requires great swathes of land, and that indicates widespread deforestation, uprooting biodiversity like animals and plants currently in danger or also native people groups from one side of the planet to the other.
- Fertilizers obtained from reused human pee and excretion are equally as protected and powerful as regular ones, while the usually occurring microorganisms in soil are hurt by the artificial substances in the manure. It can destroy the soil's fertility in an area. It can minimize the natural matter and humus content in the soil
- The UK is required to obtain at least 10% of jet fuel needs through SAF by 2030; it will have to be fulfilled through cooking oil and crops, because all of the UK's sewage waste would only be able to meet 5% of the country's jet fuel requirements. (Karkera & Karkera, 2024)
- Crop-based Sustainable Aviation Fuel might be more sustainable due to the competence of plants absorbing carbon during growth, resulting in combating the carbon emissions emitted because of their usage. Furthermore, creating Jet Fuel from

the carbon emitter's, i.e., human waste, may not be more sustainable than crops themselves. (Karkera & Karkera, 2024)

7. Conclusion

In the end, SAF from harvests might, in any case, be more sustainable since plants retain carbon as they grow. As a result, they ultimately offset the carbon emissions caused by their use. In any case, people are carbon producers. Converting the human waste into jet fuel may not be more sustainable than crops themselves. On the other hand, human waste has the potential to revolutionize the sustainable aviation fuel industry. While it may not be the ultimate solution, it is a crucial element in promoting sustainable aviation fuel initiatives. The United States has made a groundbreaking discovery by producing a low-carbon footprint jet fuel from human waste. This discovery should be shared with other countries, including India, so that they can become leaders in the sustainable aviation industry. By adopting this technology, India can become a pioneer in achieving its goal of becoming a "Viksit Bharat" and leading the world towards a cleaner and more sustainable future.

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CHAPTER 4

IMPACT OF GENERATIVE AI ON HIGHER EDUCATION

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Abstract

A subset of artificial intelligence (AI) methods and algorithms known as "generative AI" is used to create new material or data that mimic and often improve upon pre-existing data patterns. Generative AI transforms processes, increases efficiency, and spurs innovation across various fields. One of these is education, where artificial intelligence is rapidly expanding in many directions. It has a significant impact on higher education and offers new approaches to longstanding problems. This paper provides a thorough examination and study of the effects of generative artificial intelligence on higher education. The numerous implications of integrating AI in education are highlighted in this research. It investigates the potential benefits of using chatbots, analytics, generative AI, and personalized learning. The research report also explores the roles that parents, legislators, and educators play in minimizing risks and maximising the benefits of AI in higher education. The study first considers how generative AI could revolutionize personalized learning. It also discusses social issues; careful consideration must be given to matters related to higher education to ensure the responsible integration of AI technologies. Although generative AI offers unmatched creativity and efficiency, its implementation requires a careful and ethical approach to maximise its advantages in reshaping higher education.

Keywords: Generative AI, Data Privacy, Social Impact

1. Introduction

Generative artificial intelligence (AI) has the potential to revolutionize education. It can support immersive learning environments that encourage creativity, critical thinking, and engagement by producing new content that imitates and improves preexisting patterns. With the help of

technology, it is possible to enhance conventional teaching strategies and satisfy the changing demands of students, who want engaging, innovative educational opportunities.

Technology is advancing worldwide in education, and generative artificial intelligence offers special opportunities for interactive learning. Generative AI creates a link between theory and practice, allowing for a deeper understanding and practical application of complex subjects. The aim of this research is to explore the role of generative AI in higher education, particularly focusing on its impact on teaching methods and student outcomes.

Integrating generative AI into higher education shows potential for addressing global challenges in teaching and learning. By leveraging its strengths in automating content creation, personalized learning, and research advancement, educational institutions can enhance student engagement, understanding, and innovation.

This research paper aims to clarify the function of generative artificial intelligence (AI) in higher education and its potential to transform teaching and learning paradigms. Its goal is to investigate how generative AI can help educators and students meet their evolving needs. It also aims to present a thorough grasp of how Generative AI might drive beneficial changes in higher education by analyzing its potential to promote individualized learning, improve the creation of content, and encourage innovative research.

2. Opportunities Created by Generative AI in Higher Education:

- Personalized Learning Environments: With the help of generative AI, the way that learning environments are customized to meet the needs of specific students could undergo a radical change. Artificial intelligence (AI) algorithms can modify educational content, speed, and evaluation methods to meet the individual needs of every student by examining enormous volumes of data on student learning styles, preferences, and performance.
- Automated Content generation: Generative AI's ability to automate the generation of lesson plans, quizzes, and learning tools is one of its biggest benefits for higher education. AI-powered technologies can produce text, graphics, simulations, and multimedia content of a high calibre, saving instructors the time and effort of having to create course materials from the ground up. This improves content creation efficiency while freeing up teachers to work on more complex pedagogical activities like developing teaching strategies, designing curricula, and providing one-on-one student support.
- Enhanced Research Capabilities: Research procedures in higher education institutions can be advanced in ways never before possible thanks to the potential that generative AI presents. AI systems can speed up research and development in a variety of disciplines by analysing large databases, seeing trends, and coming up with theories that human researchers might miss.
- Administrative Efficiency: Generative AI can improve administrative procedures in higher education institutions, which will increase efficiency and save costs. It can also revolutionize teaching and research. Routine processes like course scheduling, academic advising and admissions can all be automated by AI-powered technologies, freeing up administrative staff time for strategic planning, policy creation, and student engagement projects.
- Accessibility and Inclusivity: By removing obstacles to learning faced by students with a variety of backgrounds, skills, and learning needs, generative AI has the potential to improve accessibility and inclusivity in higher education. Artificial intelligence (AI)-driven technologies, like speech recognition, natural language processing, and adaptive learning platforms, can help students with learning disabilities or language barriers participate in educational activities and access educational content on par with their peers.

With everything considered, generative AI has the power to revolutionise higher education by enabling tailored learning experiences, improving content production processes, enabling sophisticated analytics and insights, encouraging creative research projects, boosting administrative efficiency, and promoting accessibility and inclusivity.

3. Literature Review

An extensive analysis of generative AI's effects on higher education offers a range of viewpoints, research findings, and insights that help us understand the opportunities that come with incorporating AI technologies into teaching methods. Some of them are mentioned below: -

1. Artificial intelligence (AI)-driven technologies, like speech recognition, natural language processing, and adaptive learning platforms, can provide tailored learning pathways for every student and accommodate a variety of learning styles (Adams et al., 2021).
2. According to studies, Indian universities are becoming more interested in implementing generative AI technology to improve research, teaching, and learning (Gupta & Singh, 2020).
3. Studies highlight the potential of Generative AI to personalize learning experiences by adapting content, pacing, and assessment methods to individual student needs and preferences (Johnson et al., 2020).
4. Research suggests that AI-powered adaptive learning systems can improve student engagement, retention, and academic performance by providing tailored support and challenges (Xu et al., 2019).
5. However, concerns have been raised about the potential for algorithmic bias and loss of human connection in personalized learning environments (Williamson, 2019).
6. Research highlights the transformative potential of Generative AI in accelerating research processes, fostering interdisciplinary collaboration, and advancing knowledge discovery in higher education (Bundy et al., 2021).

4. Methodology

This research study reviews pertinent literature on the impact of Generative AI in education. It is based on a qualitative research technique. A variety of scholarly databases, including UNESCO, Digital Library, Google Scholar and previous research papers, were searched during the research. Academic journals, books, and topic reports were among the sources consulted for this study.

4.1 Comparative analysis of Generative AI applications in higher education:

Generative AI Application	Effectiveness	Usability	Scalability
Chatbots	Personalized support	Natural language processing capabilities	Ability to handle increasing user volumes
	Answering queries	Response time	Adaptation to diverse user needs and preferences
	Facilitating engagement	Ease of interaction	
Analytics	Data collection	Usability for educators	Ability to process large volumes of data
	Analysis	Accessibility	Actionable insights
	Visualization	Integration with existing systems	Support for data-driven decision-making

Content Creation Tools	Generating educational materials	Ease of use	Adaptation to diverse curriculum objectives
	Creating assessments	Customization options	Scalability to large user bases
	Simulating learning	Alignment with curriculum objectives	
Personalized Learning Platforms	Tailored learning experiences	Ease of use	Adaptation to diverse learner profiles
	Addressing individual student needs	Integration with existing learning environments	Scalability to large user bases
	Promoting learner autonomy		

This table provides a structured comparison of different Generative AI applications in higher education based on key criteria such as effectiveness, usability, and scalability.

5. Limitations of Generative AI in Higher Education

1. Data Privacy Concerns: The use of massive datasets by generative AI gives rise to worries about the security and privacy of sensitive student data.
2. Quality Control Challenges: It can be difficult to guarantee the dependability and correctness of content produced by generative artificial intelligence (AI), which could result in inaccurate or misleading information in instructional materials.
3. Ethical Considerations: Fairness and equity concerns in educational material and decision-making may be exacerbated by generative AI algorithms, which may reinforce biases seen in training data.
4. Lack of Human Expertise: Reliance on generative AI tools too much could minimize the importance of human teachers and lower the bar for mentoring and critical thinking in higher education.

6. Importance of Stakeholders in Implementing Generative AI in Education for Parents

Parents support their children's education and worry about the consequences of AI technology for equity, privacy, and ethics. Their input and participation can influence policy formulation, AI system design, and decision-making processes that put students' welfare and academic performance first. The following points show the role of parents: -

1. Advocacy: Parents advocate for their children's education, ensuring that the integration of generative AI prioritizes student well-being and academic success.
2. Monitoring: Parents monitor and guide their children's use of AI tools, promoting responsible behaviour and digital literacy to support academic development.

Legislators: Regulations, standards, and financial goals set by policymakers influence how generative AI is adopted and used in higher education. Their choices affect matters such as data privacy, accountability, and accessibility, underscoring the importance of developing policies informed by expertise and engaging with stakeholders in the education sector. The following points show the role of legislators:-

1. Exchange of Knowledge: To solve new issues in the application of AI in education, legislators encourage communication and cooperation between specialists in AI and stakeholders in the field of education. They also share best practices and exchange expertise.
2. Transparency: Legislators support the transparent application of AI in education, making sure that stakeholders can access and comprehend the algorithms and decision-making processes.

Educators: They are crucial in incorporating generative AI tools into lesson plans, modifying curricula to leverage AI-generated content, and offering insights into the pedagogical applications and efficacy of AI tools. The following points show the role of Educators: -

1. Curriculum Development: Educators incorporate generative AI technologies into their lesson plans, using AI-generated content to improve student engagement and curriculum delivery.
2. Evaluation and Remarks: Educators evaluate how well generative AI tools improve student learning results, and they use data-driven insights to improve AI integration and instructional strategies.

7. Conclusion

In conclusion, with its ability to customize learning, automate content development, and enhance research capabilities, generative AI has the potential to transform higher education and create a more innovative and productive learning environment. Despite its possible benefits, the use of generative AI in higher education faces challenges regarding data privacy, quality assurance, ethical concerns, and the need for ongoing professional development and support for educators.

For generative AI to be used responsibly and to produce the greatest benefits, cooperation among researchers, educators, administrators, parents, students, legislators, industry partners, and technology providers is essential. Unlocking the full potential of generative AI in higher education will require continuous study, discussion, and adaptation as technology advances, helping students, instructors, and institutions succeed in the digital age.

8. Future Recommendations

- **Invest in Research**: Provide funds for more studies that will help us better understand the potential advantages and difficulties of generative AI in higher education by examining its effectiveness, effects, and ethical implications.

- **Collaborative Partnerships:** Promote cooperation between academic institutions, business associates, governmental bodies, and research centres to exchange resources, best practices, and knowledge, stimulating creativity and propelling the field of artificial intelligence in education.
- **Student Engagement**: Give students the tools they need to take an active role in the creation and application of AI technologies in the classroom by asking for their opinions, ideas, and comments to help shape the creation of AI-enabled educational materials.
- **Ethical Frameworks**: Provide transparent, accountable, and responsible decision-making in AI-related endeavours by establishing ethical frameworks and standards for the creation, application, and assessment of generative AI systems in education.
- **Accessibility and Inclusivity**: By creating inclusive interfaces, offering alternate formats, and removing obstacles, you can make sure that generative AI tools and resources are available to all students, including those with impairments and a variety of learning needs.
- **Continuous Evaluation:** It is recommended to establish systems for the ongoing assessment and observation of generative AI applications in the field of education. This will involve gathering input from relevant parties, examining usage and result data, and refining approaches to maximize their influence and potency.
- **Long-Term Impact Assessment:** To determine the long-term impacts of generative AI integration on student learning results, retention rates, and workforce preparedness, conduct impact evaluations and longitudinal research.

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CHAPTER 5

IMPACT OF CLIMATE CHANGE ON SAMBHAR LAKE

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Abstract

The impacts of climate change disrupt the natural balance of the environment. The emissions of greenhouse gases cause global warming and increase the Earth's average temperature. These changes affect rainfall patterns, lead to droughts, and harm water bodies. Sambhar Lake is the largest saline inland lake in Rajasthan. It is a wetland area and a designated Ramsar site. Due to climate change and human activities, Sambhar Lake faces threats such as receding water levels and loss of biodiversity.
Keywords: climate change, wetland, Landsat Satellite program.

1. Introduction

The effects of climate change are visible worldwide. Water and climate change are closely connected. Climate change influences the Earth's water in complex ways. It causes unpredictable rainfall, shrinking ice sheets, rising sea levels, floods, and droughts, among other impacts (UN WWDR 2020). Only 0.5% of Earth's water is accessible freshwater, and climate change threatens this supply. Over the past 20 years, terrestrial water storage—including soil moisture, snow, and ice—has decreased by about 1 cm annually, posing serious risks to water security (WMO, 2021).

The unprecedented rate of urbanisation, coupled with climate change, has made the water crisis even more dire. According to recent studies, anthropogenic activities have expedited climate change and have caused the shrinkage of more than 50% of the world's largest lakes and reservoirs. The researchers found that of 1052 natural lakes examined, 457 had significant water loss over the past 3 decades (Chauhan Alind, 2023).

Water bodies such as the Aral Sea (Central Asia), Dead Sea (Middle East), Lake Mar Chiquita (Argentina), Lake Kara Bogaz (Turkmenistan), Lake Kyrargas (Mongolia), etc., have suffered significant shrinkage due to human activities and climate change.

India, the most populous nation in the world, thriving on just 2.7% of the world's land, is a developing nation with 35.87% of its population urban. (Aaron O' Neil 2024). The unpleasant effects of urbanisation, such as encroachment upon small lakes, built-up areas in the catchment area, and groundwater pumping, have led to severe water depletion.

Shrinking and drying of lakes have been reported from many parts of India, such as Tso Moriri Lake, Pulicat Lake, Kolleru Lake, Ana Sagar Lake, and others. The reduction of water bodies in desert regions creates serious issues like water scarcity, loss of livelihoods, and urban flooding.

Sambhar Lake is an inland saline lake located west of Jaipur. Sambhar Lake, a well-known wetland ecosystem, is under threat due to human activities and climate change. The following research paper examines the degradation of Sambhar Lake using secondary data and satellite imagery. Further endeavour has been made to evaluate the measures taken up by communities and the government to conserve the wetland.

2. Objective

- To analyze the impact of climate change on Sambhar Lake.
- To study the changes and shrinkage of Sambhar Lake.

3. Methodology

The study is based on the analysis of authentic secondary data sources collected from various government websites, census handbooks, research journals, and newspapers. Satellite images have been taken from Google Earth Pro, which is based on the Landsat Satellite program. Satellite images of Sambhar Lake are used to provide a temporal assessment of the study region.

4. Study Region

Sambhar Lake is the largest inland saline water lake in India. The elliptically shaped lake is spread across three districts of Rajasthan: Jaipur, Nagaur, and Ajmer. The latitude and longitude of the lake are 26 degrees 58 minutes north and 75 degrees 5 minutes east, respectively, covering an area of approximately 230 square kilometres. The lake lies east of the Aravali Hills and is surrounded by Jaipur district to its south, southeast, and east; Nagaur district to its north and northwest; and Ajmer district to its southwest.

