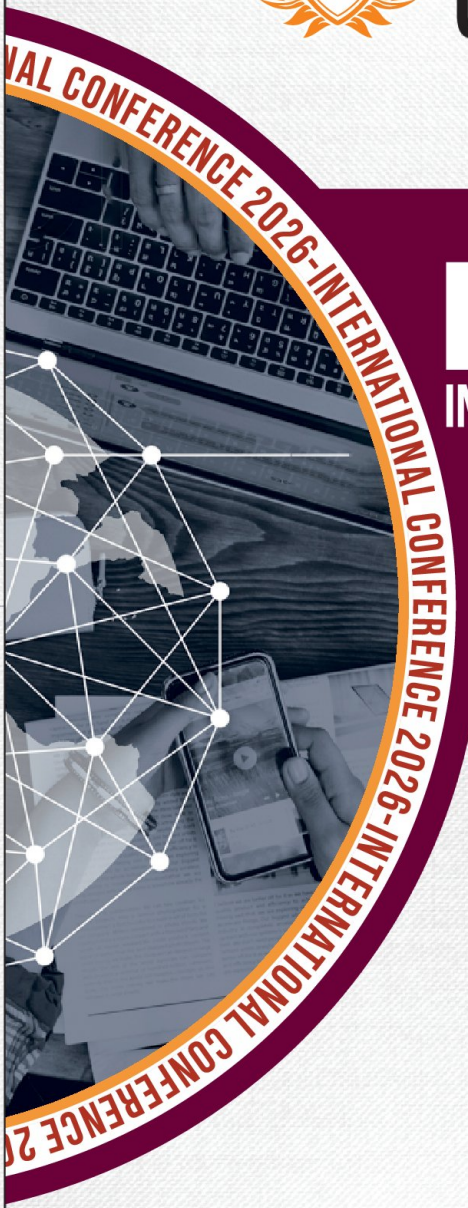
# ANJANEYA UNIVERSITY




# INCON 26
## INTERNATIONAL CONFERENCE-2026

## GLOBAL CONVERGENCE

### BUSINESS, TECHNOLOGY, AND HUMANITIES FOR SUSTAINABLE DEVELOPMENT

**HYBRID MODE**

**FEBRUARY 27- 28 - 2026**

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# International Conference
# on
# Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)

February 27-28, 2026

***Conference Proceedings***


**Editors**

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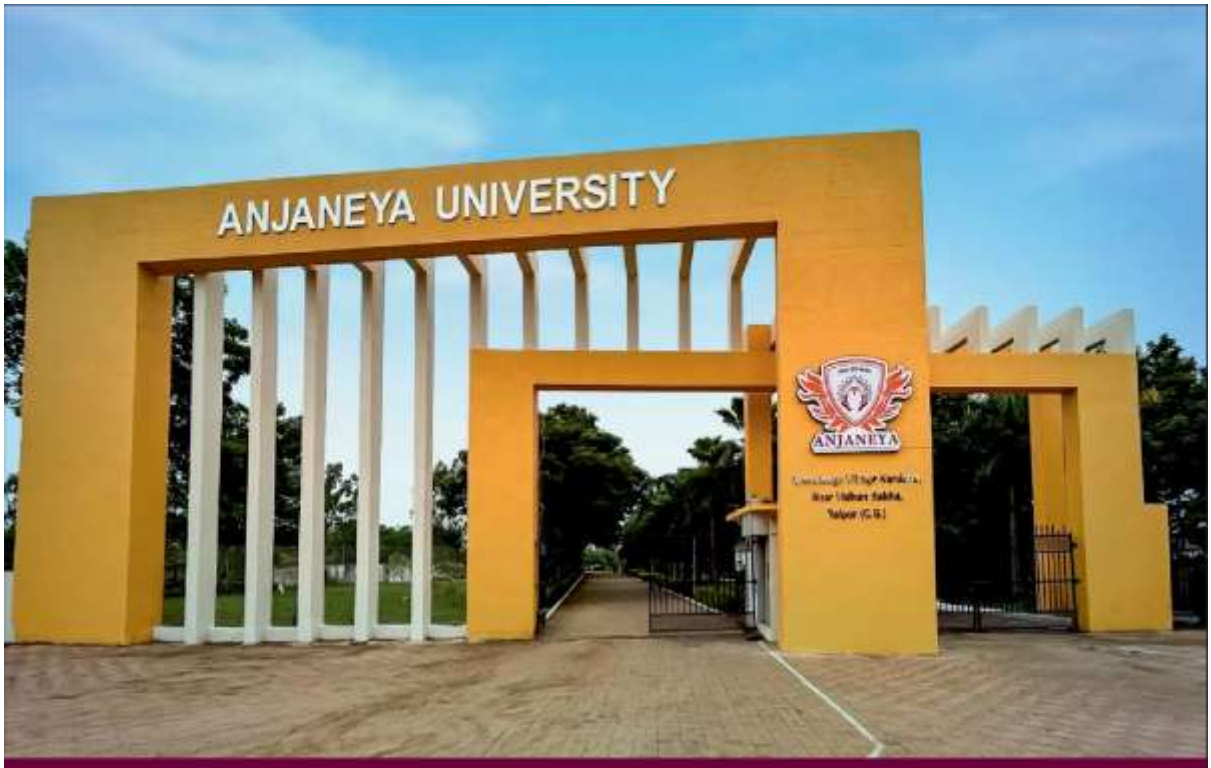


# ABOUT ANJANEYA UNIVERSITY

Anjaneya University, located in Raipur, Chhattisgarh, is a leading institution dedicated to academic excellence, research and innovation. The university has established itself as a hub for quality education, offering a diverse range of programs in Management., Arts, Commerce, Science, Engineering, Law, Pharmacy and Education. With a strong emphasis on holistic learning and industry-oriented education, Anjaneya University is shaping the future of higher education by nurturing leaders, innovators and change-makers.