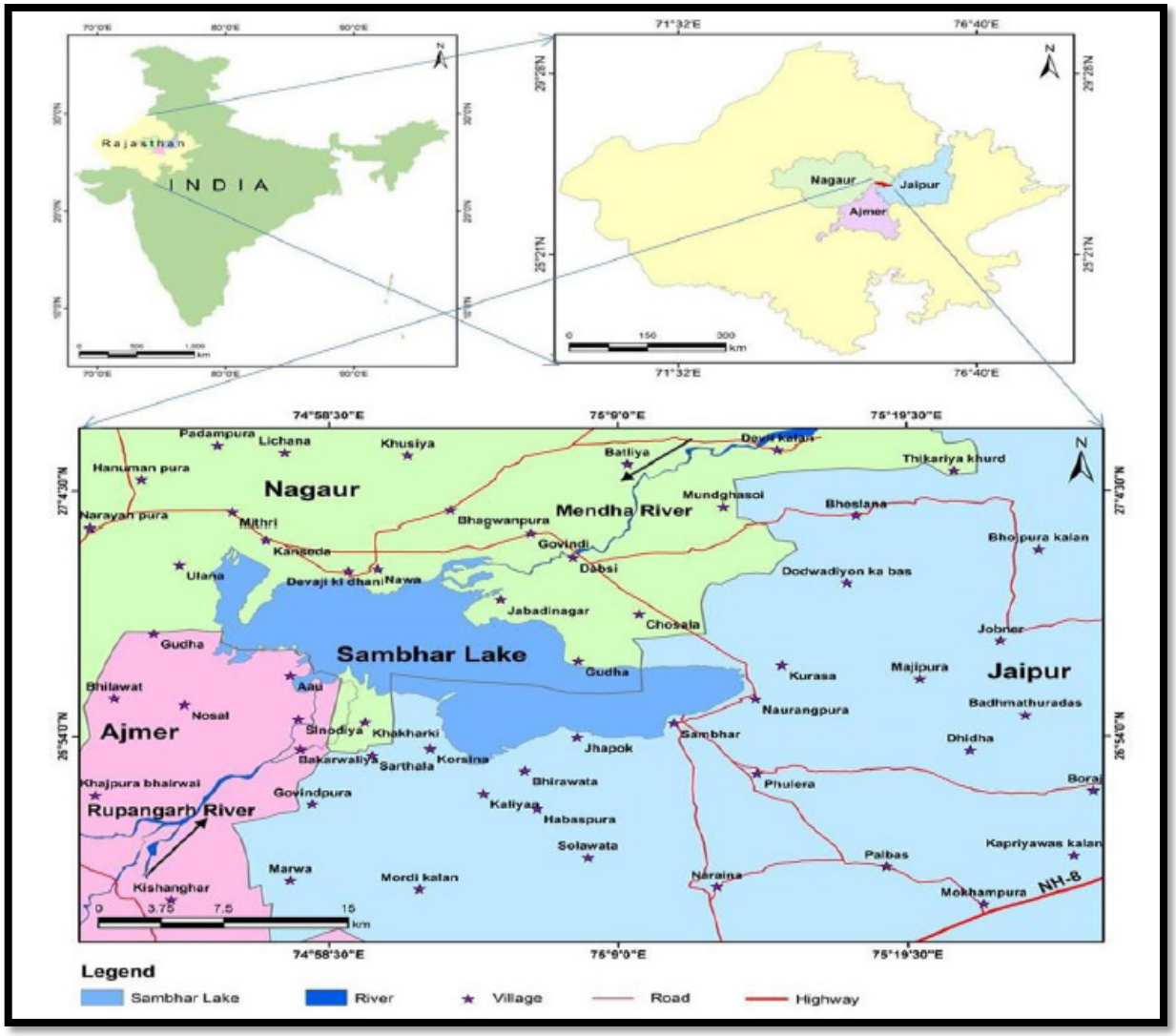


Figure 1: Location Map of Sambhar Lake

Source: Interim Compliance Report for News "Sambhar's Ecology among Worst" Department of Environment, Government of Rajasthan.

Owing to its biotic and biological importance, Sambhar Lake became a designated Ramsar site, {Ramsar site number- 464}, a wetland of international importance in the year 1990. It is a home to migratory birds during winter. Thousands of flamingos, pelicans, etc., come flying from North Asia and take shelter in the lands and waters of the Sambar region. The lake, along with Phulera and Didwana Salt Lake, forms a vast saline wetland that constitutes the most important area for flamingos outside the Rann of Kutch. This has made Sambhar Wetland a popular destination for bird lovers and tourists (Goswami Rakesh, 2019).

Great White Pelican

Purple Heron

Black Stork

Greater Flamingo

Figure 2: Migratory Birds of Sambhar Region

Source: Draft Management Plan for Sambhar Lake by PDCOR Ltd.

4.1 Physiography of Sambhar Lake

The Sambhar Lake is situated in the eastern part of the Thar Desert, southeast of the Aravali Mountain range. The region's rock formations date back to the early and middle Proterozoic Age. The lake features a gentle, rolling slope of less than 10 cm per kilometre and an almost flat bed. Its maximum length is 22.5 km, with a width varying widely from 3.2 to 11.2 km. The water is shallow, with depths ranging from a few centimetres to about 3 meters at maximum. The Sambhar Lake basin is divided into two equal parts by a 5.16 km-long stone dam between the settlements of Jhapok in the south and Guddha in the north. The eastern part of the lake includes two large reservoirs and is used exclusively for salt extraction. Conversely, the western part remains an undisturbed, continuous natural lake area spanning over 155.4 square kilometres. The soil types present in the region include clay, clay loam, OM, and sandy soil.

4.2 Climate

The region experiences a Monsoon type of climate. Located in a desert region, it lies in a transitional zone of arid and semi-arid climatic conditions. The average annual temperature of the area is 23^0 C, and the maximum summer temperature is recorded in May and June, whereas the minimum temperature is recorded in December. The average annual rainfall received is 18 inches per year, and the maximum and minimum rainfall are received in July and December, respectively.

Table 1: Average Monthly Temperature and Rainfall Data of Sambhar Region

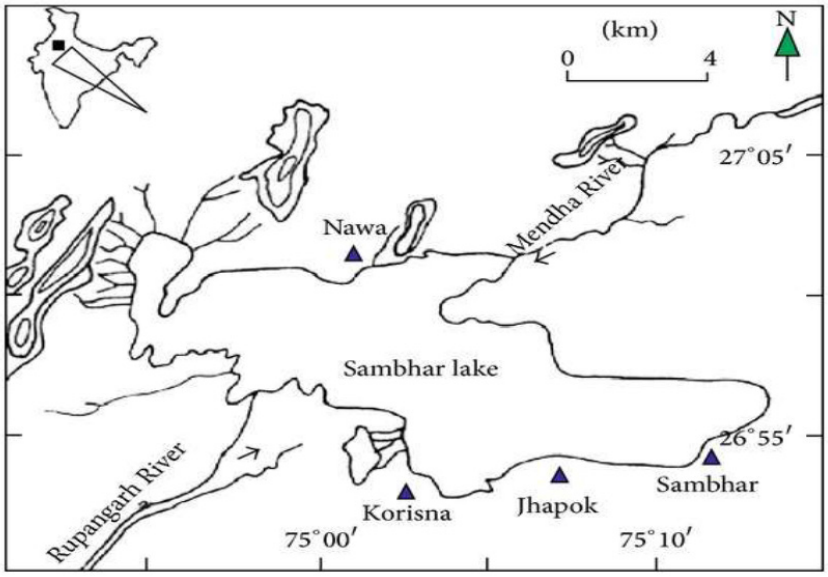
	Jan.	Feb.	Mar.	April	May	June	July	Aug	Sept.	Oct	Nov.	Dec.
Avg Temp.°C	14.3	17.9	23.8	29.8	33.5	33.1	29.4	27.6	28.1	26.3	21	15
Min Temp. °C	7.3	10.5	15.8	21.4	26.4	27.9	26	24.6	23.6	19.5	14.1	9
Max Temp.°C	21.6	25.4	31.4	37.3	40.2	38.4	33.4	31.4	33 °C	33.3	28.2	23.3
Rainfall (mm)	7	9	5	5	10	44	166	139	54	9	6	3
Humidity (%)	53%	43%	30%	21%	25%	41%	65%	74%	59%	39%	43%	51%
Rainy days (d)	1	1	1	1	2	5	12	12	6	1	1	1
Avg Sun hours (hours)	9.1	9.9	10.7	11.5	12.1	11.9	9.3	8.1	9.7	10.2	9.6	9.2

Source: Climate Data.org

4.3 Drainage

The sambar basin has a total catchment area of 7560 square kilometres. It features a centripetal drainage pattern. The lake receives water from four seasonal rivers: Mendha, Rupangarh, Kharain, and Khandel. The Mendha River is the largest feeder, originating from the Sikar district.

Figure 3: Map showing Centripetal Drainage Pattern and Main Feeder Rivers of Sambhar Lake



Source: Study of Water Parameters of Sambhar Lake Conducted by Garima Kumari and Dr. Rashmi Sharma

4.4 Rich Biodiversity

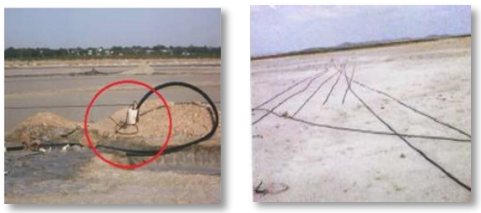
The wetland ecosystem of Sambhar Lake supports a rich biodiversity. The biodiversity of the Sambhar region includes a variety of phytoplankton, zooplankton, invertebrates, and avifauna. The lake provides an ideal habitat for water birds. Every winter, the lake is home to thousands of migratory birds. Common migratory birds supported by the wetland are greater flamingos, black storks, herons, white-throated kingfishers, etc.

5. Degradation of Sambhar Lake

Analysis of the study region shows degradation in the lake region and its vicinity. Anthropogenic activities and climate change are the primary causatum of this degradation. Both factors pose numerous threats to the Sambhar Lake region.

- In the region there is scanty rainfall, and to cater to industrial and domestic usage, large-scale withdrawal of groundwater is pumped out. This has lowered the groundwater table and led to the drying of Shallow Wells.
- The hydrological patterns of the region are disturbed with inadequate recharge of groundwater. Constructions in the lake catchment area and stream diversions for irrigation have reduced water inflow into Sambhar Lake.
- Declining water levels and changes in local weather conditions have altered the physicochemical and biological makeup of the habitat. This has resulted in the loss of biodiversity in the wetland.
- Construction of human settlements in the surrounding regions of the lake has caused problems of sewage, solid waste disposal, etc. The transportation lines running through the lake divide it into two unequal parts. Such an unsustainable human activity has severely affected the movement and habitat of migratory birds. Also, these human interventions result in increased levels of air, water and noise pollution.
- Illegal water extraction and encroachment in the lake area involve salt production without the required permits. Pipelines have been illegally dug to draw water from the lake for salt manufacturing. Unauthorised borewells, pumps, motors, pipelines, and electric cables have been installed to extract water, leading to the depletion and degradation of the reservoir.

Figure 4: Illegal Borewells and Electric Cables around Sambhar Region



Source: Interim Compliance Report for News "Sambhar's Ecology among Worst" Department of Environment, Government of Rajasthan

All such observations can also be processed from satellite images. A comparative analysis of the temporal evolution of Sambhar Lake is conducted using satellite images obtained from Google Earth Pro, which uses the Landsat satellite program. For research purposes, three satellite images have been taken for the years 1984, 2012, and 2020.

The satellite image from 1984 is used as the baseline for assessing subsequent changes in the lake region. The dry beds of the lake are clearly visible in the 1984 satellite image. Water is only present in the eastern part of the lake.

Satellite images from 2012 reveal the development of dense human settlements, especially in the western part of the lake. Additionally, the transportation network passing through the lake, which divides it into two unequal parts, has led to increased pollution levels. Issues such as illegal encroachment, illegal salt production, rising water salinity, and the subsequent loss of biodiversity can be inferred from this.

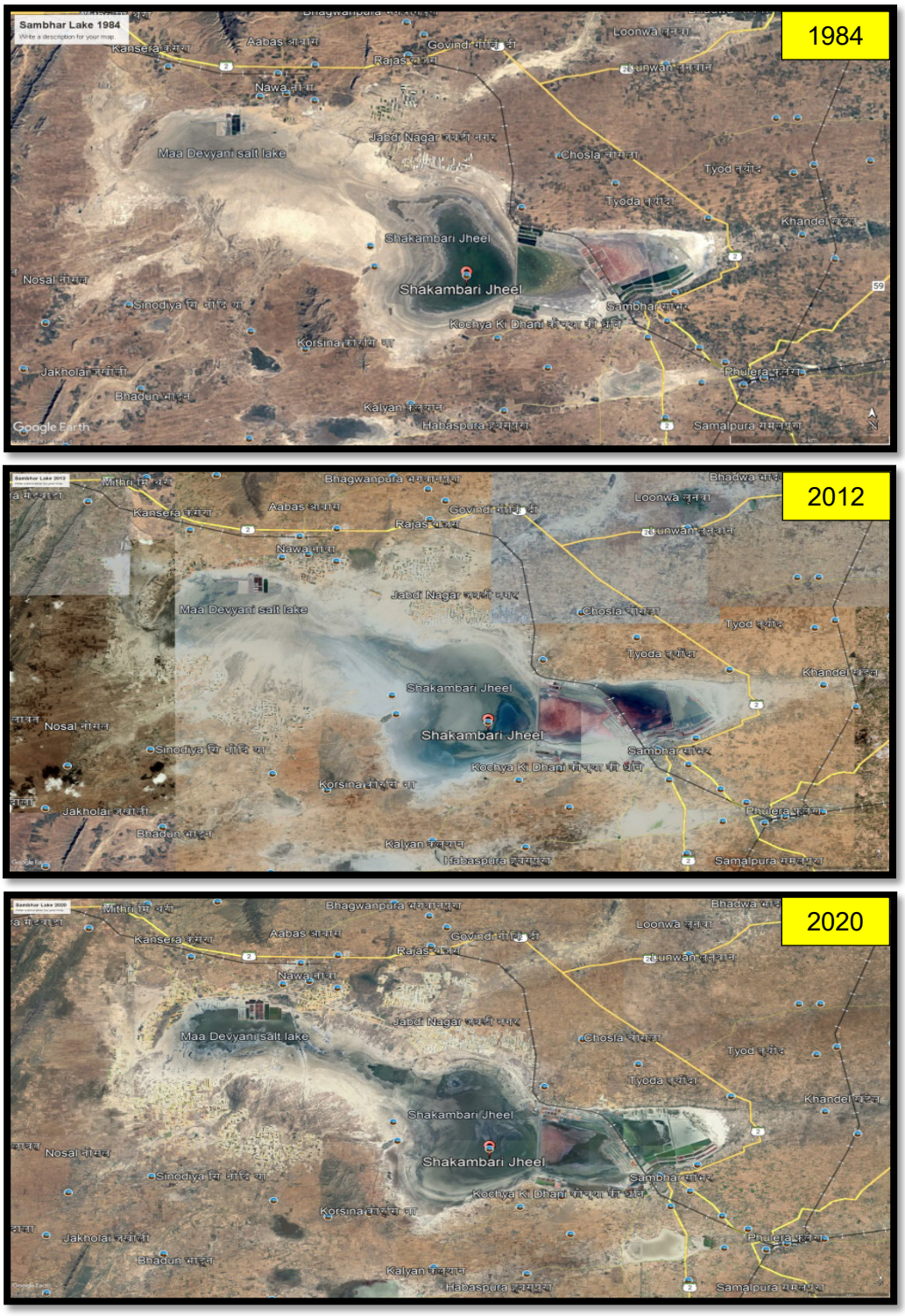
Consequently, the 2019 epidemic revealed the critical state of the shrinking wetland. During the Avian Botulism incident at Sambhar Lake in 2019, thousands of migratory birds were found dead around the lake due to Avian Botulism, a severe neuromuscular disease in birds caused by the bacterium Clostridium botulinum. The report by the National Green Tribunal indicated that the incident resulted from illegal water extraction for salt production and excessive agricultural activities in the catchment area, which have reduced the water body's size from 74.63% to 35.1% (Draft Management Plan for Sambhar Lake, 2023). The 2020 satellite image shows increased turbidity and exposed dry lake beds.

6. Conservation Strategies

As a Ramsar site, a unique habitat and wetland of international repute, special measures ought to be taken to prevent further degradation of the lake and restore its ecology. The following conservation strategies could be adopted for the same.

- Sustainable salt extraction limit to be defined.
- Implementation of a brine recycling system for reusing brine for salt production.
- Develop buffer zones and setbacks around the lake to protect ecologically sensitive areas.
- Removal of encroachment from the feeding rivers.
- Desilting of the river catchment area to restore its natural capacity.
- Implementation of community awareness programs.
- Collaboration with local communities, environmental organizations, and law enforcement agencies to safeguard and restore the region.

Figure 5: Temporal Comparative Analysis of Sambhar Lake through Satellite Images



Source: Done by Author by Google Earth Pro

7. Conclusion

Climate change, increased population pressure on land and water, illegal industrial activities, encroachments and alarming pollution levels are the potential threats that have degraded the eco-sensitive region of Sambhar wetland. Such impacts not only destroy a unique habitat but also cause a loss of rich biodiversity. Strict enforcement of laws, heavy penalties, community awareness and participation, effective management and a dedicated restoration plan can check the degradation of Sambhar Lake and restore its glory.

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CHAPTER 6

INDIA'S $5 TRILLION ECONOMY AND THE ROLE OF TRADE OPENNESS: A POLICY-LITERATURE SYNTHESIS

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Abstract

India has set an ambitious goal to become a $5 trillion economy, a milestone that requires robust and inclusive economic growth. Among various growth drivers, trade openness has become a key factor in attracting foreign direct investment (FDI), boosting export competitiveness, and integrating India into global value chains. This paper examines how trade openness can support India in achieving this economic target. The study analyses the relationship between trade openness, GDP growth, and sectoral performance through key policy developments, economic data, and academic literature. While the results confirm that trade openness plays a significant role in economic growth via productivity improvements, FDI inflows, and export growth, they also highlight that it is not a cure-all. Issues like infrastructural limitations, trade deficits, and protectionist tendencies limit the full potential of trade-led growth. Therefore, trade openness, while essential, alone cannot drive India to the $5 trillion mark. Complementary reforms in logistics, finance, labour markets, and governance are vital.

Keywords: Trade Openness, FDI (Foreign Direct Investment), Export Competitiveness, Economic Growth, $5 Trillion Economy Goal

1. Introduction

India's economic trajectory underwent a profound transformation following the liberalization policies of 1991. These reforms marked a paradigm shift from a protectionist regime to a more open, market-oriented economy. Since then, trade has emerged as a cornerstone of economic policy, influencing decisions at both domestic and international levels. India's accession to the World Trade Organisation (WTO), negotiation of Free Trade Agreements (FTAs), and emphasis on bilateral ties underscore this strategic shift.

The extent of integration with the global economy and involvement in international business are important measures of trade openness. It is calculated by comparing a country's total trade, including imports and exports, to its GDP. Trade openness has various advantages, including increased economies of scale, access to a broader choice of products and services, faster economic growth, and technological transfer. However, it also poses disadvantages such as the loss of domestic industry, reliance on foreign markets, and vulnerability to global economic cycles. It envisions a future in which India achieves great socio-economic progress and rises to prominence in a variety of international arenas.

In recent years, the government's vision of achieving a $5 trillion economy has gained prominence as a part of India's mission of Viksit Bharat. It is framed as a form of economic nationalism, this goal encapsulates aspirations for global competitiveness, innovation, and sustainable development. Trade policy is central to this vision, enabling access to markets, attracting FDI, and fostering sectoral transformation.

Viksit Bharat prioritizes exploiting India's rich cultural legacy, encouraging innovation and entrepreneurship, and profiting from the country's demographic dividend. It stands on key pillars such as global competitiveness, inclusive growth, sustainable development, and technical innovation. It seeks to maximize the country's potential for growth and development while tackling current concerns such as poverty, inequality, and inadequate infrastructure through targeted policies and investments.

The vision of Viksit Bharat includes improving industrial capacities, increasing agricultural production, and developing a knowledge-based economy. This transition is anticipated through the creation of smart cities, renewable energy initiatives, and robust digital infrastructure. These programs seek to improve citizens' quality of life while reducing environmental damage and ensuring long-term economic prosperity.

Furthermore, Viksit Bharat aims to position India as a dynamic and resilient economy on the global stage, significantly improving the well-being of its people while also encouraging cooperation and collaboration with the international community by emphasizing long-term sustainability and inclusivity. This includes active involvement in global trade agreements, strategic alliances with other countries, and contributions to global forums on trade and development.

However, the core research question remains: "To what extent can trade openness drive India's $5 trillion dream?" This study seeks to explore this question by synthesizing empirical studies, policy frameworks, and macroeconomic data. As George (2023) aptly noted, "Trade liberalization has become the fulcrum of economic policy in India since 1991." The research aims to provide a nuanced understanding of trade openness as both a facilitator and a limitation in India's growth narrative.

2. Literature Review

Trade openness is generally defined by indicators such as tariff reduction, increased trade-to-GDP ratio, and liberalization of capital flows. In the Indian context, it also includes policy shifts aimed at encouraging FDI and export-oriented growth. Sarania (2021) utilized an Autoregressive Distributed Lag (ARDL) model and concluded that trade openness is a statistically significant predictor of GDP growth in India. The study highlighted how tariff liberalization and improved trade logistics contributed to sectoral efficiency. Gupta et al. (2022) echoed similar findings, emphasizing the role of trade in enhancing total factor productivity.

Historically, India's trade-to-GDP ratio increased from around 15% in 1991 to over 40% by 2015, reflecting deeper integration with the global economy. The Information Technology (IT) sector has particularly benefited, becoming a major export earner. According to Kumar et al. (2025), manufacturing and pharmaceuticals have also seen a rise in foreign investment due to relaxed trade policies and the Make in India initiative.

However, the causality between FDI and growth remains debated. Some studies suggest a positive bidirectional relationship, while others argue that without complementary factors such as skilled labor and infrastructure, FDI alone cannot stimulate sustainable growth. The literature also reflects the uneven impact across sectors, with traditional industries such as textiles struggling to keep pace due to outdated technology and competition from low-cost economies.

Moreover, liberalization has not automatically translated into equitable growth. Disparities between regions and sectors indicate that while trade openness contributes to overall GDP growth, its benefits are not uniformly distributed. This underscores the need for policy mechanisms to ensure inclusive growth.

3. Theoretical Framework and Methodology

The theoretical underpinning of this study rests on both neoclassical and endogenous growth models. The Solow Growth Model, when augmented for trade, suggests that openness facilitates capital accumulation and technological transfer, leading to higher steady-state output. In contrast, endogenous growth theories, particularly those advocated by Romer, posit that trade contributes to long-term growth by enhancing knowledge spillovers and innovation.

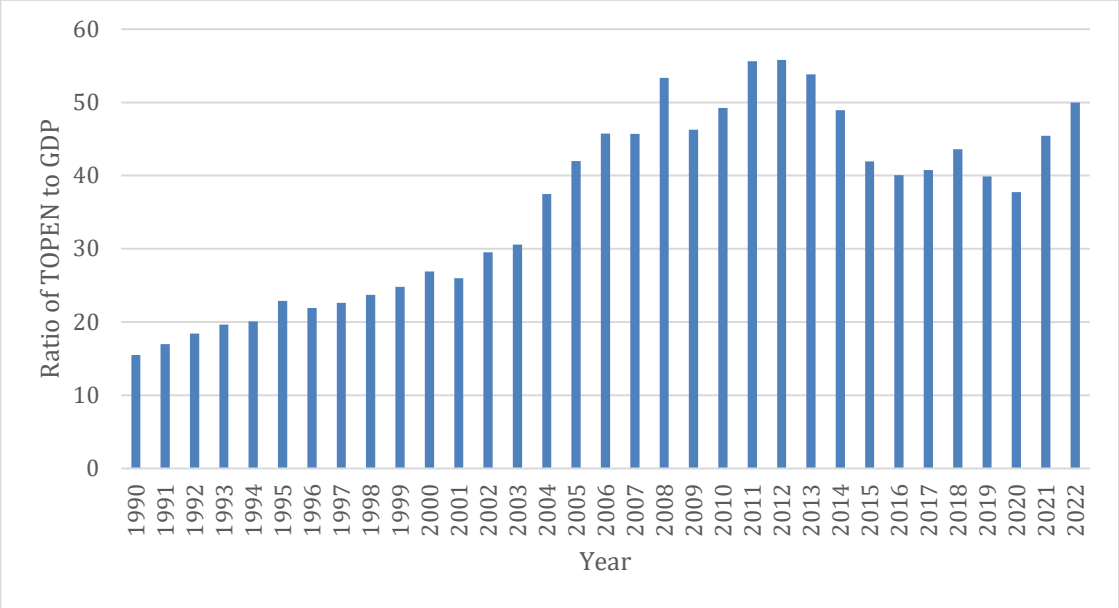
Methodologically, this paper follows a comparative approach, synthesizing findings from empirical studies and official policy documents. Quantitative data trends—such as trade/GDP ratios, FDI inflows, and export composition—are drawn from World Bank databases and analyzed alongside qualitative insights from academic sources. Models like ARDL and Johansen cointegration, as used by Sarania (2021), serve as a reference to interpret causal relationships between trade openness and economic indicators.

The study does not conduct original econometric modelling but relies on a meta-analysis of existing research and policy evaluations to construct a coherent narrative. This approach allows for a multidimensional understanding of the trade-growth relationship within the Indian context.

4. Trade Openness and India's Economic Journey

Since the early 1990s, India's trade/GDP ratio has shown a steady upward trend, peaking around 50% in 2012 before slightly declining in subsequent years due to global economic slowdowns. Recent data from the World Bank (2023) indicate a moderate recovery, with a current ratio hovering near 40%.

Figure 1: Trend of Trade to GDP in India from 1960 to 2022



Source: Constructed by authors

Figure 1 shows a sharp increase in the value of TOPEN (exports and imports) as a ratio to India's GDP since the introduction of economic reforms in 1990. This growth is attributed to sectors like petroleum products, telecom instruments, and aluminium products (Ministry of Commerce and Industry, 2023).

Sectorally, IT services continue to dominate India's export basket, contributing nearly 45% of total service exports. Manufacturing exports, led by automobiles, machinery, and pharmaceuticals, have also grown, albeit at a slower pace. Joshi et al. (2024) observe that bilateral agreements with ASEAN, the EU, and the UAE have played a critical role in expanding market access.

India's integration into Global Value Chains (GVCs) has improved, though challenges remain. Chandan and Rithesh (2024) argue that while India has made strides in electronics assembly and

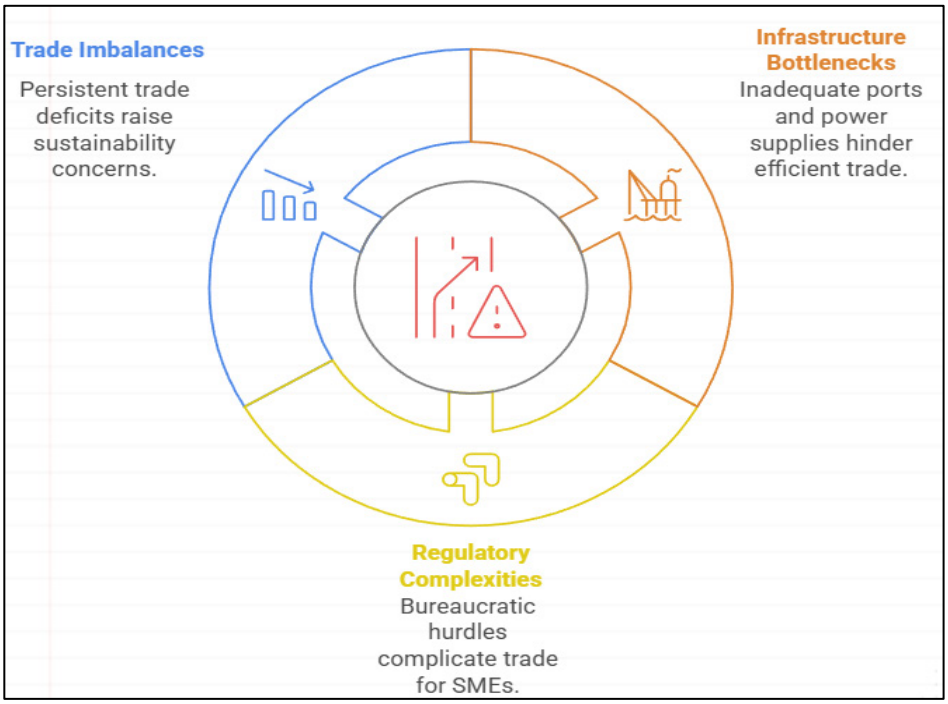
pharmaceutical APIs, it lags behind East Asian economies in upstream value creation. Policies like the PLI scheme aim to rectify this by incentivizing domestic production and export competitiveness.

Bilateral and regional trade agreements have yielded mixed outcomes. While India-ASEAN trade has grown significantly, concerns persist about asymmetrical benefits and inadequate utilization of tariff concessions. The government's cautious stance—evident in its exit from the RCEP—reflects apprehensions about the protection of domestic industry.

5. Challenges to Trade-Driven Growth

Despite notable progress, several impediments hinder the realization of trade-led growth. Infrastructure remains a critical bottleneck, with logistical costs in India among the highest globally. Regulatory inefficiencies and red tape further complicate trade facilitation.

Figure 2: Challenges faced by India for increasing Trade Openness



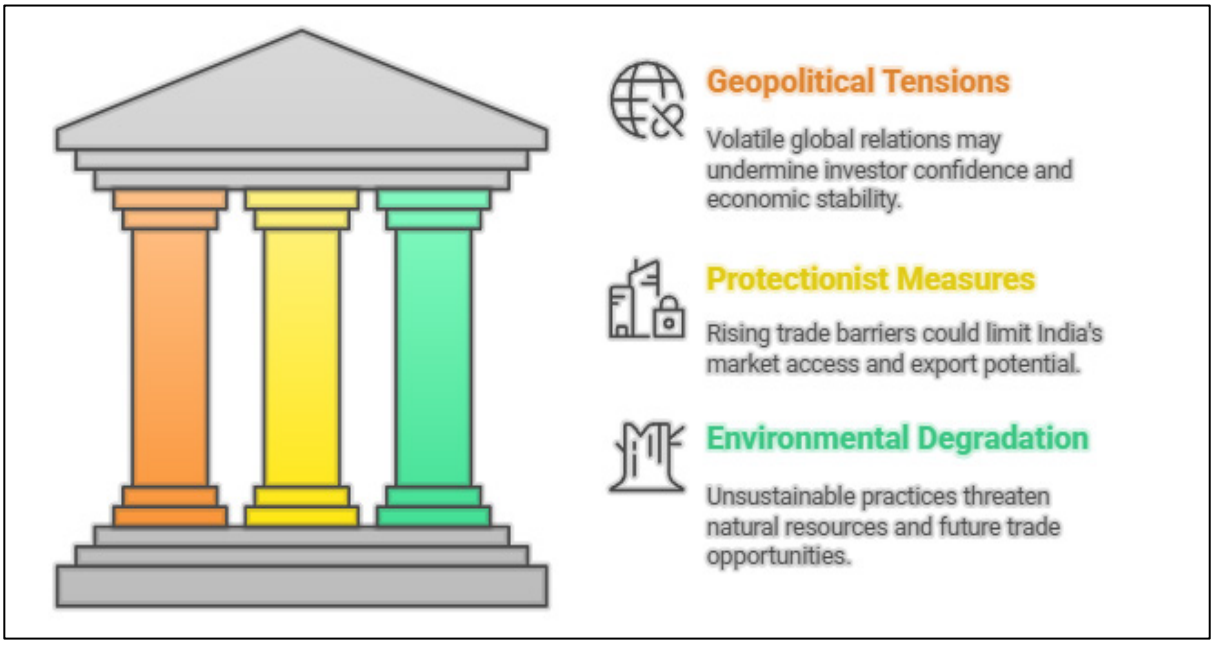
Source: Constructed by authors

Gupta et al. (2022) highlight that India's regulatory environment often lacks coherence, with overlapping jurisdictions and inconsistent policies. Additionally, the persistent trade deficit with China underscores structural imbalances in the trade architecture. India imports high-value electronic goods and exports low-value raw materials, leading to an adverse trade composition.

Protectionist tendencies, while politically expedient, undermine trade openness. The Make in India campaign, for instance, promotes domestic manufacturing but occasionally conflicts with liberal trade policies. Kumar (2025) notes that India's withdrawal from RCEP signalled a retreat from multilateralism, raising concerns among trade partners.

Moreover, India's export profile remains narrowly focused. As Kumar (2025) warns, "Despite trade growth, India's exports are narrowly focused—raising vulnerability to external shocks." This limits the resilience of trade-driven growth in times of global demand contraction.

Figure 3: Disadvantages of Trade openness for Indian economy



Source: Constructed by authors

6. Policy Measures and Case Studies

To address these challenges, the Indian government has implemented several policy measures. Free Trade Agreements (FTAs) with Japan, South Korea, and the UAE have helped diversify trade partnerships. However, Shanlax (2024) notes that utilization rates of FTAs remain low due to a lack of awareness and complex compliance procedures.

Production Linked Incentive (PLI) schemes are a cornerstone of recent trade policy. These schemes aim to boost manufacturing in critical sectors like electronics, auto components, and pharmaceuticals. The auto industry, for instance, has seen increased FDI and export orders post-PLI implementation.

Digital India and improvements in logistics infrastructure—such as the Dedicated Freight Corridors and Sagarmala Project—are gradually enhancing trade efficiency. Chouhan (2024)

argues that such initiatives are vital for reducing transaction costs and improving supply chain integration.

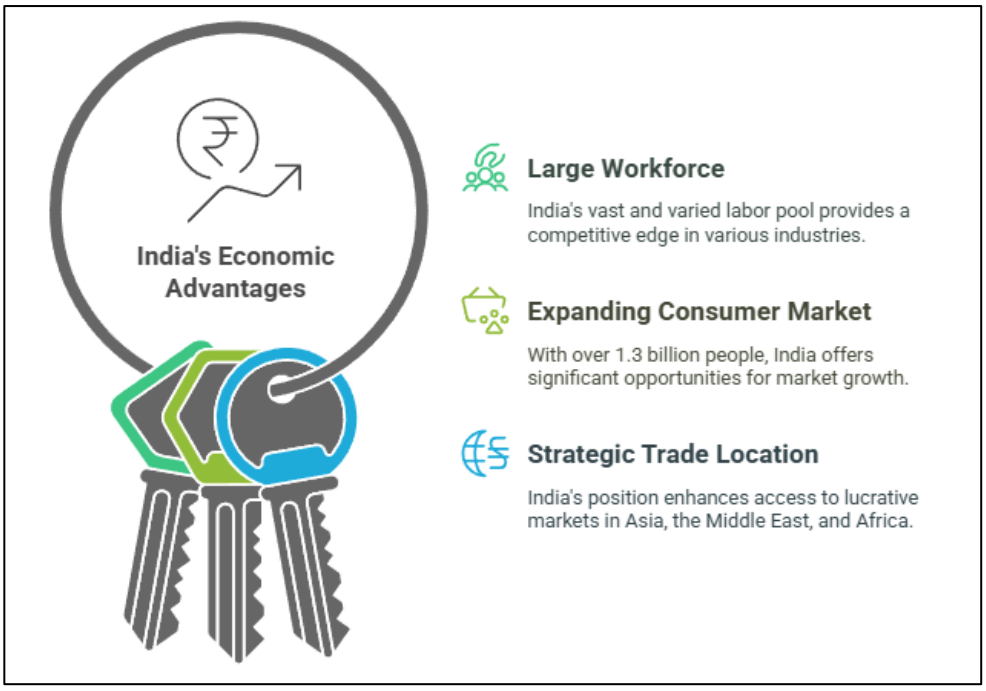
The pharmaceutical sector offers a compelling case study. Leveraging India's strengths in generic drug manufacturing, the sector has expanded exports to Africa, Latin America, and the EU. Policy support in the form of faster approvals and financial incentives has played a critical role.