The university follows a student-centric approach, ensuring that learning is engaging, interactive and application-based. The curriculum is designed to integrate theoretical knowledge with practical skills, enabling students to gain hands-on experience in their respective fields. Faculty members at Anjaneya University are highly qualified professionals and researchers, dedicated to providing mentorship and guidance to students.

To enhance learning, the university offers cutting-edge research opportunities, industry collaborations, and international academic partnerships. These initiatives help students stay ahead in a rapidly evolving global landscape and prepare them for successful careers in various industries.

**AT OUR UNIVERSITY, WE DON'T JUST TEACH LESSONS; WE SHAPE FUTURES.**

# ABOUT THE CONFERENCE

In the 21st century, the boundaries between business, technology, and humanities are becoming increasingly blurred. Technological innovations are reshaping industries, governance, education, and society, while global challenges demand inclusive and ethical solutions.

The international conference offers a multi-disciplinary platform for academicians, researchers, industry experts, policymakers, and students to share insights, discuss challenges, and propose actionable solutions. The event aims to create a knowledge ecosystem that bridges Engineering, Science, Management, Law, Arts and Humanities, and Pharmacy.

**Conference Objectives**

- To explore the convergence of business, technology, and human values in a globalized context.
- To foster interdisciplinary research and collaborations across diverse domains.
- To provide insights into sustainable, ethical, and inclusive practices for future societies.
- To generate policy recommendations and innovative models for global development.

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**Smt. DIVYA AGRAWAL**
PRO-CHANCELLOR, ANJANEYA UNIVERSITY

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Anjaneya University

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**Prof. Parin Somani**, CEO, London Organsation of Skill Development (LOSD),UK
**Prof. Naresh Agarwal**, Simmons University, Boston, Massachusetts, USA
**Dr. Amitansu Pattanaik**, Senior Scientist, DRDO, New Delhi
**Dr. Bella Damodar Shenoy**, Scientist, National Institute of Oceanography, Vishakhapatnam.
**Dr. Dinesh Kumar Chelike**, Scientist, CSIR, Institute of Chemical Technology, Hyderabad.
**Mr. Bhavik Bhatt**, Founder & CEO, Vox Parc, Singapore.
**Mr. Abhay Singh**, Global HR Leader, Lixil Global, Thailand.
**Dr. Amit Alexander**, Associate Professor, Department of Pharmaceutics, NIPER, Guwahati.
**Dr. Kamlesh Kumar Shukla**, Professor, SoS in Biotechnology, Pt. Ravishankar Shukla University, Raipur.
**Dr. Sushil Kumar Shahi**, Professor and Head, Department of Botany, Guru Ghasidas University, Bilaspur.
**Dr. Wasim Raza**, Scientist, CCOST, Raipur.
**Dr. Shama Baig**, Swami Shri Swaroopanand Saraswati Mahavidyalaya, Bhilai
**Dr. Ashish Saraf**, Professor, MATS University, Raipur, Chhattisgarh.
**Mr. Kishore Gembali**, Senior Manager, Talent Management, Mastek, Ahmedabad.
**Dr. Debashish Mukherjee**, Principal, Mahant LND College, Raipur.
**Dr. Kartik Nakhate**, Associate Professor, SVKM NMIMS Global University, Dhule, Maharashtra.
**Dr. Dinesh Kushwaha**, Professor, Avdesh Pratap Singh University, Rewa, M. P.
**Dr. Sunil Kumar Kashyap**, Professor, CRSI India

## Message from the Hon'ble Governor, Chhattisgarh

INCON 26
INTERNATIONAL CONFERENCE-2026

रमेन डेका
Ramen Deka

लोक भवन, रायपुर
Lok Bhavan, Raipur

सत्यमेव जयते

राज्यपाल, छत्तीसगढ़
Governor, Chhattisgarh

No./ 102 /PRO/LS/2026
Raipur, 20 Feb 2026

### Message

I am pleased to learn that Anjaneya University, Raipur, Chhattisgarh, is organizing an International Conference on "Global Convergence: Business, Technology & Humanities for Sustainable Development (INCON 26)" on 27–28 February 2026. I extend my warm greetings and best wishes to the organizers, participants and all associated with the conference, as well as for the release of the conference souvenir.

In today's rapidly evolving world, the convergence of business, technology and the humanities is essential for sustainable and inclusive development. Interdisciplinary collaboration plays a vital role in addressing contemporary challenges and translating knowledge into practical solutions.

Such conferences provide a valuable platform for academic exchange and collaborative research. I appreciate the efforts of the organizing committee and wish the conference great success.

(Ramen Deka)

## Message from the Hon'ble Minister of Higher Education, Chhattisgarh

INCON 26
INTERNATIONAL CONFERENCE-2026

टंक राम वर्मा
TANK RAM VERMA

मंत्री
छत्तीसगढ़ शासन
राजस्व एवं आपदा प्रबंधन,
पुनर्वास, उच्च शिक्षा विभाग
Minister of
Revenue and Disaster Management,
Rehabilitation, Higher Education Department
Govt. of Chhattisgarh

आदेशास. पत्र क्र. 324 /2026 दिनांक 17/02/2026

### -: शुभकामना संदेश :-

**ANJANEYA UNIVERSITY, Raipur (CG)** द्वारा दिनांक 27 से 28 फरवरी 2026 को आयोजित दो दिवसीय अंतर्राष्ट्रीय शोध संगोष्ठी **"Global Convergence: Business, Technology and Humanities for Sustainable Development"** के सफल आयोजन हेतु मैं आयोजक मण्डल, विद्वत् समुदाय, प्रतिभागियों एवं विश्वविद्यालय परिवार को हार्दिक बधाई एवं शुभकामनाएँ प्रेषित करता हूँ।

इस संगोष्ठी द्वारा वैश्विक दृष्टिकोण, नवीन शोध, विचार–विमर्श एवं अनुभवों का आदान–प्रदान निश्चित ही भारत देश को सशक्त बनाने की दिशा में सार्थक मार्गदर्शन प्रदान करेगा।

मुझे पूर्ण विश्वास है कि इस शैक्षणिक पहल से न केवल शैक्षिक गुणवत्ता में वृद्धि होगी, बल्कि नीति–निर्माण और विकास योजनाओं के लिए भी उपयोगी निष्कर्ष सामने आएंगे। उच्च शिक्षा के क्षेत्र में इस प्रकार के चिंतन–मंथन एवं नवाचार की आवश्यकता सदैव रहती है। आपका यह प्रयास अनुकरणीय एवं सराहनीय है।

मंगलकामनाएं ...

(टंक राम वर्मा)

प्रति,

(Dr. T Rama Rao)
Vice Chancellor,
ANJANEYA UNIVERSITY, Knowledge Village Nardaha,
Near Vidhan Sabha, Raipur (CG)

निवास- बी-5/10, शंकर नगर, रायपुर (छ.ग.) पिन कोड- 492001, दूरभाष- 0771-2991022
कार्यालय- कक्ष क्र. एम-1/17, मंत्रालय, महानदी भवन, नवा रायपुर, अटल नगर (छ.ग.) 492002, दूरभाष- 0771-2510527, 0771-2221221

## Message from the Hon'ble Member of Parliament, Raipur, Chhattisgarh

INCON 26
INTERNATIONAL CONFERENCE-2026

बृजमोहन अग्रवाल
सांसद,
रायपुर लोकसभा क्षेत्र
एवं पूर्व मंत्री, छत्तीसगढ़ शासन

निवास : बी-5/1, शंकर नगर, रायपुर
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क्रमांक CVIP /सांसद रायपुर लोकसभा/ रायपुर, दिनांक 23/02/26

### "Message"

I am delighted to note that Anjaneya University is convening an International Conference on the theme "Global Convergence: Business, Technology and Humanities for Sustainable Development" '

on 27-28 February 2026. This landmark initiative reflects the University's commitment to fostering interdisciplinary dialogue and advancing collaborative solutions to address the evolving challenges of sustainable global progress.

In an era marked by rapid transformation and complex global challenges, the need for an integrated approach to development has never been more critical. The convergence of business leadership, technological innovation, and the guiding principles of the humanities offers a powerful framework for building resilient economies, equitable societies, and environmentally responsible systems. By creating a platform for exchanging dialogue among academicians, industry experts, policymakers, and researchers, this conference underscores the vital role of higher education institutions in shaping a sustainable and inclusive future.

I am pleased to note that distinguished delegates from India and abroad will share their expertise and perspectives through keynote addresses and deliberative sessions. Such exchange of ideas will not only strengthen academic and research collaborations but also generate actionable insights that can inform policy and practice at both national and global levels. I commend the visionary leadership, organizing committee, faculty members, and students for their dedicated efforts in conceptualizing and hosting this important international gathering. Their commitment to academic excellence and societal progress is truly appreciable.

I extend my heartfelt greetings and best wishes to all participants and delegates. I am confident that the deliberations of this conference will lead to innovative solutions, meaningful partnerships, and lasting contributions toward sustainable development for our nation and the global community. I wish the conference every success.

(Brijmohan Agrawal)

## From the Desk of the Chancellor

I am extremely pleased to welcome you to the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development", being hosted by Anjaneya University on 27–28th February 2027. This conference provides a dynamic platform for academicians, researchers, industry leaders, policymakers, and thought leaders to engage in meaningful dialogue on how the integration of diverse disciplines can address pressing global challenges and foster sustainable growth.

We are privileged to witness the participation of both seasoned professionals and emerging scholars, creating a collaborative environment where interdisciplinary knowledge exchange fuels innovation and inclusive progress. The convergence of business strategies, technological advancements, and humanistic values strengthens our shared commitment to building resilient institutions, ethical systems, and sustainable communities.