7. Discussion: Is $5 Trillion Feasible Through Openness?

Trade openness is undoubtedly a key enabler of economic growth, but it cannot be the sole driver of India's $5 trillion goal. In the short term, global headwinds, geopolitical uncertainties, and structural inefficiencies limit the efficacy of trade liberalization.

In the long term, sustained trade growth requires political will, economic reforms, and institutional capacity. Trade must be complemented by inclusive financial systems, robust infrastructure, and dynamic labor markets. While trade can open doors, walking through them demands cohesive policy action.

Figure 4: Leveraging India's Economic Strengths for Increasing Benefits of Trade Openness



Source: Constructed by authors

Figure 5: Opportunities available for India to increase Trade Openness

Source: Constructed by authors

Hence, the vision of a $5 trillion economy must be pursued through a balanced strategy—leveraging trade, but also investing in human capital, digital infrastructure, and governance reforms.

8. Conclusion and Recommendations

Trade openness has significantly contributed to India's economic advancement by improving efficiency, fostering innovation, and attracting FDI. However, realizing the $5 trillion economy goal requires a broader development strategy.

Complementary reforms in logistics, labor laws, financial systems, and institutional governance are essential. Policymakers must adopt a calibrated approach that combines openness with

strategic protectionism. Future trade policies should focus on high-value sectors, simplify FTA utilization, and invest in trade-enabling infrastructure. Only then can trade openness transition from a necessary condition to a sufficient driver of India's economic transformation.

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CHAPTER 7

GIG ECONOMY DYNAMICS IN VIKSIT BHARAT: OPPORTUNITIES AND CHALLENGES AHEAD

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Abstract

The gig economy, primarily characterised by project-based labour or short-term contracts through businesses, third parties, or internet platforms, has transformed the modern workplace. It has a significant impact on various businesses and alters how people work. The gig economy's key advantages- unparalleled flexibility and independence- continue to draw more workers worldwide, especially in India, where its adoption is rapidly increasing.

With a large population of workers seeking flexible jobs, numerous gig economy opportunities are emerging in India. The evolving economic landscape and shifts in employment paradigms have prompted more individuals to join the gig economy as a significant source of income. This change is driven by factors such as the need for additional earnings, the rise of digital platforms, and a desire for independence. It is important for the gig economy because it provides economic opportunities for many different people—ranging from alternative work arrangements to showcasing unique abilities. Additionally, the gig economy fosters innovation and entrepreneurship by enabling people to generate income through their skills and knowledge outside traditional employment structures.

However, advantages are accompanied by disadvantages concerning the wage earner's rights and job security. Gig workers may be especially vulnerable due to the absence of common employment benefits, such as healthcare, retirement plans, and stable employment. Additionally, the gig economy can lead to increased competition and reduced wages in certain sectors. This study examines various trends in the gig economy and highlights its advantages and challenges in India. By understanding the implications of the gig economy, policymakers, businesses, and employees can better navigate its complexities and maximise its benefits for sustained economic growth.

Keywords: Gig Economy, Opportunities, Challenges, Implications

1. Introduction

Viksit Bharat envisioned a prosperous and developed India that needs an agile and dynamic workforce. The gig economy has emerged as a significant force to achieve this vision. A gig economy characterizes a labour market in which short-term contracts or freelance work are more prevalent than permanent jobs. This economic model is mainly driven by digital platforms that connect workers with temporary positions or specific jobs, thus providing a flexible, autonomous work environment. This new model has revolutionized the way people used to do things in a traditional employment context and empowered workers to perform multiple jobs at one time, and provided businesses with an affordable way to access a diversified talent pool. Some examples of India's gig economy include ride-hailing (Ola, Uber), food delivery (Swiggy, Zomato), and skilled freelance work (Upwork, Fiverr).

Some Major Features of India's Gig Economy:

- Rapid Growth: This is one of the world's fastest-growing gig economies, driven by factors outlined in this overview. As per a report from NITI Aayog, it puts the number of gig workers at 23.5 million by 2030.
- Young workforce: The young and tech-savvy population drives and benefits India's gig economy.
- Diverse sectors: It encompasses blue-collar jobs, such as delivery and driving; white-collar jobs, such as consulting, IT, or design, as well as services that fall in between.

The key drivers of India's gig economy are: Technology advancements, economic liberalization, urbanization, and changing work preferences of younger generations.

1.1 Importance of Understanding Gig Economy Dynamics in Viksit Bharat

At a time when India is envisioning Viksit Bharat, or Developed India, understanding the dynamics of the gig economy is essential. The gig economy has the potential to change employment patterns, which could help promote economic growth and support more youth and women in pursuing their livelihoods. That said, this new economy has unique problems that must be addressed so that its developmental implications are realised in an inclusive and sustainable manner.

1.2 Research Objectives

This paper aims to critically examine the gig economy in India, with respect to its evolution, opportunities, challenges, and prospects, against the backdrop of Viksit Bharat.

1.3 Scope of Research

The scope of this study will include a sector-wise analysis, comparison with urban and rural areas, implications for different stakeholders, including policymakers and businesses, as well as

the gig workers. The study aims to provide actionable insights about how it can stimulate an environment-friendly gig economy in India.

2. Overview of the Gig Economy in India

2.1 Growth Trajectory of India's Gig Economy: The Indian gig economy has appreciated by leaps in the last ten years. It has seen a significant rise with technological advantages and changes in work preferences. ASSOCHAM reported that the gig economy in India is expected to grow to a compounded annual growth rate of 17%, with a size of $455 billion by 2024. A study by PayPal has announced that one in four freelancers comes from India, and 41 percent of Indian freelancers have seen growth in the past year.

2.2 Sector-wise Analysis: The main sectors that comprise the gig economy of India include:
(1) Transportation and Logistics: Ride-hailing companies, like Uber and Ola, and delivery service providers such as Dunzo and Swiggy, are at the top of this list and have made such drivers and delivery workers engage in flexible employment.
(2) Food Delivery and E-commerce: Food delivery platforms (Zomato, Swiggy) and E-commerce (Amazon, Flipkart), provide numerous gig jobs ranging from delivery agents to customer service representatives.
(3) Information Technology and Creative Services: Freelance platforms (Upwork, Freelancer) enable professionals to offer IT services, graphic design, writing, and other creative skills.
(4) Healthcare and Education: Online tutoring (Byju’s, Vedantu) and telemedicine services (Practo, 1mg) have expanded gig opportunities for educators and healthcare professionals.

2.3 Comparison of Gig Economy Dynamics in Urban and Rural Areas: The gig economy's impact varies significantly between urban and rural areas. Urban regions, with better digital infrastructure and higher demand for services, have seen rapid adoption of gig work. Conversely, rural areas face challenges such as limited digital accessibility and lower service demand.

2.4 Current Trends Witnessed by the Gig Economy in India
(1) Retired population is engaging in Gigs: After retirement, many people are getting engaged themselves in contractual jobs, as it provides them flexibility.
(2) Technology takes over hiring: Artificial Intelligence helps recruiters to study the working patterns and capabilities of freelancers and match them with specific project needs. With extensive data and analytics, companies will be able to choose the right kind of worker for their projects.
(3) Established companies to hire more contractual employees: A survey by Flexing IT, an online marketplace for consultants, shows that in 2016, 50% of the demand came from start-ups, while 20% of the demand came from larger corporations. To reduce costs, established firms also look for contractual workers.

3. Opportunities in Viksit Bharat's Gig Economy

3.1 Empowerment of Youth and Women through Gig Work by providing flexible work options: For the youth, gig work serves as a platform to gain practical experience, develop skills, and earn an income. For women, especially those in rural areas or with caregiving responsibilities, gig work offers the flexibility to balance work and personal commitments. According to a NITI Aayog report, the gig economy could potentially employ over 90 million people and add 1.25% to India's GDP in the long run.

3.2 Technology's Role in the Growth of Gig Economy Platforms: The increased penetration of smartphones, enhanced internet connectivity, and development of digital payment mechanisms have enabled the rapid expansion of gig platforms. Advanced algorithms and AI-based systems support elaborate matching of gig workers with tasks, optimize logistics, and enhance the user experience.

3.3 Role of the Gig Economy in Job Creation and Economic Growth: The gig economy has created a large number of jobs and contributes positively to growth by providing opportunities for additional income. It also touches on issues of employment opportunities, entrepreneurship, and productivity. The work pertains to questions on issues of unemployment and underemployment, especially at times when the job market is rapidly changing.

4. Challenges Facing Viksit Bharat's Gig Economy

i. Income Insecurity and Non-Provision of Social Security: Gig workers do not have an assured income and job security, often because their engagements are temporary and on demand. More significantly, unlike traditional employment, there is no provision for health, pension, or paid leave-related benefits, which makes the financial vulnerability of such workers more glaring.

ii. Regulatory Hindrances and Legal Ambiguity: The gig economy is presently operating in a grey area of regulation, with a lack of clarity in terms of the legal frameworks for gig work. This works to create concerns over issues such as workers' rights, taxation, and compliance. Such grey legality places both the gig workers and platforms at risk. There is an absence of a complete legal framework, leading to unfair labour practices, exploitation, and a lack of recourse regarding grievances.

iii. Rural Areas: Digital Divide and Inequality Digital divide, unequal access to digital technologies and internet connectivity and smartphones, inadequate internet connectivity and low level of digital literacy are major barriers that prevent rural populations from getting access to the gig economy.

5. Implications For Stakeholders

5.1 Implications for Workers:

(1) Flexibility and Autonomy: For a gig worker, the work in the gig economy would offer flexibility in selecting their working hours and projects, as well as enabling personal goals. This is quite helpful for caregivers or for learning.

(2) Income Uncertainty: The first challenge for the gig workers is income uncertainty. Income uncertainty because gig work is usually project-based or temporary with no guarantee of a steady source of funds; therefore, one cannot easily budget his or her finances.

(3) No benefits: Generally, employees are not entitled to traditional employment benefits. For instance, health insurance, paid leave, and retirement plans may be some of the benefits offered to the employee. A lack of such benefits deters people from gig work, so as to enjoy better long-term financial security.

(4) Learning New Skills: Gig work might also provide a good opportunity for workers to learn new skills or have wide experiences. This can contribute positively towards skill-building individuals who are interested in growing or changing the industry.

5.2 Business Implications:

(1) Cost-saving: Businesses can outsource jobs in the gig economy by hiring freelancers or independent contractors on a project basis, which will save them from most of the costs associated with full-time employees including benefits and office space.

(2) Access to Specialized Skills: Gig economy platforms provide businesses with the opportunity to tap into a global talent pool and find individuals with skills that would be difficult to find locally. This can help businesses innovate and become competitive.

(3) Increased Competition: The gig economy is characterized by a high level of competition among the firms, because the freelancers and independent contractors may work for various clients at the same time. This compels firms to be efficient and effective as well as enhance their quality to retain and attract more customers.

5.3 Societal Implications:

(1) Transformation of Traditional Employment: The emergence of the gig economy has led to a shift in traditional employment, where many employees are transitioning into the gig economy, hence transforming the nature of employment in society, as more people choose freelance or gig work over traditional full-time employment. This affects social security systems and labour laws.

(2) Income Inequality: The gig economy can aggravate income inequality, as workers in the gig economy do not have all the benefits and protections that traditional employees do.

(3) Regulatory Challenges: The rise of the gig economy also poses regulatory challenges because current labour laws might not strengthen the rights of gig workers nor their needs. Policymaking is being challenged by balancing flexibility brought about by gig work with worker protections.

(4) Innovation and Entrepreneurship: The gig economy now brings forth possibilities in innovation and entrepreneurship. Gig work allows the individual to have a stepping stone to their own business or creative pursuits.

6. Case Studies of Successful Gig Workers and Platforms

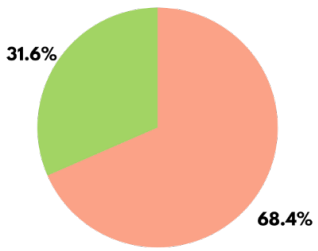
6.1 The Case Study of UrbanClap, now part of Urban Company, highlights how it was able to offer sustainable livelihood opportunities to service professionals in areas such as home cleaning, beauty services, and repairs.
6.2 TaskRabbit, a platform for outsourcing household tasks and errands, is a compelling case study on how the gig economy impacts home services. On the website TaskRabbit, anyone can hire 'Taskers' to do everything from assembling furniture to cleaning houses to handling handyman tasks. Taskers can work with them part-time, for as long as they like and based on the services they can provide. Through this, Taskers have the chance to earn cash while making a significant contribution to busy homeowners.
6.3 Case Study: Zomato
This case study examines how this platform has empowered delivery partners to freely choose their working hours, receive competitive pay, and access opportunities for skill development. Through the gig economy model, Zomato connects consumers with delivery partners who work as freelancers. These delivery associates, branded as "Zomato Delivery Executives," enjoy the freedom to choose their working hours and earn based on delivery volume. Zomato's gig-economy approach has transformed food delivery by providing consumers with convenience and flexible employment for those seeking adaptable schedules.

7. Survey

7.1 **Objectives of Study:** To identify current trends and analyze ethical challenges that can help us identify future opportunities lying within the gig economy and make wise decisions.
7.2 **Methodology:** Data was gathered by conducting a questionnaire survey using random convenience sampling and offline interviews, which mainly included freelancers, ride sharers, and delivery guys.
7.3 **Data Analysis and Interpretation**

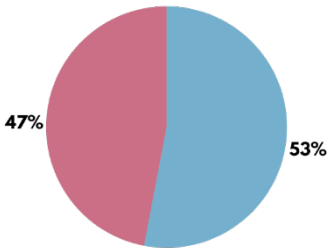
1. AGE GROUP

Interpretation: A significant proportion of respondents were in the 18-25 age group (68.4%), while 31.6% were in the 25-45 age group.

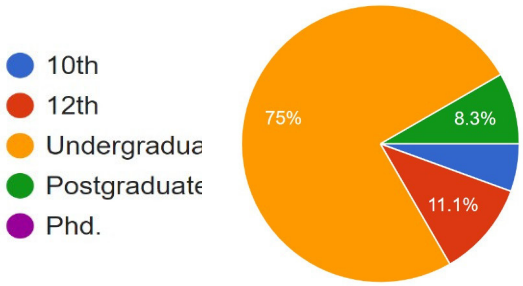


2. GENDER

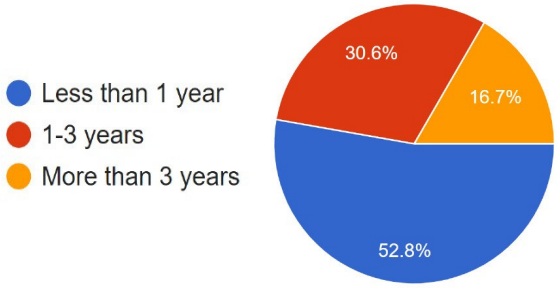
Interpretation: There was an even split between male and female participants, with slightly more males (53%).



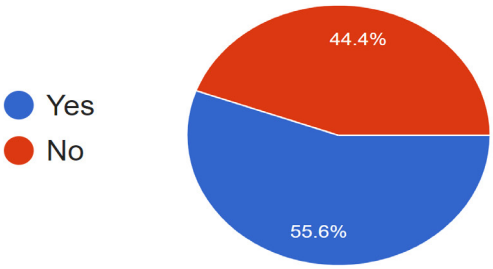
3. EDUCATIONAL BACKGROUND



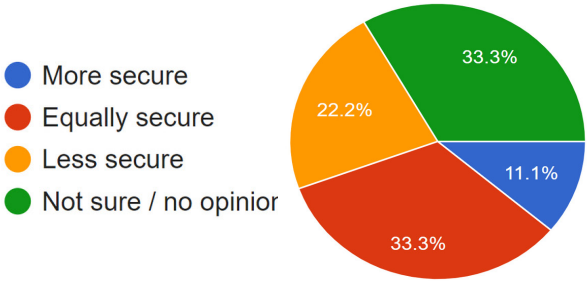
4. EXPERIENCE AS GIG WORKER



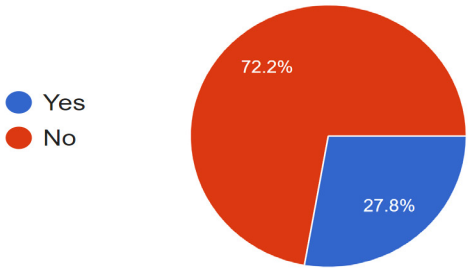
5. MAIN SOURCE OF INCOME



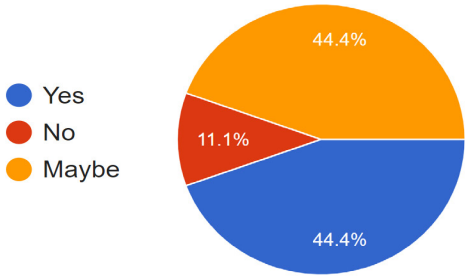
6. JOB SECURITY



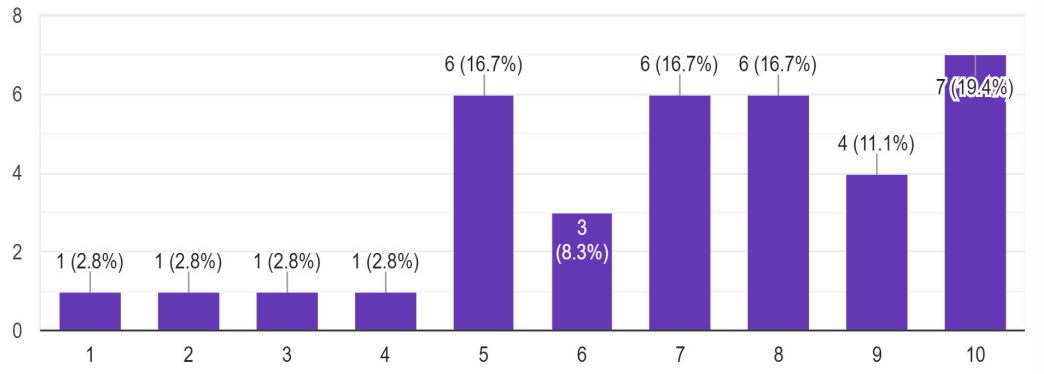
7. ADDITIONAL BENEFITS



8. WORK RETENTION



9. SATISFACTION WITH WORK ON A SCALE OF 1-10



7.3 Opportunities in the Gig Economy According to the Study:

(1) Freedom of work and choice
(2) Personal skill development
(3) Global exposure
(4) Ability to be your boss
(5) Flexibility in work hours and workplace

7.4 Challenges in the Gig Economy According to the Study:

(1) Difficulty in getting a good flow of clients
(2) High competition on online platforms
(3) Unstable market situations
(4) Demands a lot of time to earn a good income
(5) Skill level and expertise need to be updated
(6) Pursuit of interests and passion

7.5 Implications According to the Study:

(1) Full-time employees are earning extra income through gigs.
(2) The gig economy provides an opportunity to provide “Bridge Employment”.
(3) It is allowing companies to tap the most recent and relevant knowledge and expertise at a fraction of the cost.
(4) It is creating a great opportunity for the Indian economy by facilitating inclusive growth.

7.6 Limitations of Study:

(1) There was a time constraint.
(2) The data is collected only within Jaipur city.
(3) The respondents are fewer in number to know the real perception of people.

8. Future Outlook and Recommendations

8.1 Potential Opportunities for Growth and Expansion in Viksit Bharat's Gig Economy: The gig economy holds significant potential for growth and expansion, driven by increasing digital penetration, evolving consumer preferences, and supportive policy measures. Key opportunities include:
(1) Expanding into New Sectors: Such as renewable energy, healthcare, and education.
(2) Enhancing Digital Platforms: Investing in advanced technologies to improve platform efficiency, user experience, and worker management.
(3) Skill Development Promotion Training programs to upgrade the skills of gig workers and thus raise their employability in various sectors.

8.2 Long-term Consequences of Gig Economy Dynamics on Viksit Bharat's Socio-economic Landscape: The long-term consequences of gig economy dynamics on Viksit Bharat's socio-economic context encompass changes in employment patterns, economic diversification, and changes in the social structures. As gig economy continues to expand, it is likely to lead to greater labor market flexibility, increased economic participation, and greater diversity in the workforce. It also demands that there be sound policy frameworks and proactively implemented measures to make sure the fruits of the gig economy are divided more evenly, with the risks of such economies being minimized.

8.3 Policy Recommendations for Government for Fostering a Conducive Environment for Gig Work: Key policy recommendations include:
Legal framework: This would involve full, clear regulations covering gig work, supporting worker rights, and ensuring fair practices.
Improving Social Security: Extend social security coverage for freelancers, health insurance, pensions, and even unemployment benefits.
Digital Expansion: Infrastructural investment in and digital education for improving rural access to gig employment.

8.4 Business Strategies for Meaningful Engagement with the Gig Workers: Fair wage payments, training, development, and safe working environments for gig workers. Digitize to reduce administrative and operational burdens, improve communication, and track performance. Appropriate policies and agreements for gig workers define delivery consistency and quality. Businesses can give counselling and mentoring, as well as upskilling initiatives for laid-off employees to transition into gig work or entrepreneurship. Individuals must view contract labor or project-based work arrangements as a great source of income. Continuous upskilling is needed. IT skills and fluency in English contribute to creating several more job opportunities in a country in the language.

9. Conclusion

The research throws light on the transformative potential and challenges of the gig economy in Viksit Bharat. The key findings include creating large-scale employment, fostering economic growth, empowering youth and women, and strengthening robust regulatory frameworks and social security measures.

Taking proactive steps can unlock potential in the gig economy. This involves policy actions, business strategies, and societal support to build a sustainable and equitable ecosystem. Achieving this relies on fair pay, enhanced security and social protection, and digital inclusion.

Achieving a sustainable and inclusive gig economy requires the effort of all involved: the government, businesses, gig workers, and civil society. This will be achieved through collaboration and commitment, as the gig economy will drive India's socio-economic development under this visionary plan.

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CHAPTER 8

EXPLORING GENDER THROUGH ATTIRE IN VIRGINIA WOOLF'S *ORLANDO* AND SHAANDILYAA'S *DREAM GIRL*

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Abstract

Gender reflects a sense of self, social expectations, and role behaviours (World Health Organization, n.d.). Clothing is one such element that contributes to the construction of gender within societal norms. Virginia Woolf's Orlando deals with identity and gender as social constructs through the character who transforms physically into the opposite sex, while maintaining the same core identity from beginning to end. The characters in Orlando are exposed to very different perceptions, and these perceptions are heavily influenced by their gender.

People's perceptions of characters' assumed gender are heavily influenced by their clothing. Orlando's transformation over time, especially in terms of clothing, humorously challenges the essentialist arguments proposed in the text. Similarly, in the Dream Girl movie, directed by Raaj Shaandilyaa, Ayushmann Khurrana's character Karamveer, who is soft-spoken and less muscular, not only modulates his voice but also, when needed, cross-dresses and can easily be mistaken for a woman. Karamveer does this for his job at a call centre but later becomes too entangled in the chaos as he attracts men who are easily fooled by his attire and superficial changes.

This paper explores how Orlando's and Karamveer's surface-level transitions affect their societal positions, which are heavily influenced by clothing and outward appearance. It also discusses how Woolf in English Literature and Bollywood's Dream Girl satirically address androgyny and cross-dressing, playing with the concept that clothing is crucial in constructing and perceiving gender in society.

Keywords: Gender; Gender Fluidity; Androgyny; Cross-Dressing; Social Construct

1. Introduction

Gender has always been presented such that it is assumed to be as innate as having limbs. People are often conditioned to believe that gender is a pure, unadulterated whole when the fact that it

is a coalescence of a myriad of social factors and is constantly re-defined in the spheres of our social life is often forgotten. It can often deceive and be easily manipulated to fit into the mold created by society to fit into it. Gender is a socially created phenomenon that is directly proportional to everyone "doing gender" (West and Zimmerman 1987). “Doing Gender” implies that an individual is constantly achieving gender by manipulating the perceived form of oneself. Gender is an amalgamation of varied perceivable factors that are created in society and can be easily constructed and deconstructed by something as shallow as clothing and hair. Gender is essentially a matter of free will; however, it is expected of an individual to follow the norms, as set by society, for the biological sex assigned to us at birth. People who find themselves disconnected from their biological sex often keenly construct their gender via their attire, hair, and makeup.

It is often expected to present oneself as a man or a woman, but according to Virginia Woolf, humans can balance out genders and have both the feminine and masculine traits. (Woolf, 1977, p. 106). An individual can present themselves as a feminine man or a masculine woman which is largely depicted through the clothes they choose to wear. In her book Gender Trouble, Judith Butler (1993) stated that there is no pure natural gender in the society; what we call ‘gender’ is the result of different social norms and conditions imposed on us. Implying that pure man or pure woman do not exist, rather they have androgynous qualities that complement each other, hinting at the concept of gender fluidity, which dismantles the idea of having a concrete gender.

Cross-dressing is the act of wearing clothes and accessories that are stereotypically associated with the opposite sex. Characters cross-dressing in literature and cinema often emphasise the performative nature of gender, showcasing how clothing and surface-level alterations are capable of shaping perceptions of identity. Virginia Woolf’s *Orlando* and Raaj Shaandilyaa’s *Dream Girl* film series play with the idea of androgyny by dealing with the main characters that cross-dress for their reasons and are accepted into a society which do not delve deeper into a person’s identity but rather rushes to assume the gender on surface value.

Published in 1928, *Orlando*: A Biography by Virginia Woolf is a fictional novel about a man who transitions into a woman and constantly goes back and forth between presenting himself as a man and a woman. Orlando is supposed to be a representation of Vita Sackville-West, who was Woolf’s friend as well as alleged lover which implies that Orlando might very well be Virginia Woolf’s own understanding of gender. The story follows the life of Orlando, a young nobleman in Elizabethan England who undergoes a mysterious transformation that extends his life for centuries, during which he constantly fluctuates in his gender performance. Initially, Orlando is a young man who aspires to be a poet and courtier.

However, he suddenly undergoes a sudden transformation into a woman. As a woman, Orlando navigates the social and cultural constraints placed upon women in different historical epochs, experiencing life as both privileged and oppressed. Throughout the novel, Woolf cleverly

explores themes of gender and identity. Orlando's journey serves as a metaphor for the complexities of gender and the construction of identity, challenging traditional notions of masculinity and femininity. Woolf also critiques the limitations imposed by society on individuals based on gender, class, and status.

Dream Girl, a series of films by Raaj Shaandilyaa, at first glance at the title, suggests a woman of ethereal existence and behaviour who claims the sight of every man's fantasy and desire. However, despite what the name suggests, the films deal with a man named Karamveer Singh who, in both the films, possesses the talent of impersonating a woman's voice and cross-dresses in the second movie to earn money via an unconventional job that is originally meant only for a woman. The films focus on the ideology of the social construct of gender, and of the stereotypical expectations of gender which turns out to be a mould of outward behaviour and appearance that solidifies an identity of performative dance if remembered to follow the steps till the last bow.

2. Theory of Gender Performativity

Performative Gender as suggested by Judith Butler, is a concept that suggests that gender is not an implicit trait but rather something that is perpetually enacted through performance and constructed through repeated sets of behaviours. This theory implies that gender expression is fluid and variable instead of being rather concrete and stagnant. It suggests that gender behaviours can be taken as "performance," and people as actors, who choose the roles they want to perform. In *Orlando*, Woolf cleverly challenges the dichotomy of socially constructed gender. In *Dream Girl*, Shaandilyaa subtly depicts that dressing up is a part of the performance people do to play their roles in society.
In *Orlando*, Woolf states, "He for there could be no doubt of his sex, though the fashion of the time did something to disguise it" She here ultimately argues that gender is a social construct, and the biographer's comment about "the fashion of the time" implies the same. Elizabethan fashion was incredibly elaborate and feminine, which obscured Orlando's gender. When Orlando transforms into a woman, he can act like a woman, but his actions remain rather unladylike and lack gracefulness, which is linked to a trait possessed by women in general. This suggests the presence of masculinity still present in her, clearly implying that androgyny is present in Orlando while also reflecting how he is performing his gender.

Woolf's overarching idea that gender is a social construct is reflected when Orlando believes Sasha to be a man based on her clothing, and he initially treats her as such. She skates with "speed and vigour," which suggests a level of strength that is often only associated with men rather than women. Sasha is also in a tunic and trousers that disguise her sex, making Orlando assume her to be male. As soon as Orlando realises Sasha is a woman, he is immediately attracted to her. This implies that how one perceives gender is deeply influenced by set norms. In one instance, Harry, another character in *Orlando*, becomes Harriet to seduce the male Orlando in the seventeenth century and goes back to his original form when Orlando becomes a woman in

the eighteenth century. Along with that, one night, Orlando, while still in his transitioned woman state, dresses up in male clothes and is able to seduce a young woman, which brings light to the performative nature of gender and again reflects Woolf's central argument that gender is a social construction that manifests itself through clothing. As she wisely states, "Clothes are but a symbol of something hid deep beneath".

In Shaandilyaa's *Dream Girl*, like Orlando and Harry, Karamveer, the main lead of the story, is constantly switching his 'gender' with variations in the materialistic spheres such as hair, makeup, and attire that contribute to his gender performance. In the second movie, when he is dressed up in traditional female attire, Karam unintentionally lures men who fail to realize that underneath the guise is a male. With the help of attire and surface-level alterations, Karam is able to create two identities in society, depicting how the stereotypes about clothes heavily influence one's perception of gender.

In *Dream Girl*, Abu's adopted son Shaukya, is attracted to "Pooja", the feminine personality created by the lead, Karam. Meanwhile, Abu's sister Jumani is attracted to Karam, which again implies that a person's understanding of gender is highly dependent upon social norms. Karam's voice alteration and changing his appearance using clothes, hair, and makeup feeds into the well of stereotypes, it also illustrates how gender is an elaborate performance we all have been scripted to play, pointing out how the role of gender can be played by anyone if sufficed for a shallow change in appearance.

3. Conclusion

In both *Orlando* and *Dream Girl*, the protagonists hint at androgyny when both of them are constantly performing as females in society while still holding onto their fundamental identity with masculine desires and temperament. Through the fluid depiction of gender in *Orlando* and *Dream Girl*, the creators imply that the dichotomous male-versus-female understanding of gender is merely a social construction and that a person cannot be defined as one absolute gender. "Clothes change our view of the world and the world's view of us," as said in the book, certainly applies to both characters. They, in their attempts to dress up to be accepted as women in society, suggest the performative construction of gender, which can be perceived differently with a change as shallow as attire or hair. Looping back to the point of gender being a mold made of appearance and perception, if one fits the body in the creases of these shapes, a new set of visions greets them.

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CHAPTER 9

POLICY AND GOVERNANCE: GEOPOLITICS AND THE CHANGING WORLD ORDER

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1. Introduction

In simple words, geopolitics can be defined as the study of how the Earth's geographical and political factors affect international relations. Often, geopolitics is also called the struggle for geographical locations and resources. This is because energy is a vital resource that not only fuels the global economy but also influences international relations. Therefore, the availability, accessibility, and affordability of energy resources significantly impact various aspects, such as a country's political stability, economic growth, and national security.

Cause of Change in World Order: The primary reason for conflict and competition among countries is the unequal distribution of resources, which is also a necessity for every nation. The struggle for these resources leads to domestic and/or international wars, resulting in changes in the world order. For example, the 'Gulf War' of the 1990s and Iraq's annexation of Kuwait in 1991 illustrate this. We can describe a change in the world order as a shift in the balance of power among nations, where one empire falls and a new empire rises to establish its hegemony — the dominance of one nation over others.

However, due to these facts, it becomes very difficult to accurately trace transitional periods. Military capacity and the arms race have been other factors responsible for changes in the world order throughout history. The desire to be the most militarily advanced nation has persisted for centuries. Whether it is the Cold War arms race, the nuclear arms race between India and Pakistan, the East Asian arms race, or the Middle Eastern arms race, the Cold War remains the most well-known example. It was an arms race between the superpowers of post-World War II, the United States and the former Soviet Union, both aiming to establish their hegemony. This led to a situation of deterrence between the two superpowers.