In today's rapidly evolving world, sustainable development demands not only technological excellence and economic efficiency but also social responsibility, cultural sensitivity, and ethical governance. This conference embodies that holistic vision—encouraging dialogue that bridges sectors, geographies, and perspectives to shape solutions that are equitable, responsible, and future-ready.

On this occasion, I extend my heartfelt gratitude to all individuals and organizations who have contributed to making this conference a reality. The dedicated efforts of the steering and organizing committees have been instrumental in ensuring the successful execution of this event. I also express my sincere appreciation to my esteemed colleagues and collaborators whose unwavering support has been invaluable.

Most importantly, I thank all participants for enriching this conference with your insights, research, and innovative ideas. I invite each one of you to actively engage in thought-provoking discussions, build meaningful collaborations, and contribute toward shaping a sustainable future through global convergence. Let us work together to translate knowledge into action for the betterment of society and generations to come.

Abhishek

**Abhishek Agrawal**
Chief Patron, INCON 26

## From the Desk of the Pro-Chancellor

It gives me immense pleasure and privilege to welcome you all to the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development", being held on 27-28th February 2026 at Anjaneya University. The University takes great pride in organizing this prestigious conference, bringing together distinguished academicians, industry leaders, innovators, and policymakers from across disciplines and geographies.

The primary objective of this conference is to provide a vibrant and intellectually stimulating platform for scholars, researchers, professionals, and thought leaders to share their insights, research, and transformative ideas. By fostering dialogue across business, technological innovation, and humanistic perspectives, the conference seeks to encourage collaborative solutions to global challenges and promote sustainable development at local, national, and international levels. It aims to strengthen interdisciplinary research, institutional partnerships, and global networks that are essential for inclusive and responsible progress.

I extend my heartfelt congratulations to all delegates for choosing this esteemed platform to present and deliberate upon their work. We are confident that this conference will feature insightful discussions and pioneering presentations, highlighting innovative approaches that integrate economic growth, technological advancement, and social responsibility for a sustainable future.

I wish all delegates fruitful deliberations and an enriching academic experience at Anjaneya University. May this conference serve as a meaningful opportunity for learning, collaboration, and collective advancement toward building a more sustainable and harmonious world.

I wish the conference a grand success!

**Divya Agrawal**
Chief Patron, INCON 26

## From the Desk of the Vice Chancellor

It gives me immense pleasure to pen down this foreword for the Proceedings of the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)", organized by Anjaneya University on 27–28th February 2026. Staying true to our commitment to fostering academic excellence, research innovation, and societal impact, this conference serves as a vital platform for the exchange of transformative ideas at the intersection of disciplines that shape our collective future.

The conference seeks to bring together researchers, industry leaders, policymakers, and scholars from across the globe, creating a collaborative space for meaningful dialogue on sustainable development through interdisciplinary integration. The enthusiastic participation of academicians and professionals—both from India and abroad—reflects the growing recognition that global challenges demand convergent solutions rooted in business innovation, technological advancement, and humanistic values. It is evident that sustainable progress can only be achieved when economic growth, digital transformation, and social responsibility move forward in harmony.

I am confident that delegates and participants will derive immense value from the insightful deliberations, forward-looking presentations, and collaborative engagements that define this conference. The exchange of ideas and experiences during these two days will undoubtedly strengthen research initiatives, institutional partnerships, and policy frameworks aimed at inclusive and sustainable development.

I extend my best wishes for the grand success of INCON 26 and firmly believe that this conference will establish new benchmarks in interdisciplinary research and global collaboration. May it serve as a catalyst for continued dialogue, innovation, and collective action toward building a sustainable and equitable future.

**Dr. T. Rama Rao**
Patron, INCON 26

## From the Desk of the Director General

It is my privilege and honour to welcome you all to the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)", being held on 27–28 February 2026, at Anjaneya University, Nardaha, Raipur, CG.

The primary objective of this conference is to foster the exchange and expansion of knowledge across disciplines that are pivotal to sustainable development. In an era marked by rapid technological transformation, evolving business ecosystems, and complex societal challenges, it is essential to create platforms that encourage integrated thinking. Conferences such as this play a vital role in aligning innovation with ethical responsibility, economic progress with social inclusion, and technological advancement with human values.

INCON 26 offers a unique opportunity for academicians, industry professionals, researchers, and policymakers to explore emerging trends, share transformative ideas, and collaborate across domains. By bridging the gap between academia, industry, and society, the conference seeks to promote interdisciplinary research, meaningful partnerships, and actionable strategies that contribute to resilient and sustainable global development.

We hope that you will find this conference both enriching and insightful, and that it will serve as a catalyst for further innovations in this critical field. Additionally, we invite you to experience the cultural and academic excellence of Anjaneya University during your visit.

I whole heartedly invite all participants to engage with enthusiasm and vigor, as this event promises to offer immense exposure and global opportunities to everyone involved.

**Dr. B.C. Jain**

Patron, INCON 26

## From the Desk of the Director

It gives me immense pleasure to extend my warm greetings to all delegates, scholars, industry leaders, and distinguished guests participating in the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)", being organized on 27–28 February 2026 at Anjaneya University, Raipur, Chhattisgarh.

In an era defined by rapid technological transformation, evolving business paradigms, and complex societal challenges, the need for interdisciplinary collaboration has never been more critical. Sustainable development is no longer the responsibility of a single sector; rather, it demands a harmonious convergence of innovation, ethical leadership, social responsibility, and human-centered thinking. This conference embodies that very spirit—bringing together diverse perspectives to deliberate on solutions that are practical, inclusive, and future-ready.

INCON 26 aims to create a vibrant platform where research excellence meets real-world application. By fostering dialogue among academia, industry, and policymakers, we seek to encourage partnerships that translate knowledge into meaningful action. The exchange of ideas during this conference will not only strengthen scholarly inquiry but also inspire innovative strategies that contribute to sustainable economic growth, technological advancement, and social well-being.

I am confident that the insightful keynote sessions, technical presentations, and collaborative discussions will provide valuable learning experiences and open new avenues for research and cooperation. I encourage all participants to engage actively, build networks, and take forward the shared vision of creating a balanced and sustainable global ecosystem.

I extend my sincere appreciation to the organizing committee, speakers, contributors, and partners whose dedication has made this conference possible.

Wishing INCON 26 a grand success and a lasting impact on the journey toward sustainable development.

**Dr. Jayendra Narang**
Patron, INCON 26

## Message from the Desk of the Director Academics

With great enthusiasm and anticipation, Anjaneya University is delighted to welcome you all to the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)" scheduled on 27-28th February 2026**.**

This conference aspires to bring together distinguished academicians, researchers, industry leaders, policymakers, and innovators on a dynamic and collaborative platform to deliberate on interdisciplinary approaches to sustainable development. It is designed to foster meaningful knowledge-sharing, stimulate innovation, and encourage insightful discussions on how business strategies, technological progress, and humanistic values can collectively address global challenges.

Our shared objective is to inspire transformative ideas that promote inclusive growth, ethical governance, digital advancement, and social responsibility. By facilitating constructive engagement between academia, industry, and society, we seek to pave the way for sustainable models that strengthen economies, empower communities, and preserve our shared future.

We look forward to thought-provoking keynote addresses, impactful research presentations, and enriching networking opportunities that will spark new collaborations and forward-looking initiatives across sectors and borders.

Welcome to an event that promises to contribute significantly to shaping a sustainable and interconnected global future through convergence and collaboration.

**Dr. Sandhya Verma**
Patron, INCON 26

## From the Desk of the Registrar

It gives me great pleasure to welcome all delegates, academicians, researchers, industry professionals, and distinguished guests to the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)", being held on 27–28 February 2026 at Anjaneya University. This conference reflects our institution's steadfast commitment to academic excellence, interdisciplinary research, and meaningful global engagement.

In today's interconnected world, sustainable development requires collaborative efforts that integrate innovative business practices, technological advancements, and humanistic values. INCON 26 provides a vibrant platform for dialogue and knowledge exchange, encouraging participants to explore holistic approaches that address economic, social, and environmental challenges with responsibility and foresight.

I am confident that the insightful deliberations, scholarly presentations, and collaborative interactions during this conference will inspire new partnerships and research initiatives. Such engagements not only strengthen institutional networks but also contribute to shaping policies and practices that promote inclusive and sustainable progress.

I extend my sincere appreciation to the organizing committee, speakers, and participants for their dedication and valuable contributions. Wishing you all a productive conference and a memorable experience at Anjaneya University.

**Dr. Rupali Chowdhury**

Co-Patron, INCON 26

## Message from the Convener

I am honoured to extend a warm welcome to all participants of the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)" from 27-28th February 2026 at Anjaneya University.

The past few years have been transformative for the world, reshaping economies, accelerating technological adoption, and redefining the role of human values in governance and development. As we move forward in an era of rapid change and global interdependence, professionals from industry, academia, research, and policy domains are coming together to create solutions that are innovative, inclusive, and sustainable. Addressing complex global challenges requires the convergence of business acumen, technological advancement, and humanistic insight to ensure balanced and responsible progress.

The objective of this conference is to provide a vibrant platform where experts, scholars, and practitioners can share their knowledge, research, and experiences, while inspiring the next generation of leaders and innovators. Through engaging deliberations, we will reflect on the evolving dynamics of sustainable development, explore emerging trends, and examine strategies that integrate economic growth with ethical responsibility and social well-being.

I sincerely hope that all participants will have a fruitful and enriching experience, making the most of the insightful presentations, collaborative discussions, and valuable networking opportunities that this conference offers.

Finally, I express my heartfelt gratitude to Anjaneya University, our esteemed speakers and resource persons, and all participants whose contributions form the foundation of this significant academic endeavor. Welcome to an event that aims to shape a sustainable and interconnected global future through convergence, collaboration, and collective vision.

**Dr. Jay Kumar Dewangan**

Convener, INCON 26

## Message from the Organizing Secretary

As Organizing Secretary, it gives me immense pleasure to present the conference proceedings of the International Conference on Global Convergence: Business, Technology, and Humanities for Sustainable Development.

This international conference has served as a vibrant academic platform bringing together distinguished scholars, researchers, industry experts, and practitioners from diverse disciplines to deliberate on contemporary challenges and innovative solutions for sustainable development. The convergence of Business, Technology, and Humanities reflects our collective commitment to interdisciplinary collaboration for a more resilient and inclusive future.