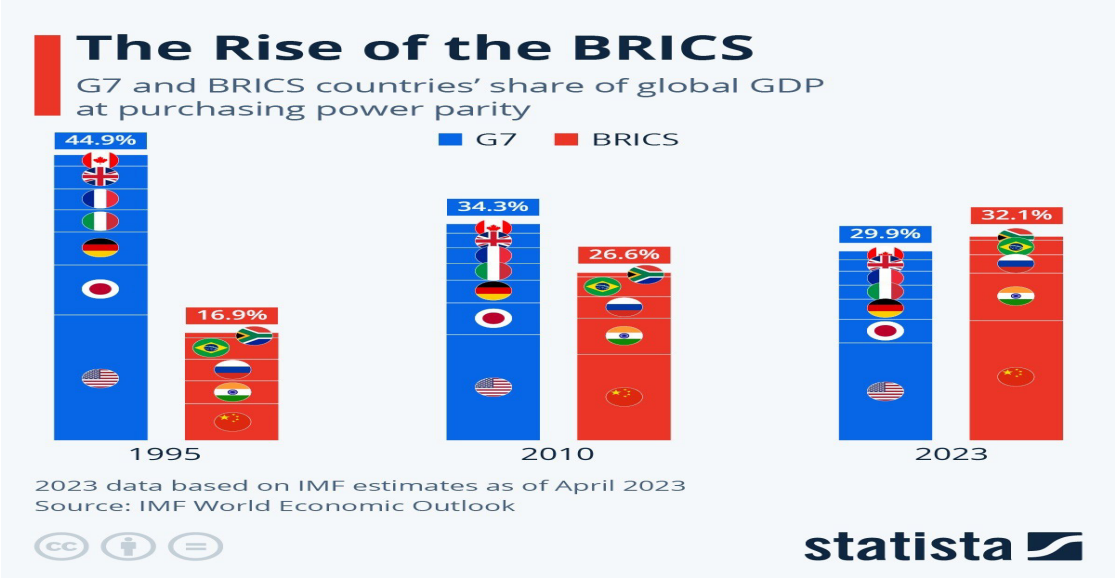
The other most famous example is the nuclear arms race between India and Pakistan. India became a nuclear power in the year of 1974 due to the escalating fear of warwith Pakistan, and Pakistan gained nuclear power in 1998 to create deterrence. The demonstrations of nuclear capabilities by both countries heightened tensions in the subcontinent and shaped the geopolitical landscape in South Asia. A very similar role is played by ideological differences among nations, as well as by political instability and conflicts within a nation.

The other major reason for a shift in world order is also the technological advancements of nations. For instance, the Industrial Revolution during the late 18th century was characterized by significant progress in manufacturing, transportation, and communication technologies. Countries that embraced industrialization experienced economic and military growth, thereby enhancing their geopolitical status. The United Kingdom and Germany are two such examples. The United Kingdom was the first-ever industrialized nation, which led to it becoming a superpower during the 19th century. Conversely, Germany's rapid industrialisation during the late 19th and early 20th centuries contributed to its quick emergence as an economic and military power, ultimately leading to geopolitical tensions as well as WW1 and WW2.

Another instance was the Cold War between the USA and the USSR, which was marked by both a technological and ideological race. The USSR launched the “Sputnik” in 1957, beginning the space race, followed by the USA, which successfully landed the “Apollo” in 1969. This period also saw the development of Intercontinental Ballistic Missiles (ICBMs), with significant implications for nuclear deterrence and shaping the geopolitical strategies of both superpowers.

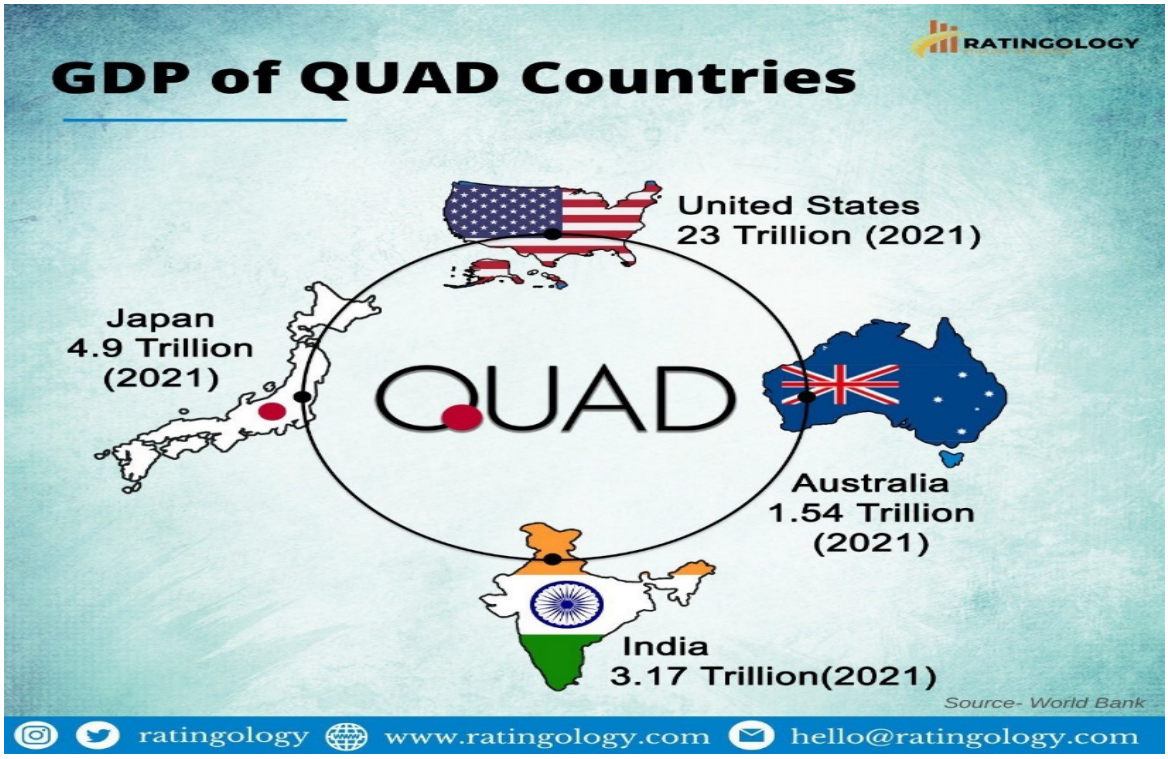
2. Does History Repeat Itself?

The examples mentioned above offer fundamental support for our thesis, which suggests that the factors triggering transformations in the international order exhibit arepetitive nature.



3. Role of Emerging Powers

The emerging powers are also playing an active role in present-day geopolitics. For example, the rise of BRIC (Brazil, Russia, India, and China) nations has improved the status of developing countries globally, marking a significant shift in the post-war international order. This rise has also diversified the global economic, political, and democratic relations in geopolitics. The emerging powers, hence, are now having an increased influence in global affairs, although they still have challenges to face from Western countries. As the world adapts to these changes, we may see a shift towards more diverse partnerships in finance, trade, and investment, which may lead us to a multipolar world, characterized by greater balance as well as democracy and international relations.

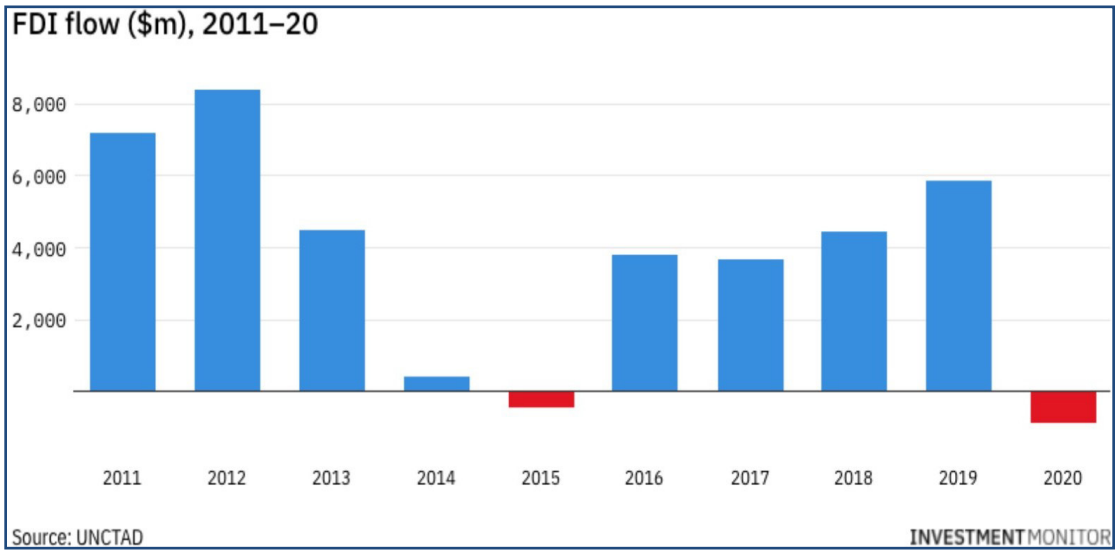


Other instances include China's Belt and Road Initiative (BRI) has its aims set to enhance connectivity along with infrastructure across Africa, Asia, and Europe, with this China aims at changing global trade routes; growing regional influence of India which is due to its economic growth and diplomatic outreach makes it a significant player in shaping regional geopolitics. Other Indian initiatives such as QUAD (comprising of USA, Japan, India and Australia) and Indian Ocean Rim Association (IORA) highlight India's efforts to counter China 'influence in the Indo-Pacific region; the role of Brazil in South America along with other nations asserts it's influence in regional affairs, it's participation in organizations such as BRICS (Brazil, Russia, India, China and South Africa) and Union of South American Nations (UNASUR) showcase it's

desire for greater integration and cooperation. Other, less important factors include Turkey's strategic position in the Middle East, where it is expanding as a hard power.

The changing world order significantly impacts the global economy, as it can completely alter economic dynamics. A shift in trade patterns is often the most noticeable change. Countries impose trade and tariff barriers to influence global supply chains. The competition between two nations also creates ripple effects across other countries and regions. This is exemplified by the trade tensions between the USA and China in recent years.

Another impact includes a change in investment flows. Investor tend to reallocate their capital based on risks and opportunities involved in different regions. Political instability and conflicts repel investors while economic growth and stability attract investors. This may be seen in the examples of the Middle East as well as the current example of Russia and Ukraine.



Currency markets are also heavily influenced by changes in the world order. Any geopolitical shifts impact currency exchange rates. Investors tend to invest in countries with relatively stable currencies. This, in turn, affects international trade, investment returns, and borrowing costs. A recent example is the UK's 2016 referendum on Brexit, which caused the UK's currency to become highly volatile and also affected its relations with the European Union. This shift has altered investment patterns in the United Kingdom.

A shift in commodity prices is another major consequence of the changing world order. Geopolitical tensions tend to disrupt the production and distribution of commodities, leading to fluctuations in prices. Any sanctions on Middle Eastern regions cause an increase in oil prices, as these areas are the main oil producers.

The impact of the changing world order is also evident in technology and innovation, global economic growth, income inequality, and development.

4. The Impact Of Changing World Order On the World Environment

Due to shifts in economic policies, resource allocation, and geopolitical priorities, a change in the world order also significantly impacts the environment. Changing geopolitical trends often influence patterns of resource extraction and exploitation. Emerging powers seek to secure access to natural resources, leading to increased extraction of minerals, fossil fuels, and other raw materials. This heightened demand accelerates environmental degradation through deforestation, habitat destruction, and pollution.

Climate policies and international agreements also influence the environment within the geopolitical context. Powerful countries encourage others to address climate change by involving them in international agreements like the Paris Agreement. The leading superpower plays a key role in shaping the environment.

Any change in world order often leads to modifications in environmental regulations and standards at both national and international levels. It is the leading superpower's role to shape environmental governmental frameworks, which can either weaken or strengthen environmental protections depending on their policy priorities. The Infrastructure Development and Land Use, Environmental Diplomacy and Cooperation, and Energy Policies and Transition are similarly affected.

5. Methods of Conflict Resolution

Diplomacy can be referred to as the art, science, or method through which nations, groups, or individuals conduct their state affairs in a way that promotes peaceful relations across political, economic, cultural, or scientific areas. It is the best way to achieve peaceful resolutions of issues, and to build institutions, laws, and norms to sustain them.

We can use many ways to deal with the changing world order through diplomatic means. The first and most important is multilateralism and international cooperation (the collaboration of several countries for the pursuit of a common goal). If we engage in diplomatic forums such as the G20, United Nations, and other regional organizations to foster dialogue, build consensus, and promote collective action on issues ranging from climate change to economic development.

The use of diplomatic dialogue and engagement with both traditional and emerging powers is also a valuable approach. This allows countries to build trust, manage conflicts, and explore areas of mutual interest and cooperation. Countries can also opt to develop strategic partnerships and alliances and promote normative, economic, as well as institutional diplomacy.

In a world of constantly changing global order, geopolitical dynamics are also continuously evolving. The only way to maintain stability, prevent escalations, and foster cooperation is through effective conflict resolution. Several methods can be applied for conflict resolution, as listed below.

Mediation and third-party intervention can also be used. If neutral third parties like international organizations, regional organizations, or mediators/arbitrators can be used to facilitate dialogue and mediation between parties.

A conflict prevention and early warning system can also be used. They can identify potential sources of conflict and address them before the issue escalates. This includes intelligence gathering, diplomatic channels, and an analysis of situations before the conflict escalates. Countries can also use confidence-building measures such as arms control agreements, military dialogue, and transparency measures to reduce tensions and to build confidence.

Confidence-Building Measures: Implement confidence-building measures, such as arms control agreements, military-to-military dialogues, and transparency measures, to reduce tensions, build trust, and prevent misunderstandings or miscalculations that could lead to conflict. Confidence-building measures help create a conducive environment for dialogue and cooperation between conflicting parties.

6. Methods Used for Research

The methods used for the research include the following:

- **Historical Analysis,** in which historical methods to study past geopolitical developments, conflicts, alliances, and power shifts to identify recurrent patterns andlessons learned for understanding contemporary geopolitics have been used.
- **Situational Analysis,** in which various factors and dynamics that shape the currentglobal landscape are considered.
- **Literature review,** which included conducting a comprehensive review of existing literature on geopolitics, establishing a theoretical framework, and understanding the key conceptsand debates in the field.
- **Case Studies** include analyzing specific geopolitical events, conflicts, or diplomatic negotiations as case studies and then exploring their causes, consequences, and implications for the changing world order.
- **Policy Analysis** evaluates government policies, strategies, and documents related to geopolitics, national security, and foreign affairs and then assesses their objectives, effectiveness, and implications for the changing world order.
- **Comparative Analysis** includes studying and evaluating different geographicalregions and their historical events to identify similarities, differences, and trends in geopolitical dynamics, strategies, and outcomes.
- **Interdisciplinary Approaches** integrates insights and methods from multiple disciplines, such as political science, geography, economics, sociology, and anthropology,to provide a comprehensive understanding of complex geopolitical issues and their implications for the changing world order.

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CHAPTER 10

EXPLORING THE PROSPECTS OF AUGMENTED REALITY (AR) IN HIGHER EDUCATION IN INDIA

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Abstract

Augmented Reality (AR) technology has emerged as a promising tool with the potential to transform various sectors, including education. It holds great promise for changing traditional teaching methods in response to the increasing need for creative and interactive learning experiences. AR technology and its educational applications highlight various ways to enhance learning environments' interactivity, visualization, engagement, and more. The purpose of this research paper is to explore the possibilities of integrating augmented reality technology into Indian higher education. The article also examines the potential benefits of using AR in Indian higher education through a comprehensive analysis of existing research and case studies. These benefits include increased student engagement, improved understanding of complex concepts through visualization, and the provision of personalised learning opportunities tailored to individual student needs. With adequate focus on this area, augmented reality could significantly enhance the quality and effectiveness of higher education in India. Higher education institutions in India can leverage augmented reality (AR) technology to meet the evolving demands of students in the digital age by addressing key challenges and seizing new opportunities.

Keywords: Augmented Reality (AR), Higher Education, Educational Technology

1. Introduction

Augmented Reality (AR) technology has emerged as a transformative tool with the potential to revolutionize various sectors, especially education. As the demand for innovative and interactive learning experiences continues to grow, AR offers a promising solution to enhance traditional teaching methods and cater to the evolving needs of students. By overlaying digital content onto the real world, AR technology can create immersive learning environments that stimulate engagement, visualization, and interactivity.

As technology reshapes education globally, Augmented Reality (AR) offers unique interactive learning experiences. In India's evolving education landscape, exploring AR's potential in higher education is vital. AR bridges theory and practice, fostering critical thinking. This research investigates AR's role in Indian higher education, supporting the integration of technology to enhance learning outcomes.

In Indian higher education, integrating AR technology shows great promise for tackling challenges faced by educators and students. By boosting interactivity, visualization, and engagement, AR can enhance student participation and help students better understand complex concepts.

The purpose of this research paper is to explore the possibilities of integrating augmented reality technology into higher education in India and globally, and to examine the potential benefits of using AR in this setting. By analysing existing research and case studies, this paper aims to highlight the advantages of AR implementation, such as increased student engagement, improved understanding, and India's potential to become a global leader in AR.

By recognizing the potential of AR technology and addressing key obstacles, higher education institutions in India can harness AR to meet the evolving needs of students in the digital age. This paper will explore how AR technology can be used to overcome challenges and seize new opportunities in Indian higher education, ultimately improving the effectiveness and potential of teaching and learning practices.

2. Features Of Augmented Reality in Education

1. Visualized Learning: AR enables students to visualize complex concepts in subjects such as science, mathematics, and engineering. For instance, they can interact with 3D models of molecules, planets, or historical artefacts, making abstract concepts more tangible and easier to understand.
2. Interactive Learning: AR promotes active learning by allowing students to interact with digital content in real-time. They can manipulate virtual objects, conduct experiments, or solve problems in a hands-on manner, which fosters engagement and deeper understanding.
3. Personalized Learning: AR can be tailored to accommodate different learning styles and preferences. Educators can develop AR experiences that cater to individual student needs, providing personalized learning paths and adapting content based on student progress and feedback.
4. Collaborative Learning: AR encourages collaboration and teamwork among students. They can work together on projects, solve problems collaboratively, or explore virtual simulations collectively, promoting communication, critical thinking, and social skills.
5. Accessible Education: AR makes learning more accessible to students with diverse needs and abilities. It can provide additional support through audiovisual cues, interactive

guides, or adaptive content, ensuring that all students can participate and succeed in their learning journey.

6. Real-world Applications: AR bridges the gap between classroom learning and real-world applications by simulating authentic scenarios and environments. Students can practice skills in simulated settings, such as medical procedures, engineering designs, or language immersion, preparing them for future careers and practical challenges.

Overall, Augmented Reality in education offers a dynamic and immersive learning environment that enhances engagement, comprehension, and retention, ultimately empowering students to explore, discover, and succeed in their educational pursuits.

3. Use of AR in Education

1. Interactive Learning Materials: AR enhances traditional learning materials such as textbooks by overlaying digital content like 3D models, videos, and quizzes, making learning more engaging and interactive.
2. Virtual Laboratories: AR creates virtual lab environments where students can conduct experiments safely and cost-effectively, providing hands-on learning experiences in subjects like science and engineering.
3. Virtual Field Trips: AR facilitates virtual field trips to historical sites, museums, and geographical locations, allowing students to explore and learn from immersive experiences without leaving the classroom.
4. Language Learning: AR apps overlay translations, pronunciation guides, and interactive exercises onto real-world objects, aiding language acquisition by providing contextual learning experiences.

Overall, these applications demonstrate the versatility and potential of Augmented Reality (AR) in transforming educational experiences worldwide, offering innovative solutions to enhance engagement, interactivity, and experiential learning opportunities for students across diverse subject areas.

4. Literature Review

a) "Augmented Reality in Education: A Review and Future Directions" by Wang, Wu, and Wang (2016).
b) "A Comprehensive Review of Augmented Reality Applications for Education" by Yuen, Yaoyuneyong, and Johnson (2011).
c) "Augmented Reality Applications in Education: A Literature Review" by Bacca, Baldiris, Fabregat, Graf, and Kinshuk (2014).
d) "Augmented Reality in Educational Settings: A Review of the Literature" by Ivanov, Barton, and Murphy (2013).

e) "A Review of the Use of Augmented Reality in Education: Implications for Teaching and Learning" by Cheong, S., and Gwee, S. (2014).
f) "The Potential of Augmented Reality in Geoscience Education: A Systematic Literature Review" by Stein, McNeal, and Lautenschlager (2019).
g) "Augmented Reality in K-12 Education: A Review of the Literature" by Radu (2014).
h) "Augmented Reality in Educational Contexts: A Systematic Literature Review" by Bonwell and Eison (2019).
i) "A Review of Augmented Reality Applications for Science Education" by Chang, Morreale, and Medicherla (2017).
j) "Augmented Reality in Formal and Informal Science Education: A Review" by Akçayır and Akçayır (2018).
k) "The Use of Augmented Reality in Higher Education: A Scoping Review of Literature" by Lai, Ye, and Sun (2020).
l) "Augmented Reality in Language Learning: A Review of Empirical Studies" by Chen and Tsai (2013).
m) "A Systematic Review of Augmented Reality in Educational Settings" by Weng, Liao, and Tsai (2014).

These papers offer comprehensive reviews, analyses, and insights into the use of AR technology across various educational contexts, providing valuable references for further exploration and research in this field.

Comparative Study of Merits and Demerits of Integrating AR into Higher Education in India

BASIS	MERITS	DEMERITS
Cost	AR reduces the need for expensive physical resources such as laboratory equipment and field trips, making practical learning experiences more accessible and affordable for both students and institutions.	Implementation of AR technology can be financially demanding, requiring investments in hardware, software, infrastructure, and training, which may pose challenges for institutions with limited budgets.
Technical Challenges	Technical challenges help in fostering problem-solving skills and resilience among students. When students encounter issues like compatibility problems or software bugs, they are prompted to think critically and creatively to find solutions. This process enhances their problem-solving	Technical challenges disrupt the learning process. Compatibility issues, connectivity problems, and software bugs can interrupt the seamless integration of AR technology into educational activities, leading to frustration and disengagement among students. As a result, these challenges undermine the effectiveness of AR-enhanced learning

	abilities and cultivates resilience, preparing them for real-world challenges in their academic and professional pursuits.	experiences, detracting from the overall educational objectives.
Complexity of Implementation	The intricate development processes involved in implementing Augmented Reality (AR) enable the creation of immersive educational experiences with advanced features like realistic 3D models and interactive simulations. This complexity enhances learning outcomes and captivates student interest, offering opportunities for innovation and tailored learning experiences.	Conversely, the technical complexity of AR implementation poses challenges for educators, requiring specialized expertise, resources, and longer development cycles. These barriers may limit scalability, accessibility, and the ability of educators to integrate AR effectively into teaching practices, hindering widespread adoption and utilization in educational settings.
Interactivity	Interactivity in AR allows for immersive and engaging learning experiences, where students actively participate in the educational content. Interactive AR applications enable students to manipulate virtual objects, explore complex concepts firsthand, and engage in hands-on learning activities. This interactivity promotes deeper understanding, retention, and motivation, enhancing the overall learning outcomes.	Excessive interactivity in AR can lead to cognitive overload, distraction, and hindered comprehension. Poorly designed or overly complex interactive elements may confuse or overwhelm students, disrupting the flow of instruction and detracting from educational objectives. Balancing interactivity is crucial to avoid negative consequences and maintain an effective learning experience.

5. Challenges and Barriers to Adoption

1. Limited Infrastructure: Insufficient access to high-speed internet and compatible devices hinders the effective implementation of AR applications in educational institutions.
2. Cost and Accessibility: The high cost of AR technology, including hardware, software, and training, poses a barrier to adoption, particularly for institutions with limited financial resources.

3. Lack of Technical Expertise: Educators may lack the necessary skills and knowledge to develop and implement AR-enhanced learning materials effectively, leading to challenges in integrating AR into the curriculum.
4. Resistance to Change: Resistance from educators and administrators, who may be sceptical of new technologies or reluctant to deviate from traditional teaching methods, impedes the widespread adoption of AR in higher education.

6. Anticipated Impact of AR on Higher Education in India

1. Enhanced Learning Experiences: AR technology can provide immersive and interactive learning experiences, allowing students to engage with course materials in new and dynamic ways. Visualizing complex concepts in subjects like science, engineering, and medicine can become more accessible and engaging, leading to deeper understanding and retention of knowledge.

2. Access to Remote Education: In a vast and geographically diverse country like India, AR can help overcome barriers to access education by providing virtual classrooms and remote learning opportunities. Students in remote or rural areas can benefit from high-quality educational experiences delivered through AR applications, reducing disparities in access to higher education.

3. Skill Development for Industry Readiness: AR can play a crucial role in bridging the gap between academia and industry by providing hands-on training and simulation experiences. Higher education institutions can use AR to offer practical, industry-relevant skills training in fields such as engineering, healthcare, and vocational education, thereby improving students' employability and readiness for the workforce.

4. Personalized and Adaptive Learning: AR technology can enable personalized learning experiences tailored to individual student needs and learning styles. Adaptive AR applications can assess students' progress in real-time and provide customized learning pathways, remedial support, and feedback, promoting more effective learning outcomes and academic success.

5. Promotion of Multidisciplinary Collaboration: AR has the potential to facilitate multidisciplinary collaboration among students and faculty members by creating virtual environments for teamwork, research projects, and creative endeavors. Collaborative AR experiences can foster innovation, critical thinking, and problem-solving skills, preparing students to tackle real-world challenges collaboratively.

6. Cultural and Heritage Preservation: India's rich cultural heritage and historical landmarks can be preserved and showcased through AR applications. Higher education institutions can use AR to create virtual tours of heritage sites, museums, and archaeological sites, offering students immersive learning experiences that promote cultural awareness, appreciation, and preservation.

7. Innovation in Teaching Pedagogies: AR technology opens up new possibilities for innovative teaching pedagogies and instructional strategies. Educators can integrate AR-based simulations, augmented textbooks, and gamified learning activities into their teaching to make learning more engaging, interactive, and enjoyable for students.

8. Research and Development Opportunities: The adoption of AR in higher education can stimulate research and development efforts in AR technology itself, as well as its applications in various academic disciplines. Indian universities and research institutions can collaborate with industry partners to advance AR technologies, develop new educational content, and contribute to the global knowledge base in AR-enhanced learning.

Overall, the anticipated impact of AR on higher education in India is multifaceted, ranging from improving learning outcomes and accessibility to fostering innovation and research collaboration. By embracing AR technology, Indian higher education institutions can adapt to the evolving needs of 21st-century learners and prepare students for success in an increasingly digital and interconnected world.

7. Conclusion

- In conclusion, the integration of Augmented Reality (AR) into higher education in India holds tremendous promise for revolutionizing teaching and learning experiences. Through this research paper, we have explored the potential impact of AR technology on education, identified key challenges and barriers to its adoption, and proposed recommendations for stakeholders to navigate these challenges effectively.
- Augmented Reality has the potential to enhance student engagement, improve learning outcomes, and provide practical hands-on experiences across diverse academic disciplines. By overlaying digital content onto the real world, AR makes abstract concepts more tangible and understandable, fostering active learning and creativity among students.
- However, the successful integration of AR into higher education requires collaborative efforts from educational institutions, faculty members, students, government agencies, and industry stakeholders. It is imperative to invest in infrastructure, provide faculty training, and develop pedagogical strategies that leverage the capabilities of AR technology effectively.

- Evaluating addressing accessibility concerns, ensuring ethical use of AR technology, and evaluating its long-term impact are crucial considerations for sustainable implementation. By embracing AR technology and exploring innovative approaches to teaching and learning, higher education institutions in India can prepare students for success in a digital and technology-driven world.
- In conclusion, Augmented Reality has the potential to transform higher education in India, making learning more engaging, accessible, and effective for students and educators alike. As we continue to explore the possibilities of AR technology, let us strive to harness its full potential to create a brighter future for education in India and beyond.

8. Future Recommendations

- ***Recommendations For Stakeholders***

1. Educational Institutions:

- Invest in infrastructure upgrades to support AR implementation.
- Provide faculty training on AR technology and instructional design.
- Encourage collaboration between faculty members and instructional designers.
- Establish support mechanisms for faculty to integrate AR into curricula effectively.

2. Faculty Members:

- Participate in AR training programs to familiarize themselves with the technology.
- Collaborate with colleagues to develop AR-enhanced learning materials.
- Integrate AR activities into course curricula aligned with learning objectives.
- Evaluate the effectiveness of AR implementations and adjust teaching practices accordingly.

3. Students:

- Embrace AR-enhanced learning experiences and actively engage with AR content.
- Provide feedback on AR implementations to faculty members.
- Collaborate with peers on AR projects to enhance teamwork and problem-solving skills.
- Take advantage of opportunities to personalize learning experiences using AR technology.

4. Government and Policy Makers:

- Allocate funding to support AR initiatives in higher education institutions.
- Develop policies to promote the ethical use of AR technology in education.
- Foster partnerships between educational institutions and industry stakeholders.
- Support research efforts to evaluate the effectiveness of AR implementations in improving learning outcomes.

- ***Recommendations for Researchers***

1. *Discipline-specific Impact:* Investigate the effectiveness of AR across different academic disciplines, assessing its impact on learning outcomes, engagement, and retention in fields such as STEM, humanities, social sciences, and vocational training. Pedagogical Strategies: Explore innovative pedagogical approaches for integrating AR into teaching practices, examining how different instructional methods and learning activities can be enhanced through AR technology.
2. *Accessibility and Inclusivity:* Research strategies for making AR content more accessible and inclusive for students with diverse needs and backgrounds, including those with disabilities and from marginalized communities. Long-term Impact and Sustainability: Examine the long-term impact and sustainability of AR implementations in higher education, including factors influencing scalability, adoption, and institutionalization, as well as considerations related to cost-effectiveness and infrastructure requirements.

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Additional Resources:

- Case studies and white papers from technology companies and AR developers, highlighting successful implementations and best practices.
- Online repositories of educational resources, such as ERIC (Education Resources Information Center) and Google Scholar.

CHAPTER 11

GEOPOLITICAL DYNAMICS AND GLOBAL GOVERNANCE: ADAPTING TO A CHANGING WORLD

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Abstract

The shifting power dynamics, economic interdependencies, and technological advancements are leading to a transformation of the global order. This abstract examines the influence of emerging powers, existing powers, and ruling authorities in shaping contemporary geopolitics. As observed, the changing world order dynamics have ranged from the Allied and Axis powers during World War I to the American world order after World War II. The geopolitical history of the world has experienced various power shifts, whether it is the division of the world into two opposing camps—the USA and USSR—majorly acting as the world powers, or the US hegemony directing the world after the Cold War. The world has paved its way to the current changing scenarios of the world order, where developing countries are taking over the power structure, challenging developed nations, and influencing global affairs with their capabilities. As a result, the world is experiencing a state of balance of power among nations. With emerging global challenges and new alliances, the landscape of international relations continues to shift. In this evolving world order, adaptability, cooperation, and diplomacy are essential for addressing emerging issues and fostering a more stable and prosperous world.

Keywords: International relations, Balance of power, Global governance, Emerging powers

1. Introduction

Geopolitics is a crucial determinant of nation-state interactions, influencing policies, alliances, and wars in the ever-changing global environment. As we navigate the challenges of the twenty-first century, the concept of geopolitics becomes increasingly important, essential to the ever-changing global order. Understanding geopolitics and its impact on society is critical to grasping the changing forces shaping our world today.

Geopolitics is the study of how geography, along with historical, economic, and political elements, influences state conduct and relations on a global scale. It investigates the strategic importance of geographical locations, access to resources, transit routes, and territorial boundaries in generating power relations between countries. Furthermore, geopolitics includes the analysis of ideologies and cultural influences.

In recent years, the world's geopolitical landscape has changed significantly, driven by various factors including the emergence of new countries, technological advances, and climate change. These changes have reshaped the global order, disrupting established norms and alliances while creating new opportunities and challenges.

The rise of new power centres, especially China, India, and other emerging economies, is a major driver of change in today's world. The economic growth and growing influence of these countries have challenged the dominance of traditional powers, leading to a multipolar world where various actors compete for influence and resources.

Furthermore, technological advancements, especially in information technology, artificial intelligence, and cyber warfare, have transformed the nature of power and security worldwide. These advancements have blurred the line between traditional and non-traditional threats, posing new challenges to global stability and governance.

Moreover, globalization has enhanced the connectivity of economies and societies, increasing the impact of transnational issues like climate change, pandemics, and terrorism, which complicates the geopolitical landscape. Addressing these challenges requires collective national action and cooperation, often testing current international governance and diplomacy frameworks.

Given these developments, understanding the relationship between geopolitics and the evolving global order is critical for policymakers, academics, and citizens alike. By investigating the fundamental dynamics driving global events and predicting future trends, we may better manage the complexity of our linked globe and work toward a more stable, prosperous, and secure future.

"Changing world order scenarios" refers to prospective shifts or transformations in the global political, economic, and social systems that influence international relations. These situations can be caused by a variety of circumstances, including geopolitical tensions, technological developments, economic changes, environmental concerns, and shifts in power dynamics between nations. The word refers to the study of alternate futures or potential possibilities for how the world might change, which frequently involves speculative research and predictions. These scenarios could include a wide variety of possibilities. For example, the Cold War era was one in which two major powers or blocs competed for global dominance.

2. The Development of Emerging Economies

Countries such as China, India, Brazil, and others are playing increasingly important roles in the global economy, challenging the traditional supremacy of Western nations. Trade Dynamics: Tariffs, trade agreements, and trade wars all influence global supply chains and international economic relationships. For example, the World Trade Organization, Regional Trade Agreements (RTAs): examples include the EU's Single Market, NAFTA (now USMCA), and ASEAN. Bilateral Trade Agreements: For instance, the Comprehensive Economic and Trade Agreement (CETA) between Canada and the EU aims to reduce tariffs and expand markets.

Financial Centre Shift: Emerging financial hubs in Asia and the Middle East are gaining prominence, challenging conventional financial centres such as New York and London. Technological disruption: The digital revolution is transforming industries, creating new economic opportunities, and reshaping global trade patterns.

Wars driven by technological developments have influenced history:

- Radar, encryption, and nuclear weapons all played important roles during World War II.
- Cold War: Competitions in space exploration and nuclear weapons defined the period.
- Cyber Warfare: Modern battles include cyber strikes for disruption and espionage.
- Arms races occur when nations compete for military technological superiority.
- Traditional and cyber-enabled espionage both seek out advanced technologies.
- Drone Warfare: With their targeted strikes and monitoring capabilities, drones have redefined warfare.

AI Dominance: Leading nations, such as the United States and China, are influencing AI's future.