The research papers compiled in this volume represent significant scholarly contributions addressing emerging trends, transformative technologies, ethical frameworks, policy perspectives, and sustainable practices across various domains. We are confident that this publication will serve as a valuable reference for academicians, researchers, policymakers, and students.

I sincerely appreciate the tireless efforts of the authors, reviewers, session chairs, advisory board members, and the entire organizing team whose dedication has made both the conference and this publication a success.

I extend my heartfelt gratitude to the university leadership for their constant encouragement and support in organizing this prestigious international event.

I hope that this publication will inspire further research, collaboration, and innovation toward achieving sustainable global development.

With best wishes,

**Prof. C. Ramesh Kumar**
Organizing Secretary
INCON 26

## Message from the Organizing Secretary

It is my great pleasure and privilege to warmly welcome each one of you to the International Conference on "Global Convergence: Business, Technology and Humanities for Sustainable Development (INCON 26)", being held on 27–28th February 2026 at Anjaneya University.

I firmly believe that this conference serves as a significant platform for academicians, industry leaders, researchers, policymakers, and scholars to come together, share perspectives, and foster meaningful collaborations across disciplines. Through dynamic discussions and knowledge exchange, we aim to explore emerging trends, sustainable business models, technological innovations, ethical frameworks, and human-centered approaches that collectively shape a resilient and inclusive global future.

This event offers a valuable opportunity for experts from diverse domains—management, technology, social sciences, humanities, and industry—to deliberate on contemporary challenges and integrated solutions aligned with sustainable development goals.

The interdisciplinary contributions of our distinguished speakers, researchers, and delegates will undoubtedly enrich the deliberations and inspire forward-thinking research and collaborative initiatives.

I take this opportunity to extend my heartfelt appreciation and gratitude to all authors, delegates, session chairs, advisory members, and organizing teams whose dedication and tireless efforts have made this conference possible. Your active participation and scholarly contributions will play a pivotal role in making INCON 26 a grand success.

Welcome to an event that strives to advance innovation, collaboration, and sustainable progress through global convergence.

**Dr. Vineet Meshram**

Organizing Secretary, INCON 26

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# *Abstracts*

# *By*

# *Keynote & Invited Speakers*

**Sustainable Innovation for a Human-Centred Future**

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This keynote explores how sustainable innovation must evolve beyond technological advancement to intentionally serve human well-being, social equity, and long-term planetary resilience. It argues that innovation is no longer defined by speed or scale alone, but by its capacity to create durable value for people, communities, and ecosystems. The address outlines a human-centred framework that integrates ethical design, inclusive participation, regenerative business models, and cross-disciplinary collaboration. It highlights how organizations can shift from extractive growth patterns toward adaptive systems that prioritize circularity, accountability, and shared prosperity.

Through practical examples and strategic principles, the talk demonstrates how human needs, behavioral insight, and local context can guide more effective and adoptable solutions. It emphasizes that sustainability is not a constraint on creativity but a catalyst for better problem-solving and deeper innovation. Leaders are encouraged to measure success through multi-dimensional impact — environmental, social, cultural, and economic — rather than short-term outputs.

The keynote concludes with a call to action: to design with empathy, build with responsibility, and innovate with foresight. A truly future-ready approach places people at the center while aligning progress with the limits and opportunities of our shared world.

**From Ocean Biodiversity to Biotechnology: Why Missing Marine Fungi Matter**

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The fungal kingdom represents a significant portion of Earth's biodiversity, yet estimates suggest that over 95% of fungal species remain undiscovered, effectively serving as "fungal dark matter". This presentation explores the ecological and biotechnological significance of these missing fungi, with a specific focus on the marine environment. Unlike their terrestrial counterparts, marine fungi have evolved under intense selective pressures—such as high salinity, low temperature, and extreme hydrostatic pressure—resulting in unique metabolic adaptations and the production of novel bioactive compounds that are finely tuned for survival.

While the pharmaceutical potential of fungi is evident in historical success stories like Penicillin and Cephalosporins, the translation of marine fungal discoveries into commercial products faces critical bottlenecks. These obstacles include the logistical difficulty of sustaining extremophilic cultures, techno-economic viability, and navigating stringent regulatory pathways. To address these challenges, I discuss emerging technological solutions such as genomic mining to uncover "silent" gene clusters and the application of synthetic biology to bypass the limitations of unculturable organisms.

Finally, the talk highlights a strategic roadmap for advancing marine fungal research in India, as proposed by Sharma et al. (2024). This ten-point program advocates for upgrading deep-sea sampling infrastructure, establishing a national repository, and fostering interdisciplinary partnerships to systematically explore India's diverse coastline. By prioritizing these initiatives, we can harness the untapped wealth of marine fungi for sustainable medical and industrial innovation.