- 5G Expansion: China and South Korea are the leaders in 5G adoption, influencing worldwide norms.
- Importance of Cybersecurity: Global efforts to counter escalating cyber dangers.
- Renewable Energy Shift: China and Germany tend to be the leaders in renewable energy adoption.
- Space Exploration: Private enterprises such as SpaceX promote space innovation.
- Biotech Advancements: The United States, Japan, and Israel are leaders in biotechnology research

Political sphere:

Rise of China: China's expanding economic and military power has reshaped global politics, challenging the traditional dominance of Western nations such as the United States and Europe. Another example is China’s Belt and Road Initiative (BRI), which aims to improve connectivity and infrastructure across Asia, Africa, and Europe. Through this, China seeks to alter global trade routes.

Proxy wars:
Major nations use geopolitical tactics to support opposing forces or governments in wars worldwide. Proxy wars are employed to expand influence, weaken adversaries, and achieve strategic goals without direct conflict. Examples include the conflicts in Syria, Yemen, and Ukraine, where regional and global powers back opposing factions in complex geopolitical rivalries. Ideological competition: Many geopolitical conflicts and struggles for influence are rooted in ideologies such as democracy versus authoritarianism, liberalism versus nationalism, and capitalism versus socialism. These ideological battles influence alliances, international conventions, and state actions on the global stage. Such political wars highlight the intense competition and power struggles that shape the changing world order. Countries aim to exert influence, protect their interests, and influence the future of global politics.

In a changing world order, the role of military forces frequently shifts and adapts to reflect new geopolitical dynamics, threats, and strategic priorities.

1. **World War I (1914-1918):** Global conflict centered in Europe between the Allied and Central Powers, characterized by trench warfare and technological advancements.
2. **World War II (1939-1945):** Global conflict involving Axis and Allied Powers, marked by large-scale battles, genocide, and atomic weapons.
3. **Vietnam War (1955-1975):** Prolonged conflict between communist forces and South Vietnam, with significant U.S. involvement and eventual reunification under communist rule.
4. **Korean War (1950-1953):** Conflict between North and South Korea, ending in an armistice and division of the Korean Peninsula.
5. **Iraq War (2003-2011):** U.S.-led invasion of Iraq, resulting in the overthrow of Saddam Hussein but leading to prolonged instability and insurgency.
6. **Syrian Civil War (2011-present):** Complex conflict involving multiple actors, including the Syrian government, opposition forces, and international powers, leading to widespread death and displacement.

In conclusion, the changing world order has gone through constant shifts from hegemony, unipolarity, bipolarity to multipolarity of balance of power, influence, and alliances throughout history. By exploring the historical contexts, current trends, and future scenarios, the study of geopolitics and the evolving world order provides a framework for analyzing global politics.

3. Legacy of Changing World Order

Geopolitics has had a significant impact on international relations, conflicts, and alliances. It affects resource allocation, territorial disputes, and global power dynamics, leaving a lasting imprint on cultures and economies worldwide. Furthermore, geopolitical strategies constantly evolve to reflect modifications in technology, economy, and ideology.

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CHAPTER 12

ANALYSIS OF TEACHING METHODOLOGIES IN THE IT SECTOR: A COMPREHENSIVE STUDY

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Abstract

In the current era, where the development of the Computer Science field and the number of students opting for it are skyrocketing, students are performing very well, and institutions are achieving exceptional results. While everything appears positive, we must recognise that some students do not perform as well and face issues that may stem from gaps in teaching methods and communication between teachers and students. This study compares various teaching methodologies used in computer science education. The methods employed by educators are a crucial factor influencing the learning experience. By examining different approaches, this research aims to assess their effectiveness and highlight the impact of various teaching and learning strategies. The scope includes diverse teaching methodologies and blended learning models. We evaluate these methods based on factors such as student satisfaction and the development of critical problem-solving skills. Additionally, the study explores the role of technology and its integration into computer science education. Our goal is to identify the strengths and weaknesses of each methodology. The insights gained will support better decisions regarding the adoption and adaptation of teaching strategies to optimize the IT sector. Ultimately, this research contributes to the ongoing improvement of computer science education and the enhancement of learning experiences for students in this vital field.

Keywords: Computer Science Education, Teaching Methodologies, Student Learning Outcomes, Educational Research.

1. Introduction

Computer science education is rapidly evolving and seeing a surge in student enrollment and institutional performance, highlighting the field's significance. However, we cannot overlook the challenges faced by students who may not be thriving due to gaps in teaching methodologies and

communication between educators and students. It is crucial to address these challenges to ensure all students can succeed.

Teaching can be defined as a multifaceted and complex process that involves imparting knowledge, skills, and values to others. This can be achieved through various methods, such as instruction, demonstration, modeling, and coaching. Teaching encompasses a range of tasks undertaken by an instructor, such as providing explanations, drawing conclusions, posing questions, inspiring motivation, recording attendance, and maintaining comprehensive records of students' achievements, development, and background details. The role of students in the teaching process is crucial as they help shape the future. The way they are taught and brought up in the teaching environment plays an important role in defining their skill levels and abilities to perform various tasks in their respective fields. Therefore, we, as teachers, are required to create an environment that ensures students receive the best education possible and develop the necessary skills for their future careers. We will analyze gaps from the perspectives of teachers and students in our research.

2. Literature Review

The most important criterion for evaluating good teaching is the quality and amount of learning students gain. Most teachers tend to rely on traditional teaching methods, which focus on the teacher and neglect interaction with students. However, teachers must recognise that students do not learn in the same way or at the same pace. Each student has a different level of understanding of any subject, so teachers must employ various teaching methods to effectively reach each student. Additionally, advances in communication, information, and educational technology have shifted the mindset of the current generation, necessitating the search for new teaching techniques.[1]

Teachers bring about transformation in their students through techniques such as developing skills, adjusting attitudes, and grasping specific scientific principles that govern the learning environment. Consequently, learning may be seen as an enduring form of change. (Sequeira, 2012) [2]. Nevertheless, every student desires to be regarded as an adult learner, possessing some degree of autonomy in the learning environment by being able to ask questions and have their uncertainties addressed, thereby fostering active engagement in higher education. (Michael, and Modell, 2003) [3]. Put differently, students anticipate overseeing the learning process (Mitra, 2008[4]; Pond & Rehan, 1997[5]).

3. Methodology

The methodology employed in this research paper aimed to provide a comprehensive analysis of the feasibility of Teaching Methodology in India, considering the various factors that impact its

potential success. The methodology enabled the collection and analysis of quantitative data to improve the Teaching environment and ensure a better one for the students.

4. Study of Current Teaching Methods Being Followed

As the generations have passed, the teaching methodology has also been passed down from one generation to the next. The way students are being taught is the foundation for future teachers in the industry. Currently, as we observe the rapid evolution of technology, we have entered the era of "Artificial Intelligence - AI," which has created a new environment for learning and improvisation. However, it has also led to a setback in the efficiency of the teaching process, as it is being exploited by students today, who use shortcuts to complete their assignments. This leaves teachers questioning their methods and the effectiveness of their teaching. To understand the gaps from the students' perspective- those that lead them to choose shortcuts just to finish their work and to neglect their studies during class- a survey was conducted. The survey revealed two main reasons for this behaviour.

(A) ***Amount of Emphasis on Theory and Assignment Based Session:*** From the data collected it was found that the Teaching methods that are mostly used are *Theoretical & PPT-oriented session* which becomes monotonous for the students and they are unable to relate and connect to what is being taught in the class which affects their interest in the topic further making them choose other options out there to come around it. This issue may stem from a teaching approach heavily focused on theory, neglecting practical applicability and failing to prioritize the learner's involvement in the educational journey. Consequently, essential knowledge, skills, and competencies may not be effectively acquired, leading to graduates who lack employability. [6]

(B) ***The Limitations of Interactive Sessions:*** Teaching relies on the collaboration of two parties. When one of them loses interest and becomes distracted, it can significantly hinder the entire teaching process. This may happen because the teaching method is not effective or the student lacks interest. One common concern among students is the fear of embarrassment in front of their peers. This may be due to the large class sizes and embarrassment during public speaking.[7]

5. Steps To Improve Learning Experience

To elevate the quality of teaching while also stimulating student interest and engagement, we can implement the following measures:

(A) ***More Emphasis on Practical Base Teaching:*** Approaching students from the perspective of teaching them through examples is highly effective. However, it is important to avoid using pre-existing examples from the web. Instead, we should provide examples from scratch to create an engaging learning environment. This practice fosters curiosity among students and encourages them to actively participate and interact. By doing so, students can

develop a more logical approach to achieving their learning goals and develop a genuine interest in the subject.

(B) ***Interactive Session's:*** The teacher should encourage students' initiative and activities, allowing them to create their own understanding of concepts based on their learning and experiences.[8] To make classes more interactive and approachable, teachers can use daily life examples to explain topics. For Example, if we talk about "Looping in Programming" say Do-While Loop, we can explain it to students by it works in a manner such as we humans wake up and brush our teeth and it is performed once in the morning, say we have a condition that while our teeth are clean, we stop brushing. In this case, the person would only brush again if he finds his teeth dirty.

This approach would be helpful to students, as they would be able to relate to it and understand the concept more easily.

6. Conclusion

Effective computer science education requires a nuanced understanding of diverse learning needs. Traditional and blended learning models both have benefits, and a symbiotic teacher-student relationship is essential. To address challenges, a holistic approach is required that considers educational techniques and a supportive learning environment. Technology should enhance, not replace, effective teaching. Institutions should thoughtfully assess and refine their teaching strategies to foster exceptional results and critical problem-solving skills. Ultimately, computer science education should prepare students for the dynamic world of technology.

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National Symposium

St. Xavier's College Jaipur has been a vibrant hub for intellectual discourse and academic collaboration through its National Symposium series. Each year, the college organizes thematic symposiums that bring together scholars, practitioners, and students to engage with pressing issues affecting society and development.

2023-24: Three-Day National Symposium on "Envisaging Viksit Bharat @ 2047"

Three-Day National Symposium on Knowledge Transfer Programme scheduled for March 2-4, 2024, focuses on the theme "Envisaging Viksit Bharat @ 2047." This event aims to explore strategies for India's development over the next two decades, particularly in terms of knowledge transfer, sustainable practices, and innovative policies. It will feature keynote speakers, panel discussions, and interactive sessions, encouraging dialogue on the role of education and research in achieving a developed nation.

2022-23: 2nd National Symposium on "The Impact of Socio-economic Policies on Global Development."

Held on March 13-14, 2023, the 2nd National Symposium continued the exploration of "The Impact of Socio-economic Policies on Global Development." This symposium sought to critically assess how various socio-economic policies have shaped global development trends and addressed contemporary challenges. It featured diverse perspectives from academia and industry, encouraging discussions on effective policy-making.

2021-22: 1st National Symposium on "Socio-economic Policies"

The inaugural National Symposium, held on March 10-11, 2022, laid the groundwork for these discussions with a similar theme. It provided a platform for scholars to analyze the implications of socio-economic policies on various aspects of global development, fostering an environment of knowledge sharing and interdisciplinary engagement.

Warm Regards
Research Project Committee

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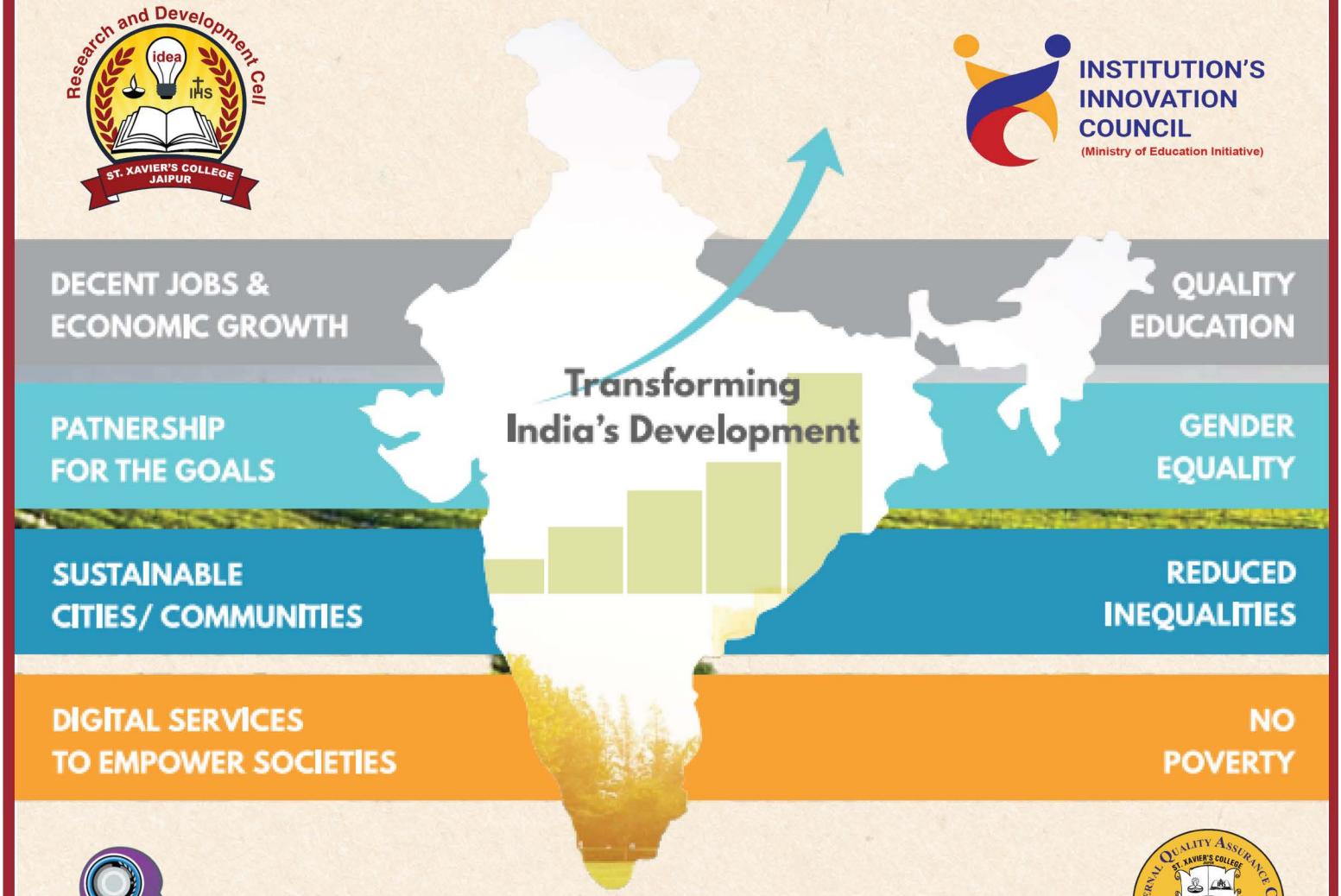

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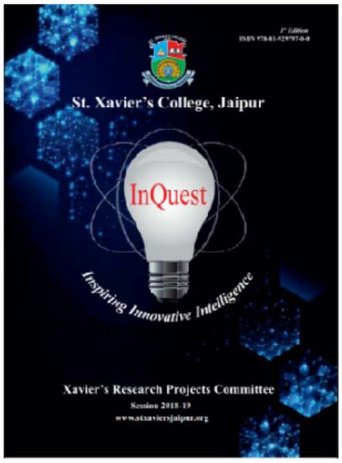

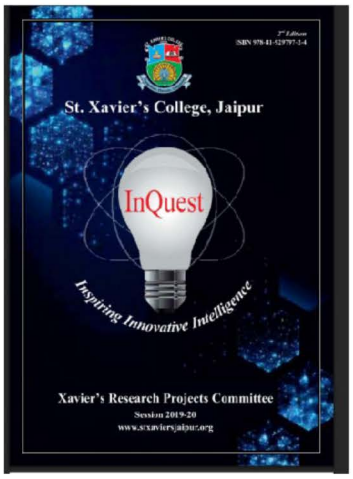

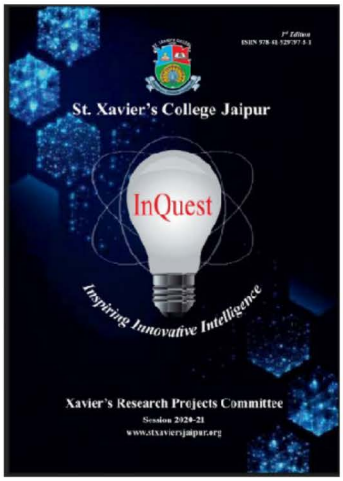

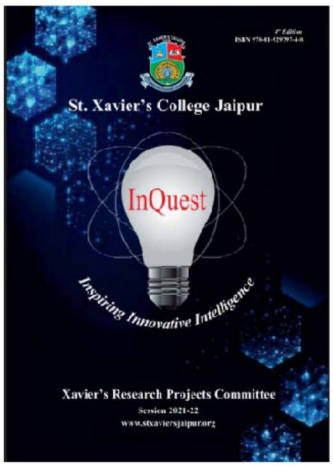

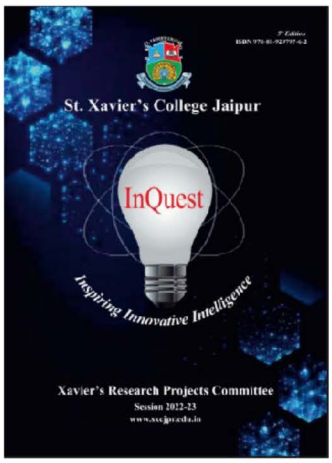

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