**Cuticle Modifications in Tomato Fruit Skin Alters its Ultrastructure and Physiological Properties**

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Plant cuticles control the diffusion of water, gases and solutes, also protecting against biotic and environmental stresses. Nonetheless, their biosynthesis, macromolecular architecture, nanomechanical capabilities, and antimicrobial properties remain incompletely understood. We disrupted the tomato fruit cuticles genetically, evaluating the consequent changes in gene expression, phenotype, chemical structure, and nanomechanics by using microscopic, spectroscopic, and transcriptome sequencing methods. To study the tomato fruit cuticle, we express fungal cutinase in exocarp-specific manner in WT M82 tomato cultivar. The transgenic fruits deposited unexpectedly thicker cuticles with elevated cutin and wax content as well as distinctive surface cracks and suberized wound periderms; they had enhanced roughness, elastic modulus, stiffness, and adhesion of the cuticle surface; and they showed wide-ranging alterations in gene expression, phase state, and permeability. In addition, these fruits also exhibited remarkable resistance to *B. cinerea* penetration during postharvest storage. Taken together, our findings provide valuable knowledge on how the shifted balance among wax, cutin, and suberin that is triggered by exocarp-specific genetic modifications can remodel the fruit cuticle ultrastructure, chemistry and nanomechanics. These findings advance our understanding of fruit cuticles, link their structural and chemical attributes with their ultimate macromolecular architecture and nanomechanical properties, and shed light on how these changes impact their essential defensive roles.

**Understanding the Response of Fungal Phytopathogen to Cytokinin**

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The plant hormone cytokinin (CK) plays an important role in regulating plant development and has also been shown to contribute to plant immunity and disease resistance. Previous work, work from our group and others have demonstrated that CKs are involved in defense responses against phytopathogens. Interestingly, many plant pathogens secrete CKs, potentially manipulating host CK signaling to alter host cell cycle regulation and nutrient allocation in ways that enhance pathogenicity. Focusing on Botrytis cinerea, we reveal a dual role for CK in fungal biology that is determined by sugar availability. Under sugar-rich conditions, CK directly suppresses B. cinerea growth, development, and virulence. Molecular and cellular analyses indicate that CK is not toxic to the fungus; rather, B. cinerea appears to perceive CK and respond by slowing cell cycle progression and individual cell growth through disruption of cytoskeletal organization and intracellular trafficking. In contrast, under sugar-limiting conditions, CK enhances glycolysis and energy utilization in B. cinerea, both in vitro and in planta. Transcriptomic analyses support these observations, showing significant upregulation of genes involved in glycolysis, oxidative phosphorylation, and sucrose metabolism following CK treatment. Together, these findings suggest that the impact of CK on fungal biology is dependent on the organism's energy status. While plants may produce CK during pathogen interactions to prime defense responses and inhibit pathogen growth, B. cinerea may exploit elevated CK levels to enhance its metabolic activity and energy production in preparation for the necrotrophic phase of infection.

**Decoding the role of Abscisic acid-induced universal stress proteins for stress adaptation and plant development in Arabidopsis thaliana**

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Abscisic acid (ABA) is a key signaling molecule that governs plant responses to abiotic stresses, particularly drought, influencing growth, development, and survival. While universal stress proteins (USPs) have been implicated in stress responses, their roles in ABA signaling and drought tolerance in plants remain poorly understood. This study investigates the function of ABA-responsive USPs in Arabidopsis thaliana. We identified two ABA-responsive USP genes, AtUSP19 and AtUSP22, through genome-wide expression analysis of 44 Arabidopsis USP genes under various abiotic stresses. The expression of both genes was significantly upregulated under ABA treatment. In silico protein-protein interaction (PPI) analysis revealed that AtUSP19 and AtUSP22 interact with components of the PAF1C complex, a key regulator of floral transition. PAF1C epigenetically regulates the expression of Flowering Locus C (FLC), a critical gene controlling the vegetative-to-flowering transition in plants. T-DNA insertion mutant atusp22 exhibited early flowering under normal growth conditions, suggesting a role for AtUSP22 in regulating floral transition. Further analysis of the atusp22 mutant under ABA stress treatments demonstrated increased ABA sensitivity, as evidenced by altered germination rates and impaired root growth. Using transcriptional GUS reporter lines, we observed that AtUSP22 and AtUSP19 are expressed across all developmental tissues, with strong expression in rosette leaves of adult plants and floral organs, and lower expression in younger tissues. No expression was detected in roots or seedlings under normal conditions. However, upon ABA treatment, AtUSP22 expression shifted significantly, with reduced expression in aerial tissues and increased expression specifically in lateral and secondary roots,

but not in the primary root. In contrast, AtUSP19 expression remained consistently high in both untreated and ABA-treated plants, showing no major changes in spatial distribution. These results suggest that AtUSP22 plays a critical role in ABA signaling and mediates stress responses in Arabidopsis. To further elucidate the molecular mechanisms, we generated CRISPR knockout, overexpression, and reporter lines for AtUSP19 and AtUSP22. Our findings provide new insights into the functional roles of USPs in plant stress adaptation and flowering regulation, highlighting their potential for improving stress tolerance and developmental regulation in plants. This study paves the way for future research in plant stress biology and crop improvement.

**Keywords:** *Arabidopsis thaliana*, ABA, Drought stress, USP

**Agri-Genomics in Action: Accelerating Field Crop Gains From Lab to Land**

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Agri-genomics has rapidly transitioned from a discipline of discovery to a powerful engine driving real-world crop improvement, enabling breeders and farmers to achieve unprecedented gains in yield, resilience, and input-use efficiency. The integration of high-throughput sequencing, pangenomics, haplotype mapping, and multi-omics has transformed our capacity to dissect complex traits and identify novel alleles in both elite cultivars and underutilized germplasm, including landraces and crop wild relatives. By coupling genomic data with speed breeding, genomic selection, and precision phenotyping, modern breeding programs are shortening the varietal development cycle from decades to just a few years. Advances in genome-wide marker datasets, SNP chips, and whole-genome resequencing are enabling the identification of trait-linked loci for drought tolerance, heat resilience, micronutrient enrichment, early maturity, and biotic stress resistance across major field crops. In parallel, machine learning and genotype-to-phenotype prediction models are allowing breeders to make data-driven decisions, improving selection accuracy and accelerating genetic gain per unit time. The deployment of panomics integrating genomics, transcriptomics, epigenomics, metabolomics, and phenomics, is providing deep insights into stress-response networks, offering new targets for molecular breeding and genome editing. Furthermore, the shift toward open-access genomic databases, digital breeding platforms, and high-density germplasm-characterization pipelines is strengthening pre-breeding efforts, particularly for climate-vulnerable dryland cereals and legumes. Importantly, agri-genomics is now delivering tangible field-level impact: genomics-assisted breeding has contributed to the release of climate-smart cultivars, enhanced nitrogen-use efficiency lines, and hybrids with improved grain quality, providing benefits across smallholder and commercial farming systems. The integration of molecular tools with participatory breeding, spatial analytics, and on-farm evaluation ensures that lab-derived innovations align with farmer priorities and agro-ecological realities. As we confront the challenges of climate variability, soil degradation, and rising global food demand, agri-genomics stands as a central pillar for building resilient, productive, and sustainable agricultural systems. This talk highlights breakthrough technologies,

successful case studies, and emerging opportunities that demonstrate how genomic innovations are transforming field crops from lab to land unlocking their full potential for food, nutrition, and livelihood security in the Global South and beyond.

**Keywords:** Agri-genomics; Genomic selection; Panomics; Climate-smart crops; Accelerated breeding;

**Sustainable Non-Isocyanate Polyurethane Materials for High-Performance Coating and Adhesive Applications**

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The growing demand for environmentally benign and high-performance polymeric materials has accelerated the development of non-isocyanate polyurethanes (NIPUs) as sustainable alternatives to conventional isocyanate-based polyurethanes. Traditional polyurethane systems rely on toxic isocyanates, posing significant health and environmental concerns during synthesis and processing. In contrast, NIPUs synthesized via isocyanate-free pathways, particularly through cyclic carbonate–amine chemistry, offer safer processing, reduced toxicity, and enhanced sustainability while maintaining competitive material performance. This work highlights recent advances in the design and synthesis of NIPU materials tailored for advanced coating and adhesive applications. The incorporation of functional monomers, nanofillers, and hybrid inorganic–organic architectures enables the development of NIPU systems with improved mechanical strength, thermal stability, chemical resistance, and interfacial adhesion properties. These materials demonstrate strong potential in protective coatings, structural adhesives, corrosion-resistant layers, and industrial bonding applications. Furthermore, the tunable network structure and functional group versatility of NIPUs allow optimization of viscoelastic behavior, substrate compatibility, and durability under harsh environmental conditions. The integration of sustainable feedstocks, including $CO_2$-derived carbonates and bio-based components, further enhances the environmental footprint of NIPU materials. Overall, non-isocyanate polyurethanes provide a promising platform for bridging sustainable chemistry with high-performance coating and adhesive technologies, supporting the transition toward safer and greener industrial polymer systems.

**Keywords:** Non-isocyanate polyurethanes, Sustainable adhesives, nanofillers, coating, and Interfacial adhesion

**Edible Mushrooms: A Sustainable Novel Ingredient for Functional Future Food**

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Edible mushrooms are rapidly gaining importance worldwide as a sustainable, nutritious, and functional food source, with the potential to support both food security and human health. Chhattisgarh, a forest-rich and biodiversity-rich state in central India, is considered a favourable region for natural mushroom diversity due to its dense forests and mineral resources. Many rural and tribal areas of the state face limited crop diversity and malnutrition, where mushrooms can provide a nutrient-dense and sustainable dietary alternative. Tribal communities have traditionally collected and utilized several wild edible mushroom genera, including *Agaricus, Astraeus, Boletus, Calocybe, Cantharellus, Clitocybe,* and *Lactarius,* which are an integral part of indigenous knowledge and local food practices. In addition, commercially cultivated species such as *Agaricus*, *Volvariella*, and *Pleurotus* varieties offer significant opportunities for both nutrition and livelihoods.

Edible mushrooms are rich in proteins, essential amino acids, vitamins, minerals, dietary fiber, and bioactive compounds, which have been shown to have antioxidant, immunomodulatory, and anti-inflammatory properties, establishing them as functional future foods. Mushroom cultivation can be done with low investment using agricultural residues and has a comparatively low environmental footprint, which aligns with sustainable agricultural goals. Value-added mushroom products such as powders, processed foods, and health-oriented formulations can provide new opportunities for food innovation and market development. However, lack of awareness, limitations of processing infrastructure, and supply chain challenges remain major constraints, which can be addressed through policy support, research initiatives, and capacity building. Overall, edible mushrooms emerge as a promising novel ingredient for sustainable and future-oriented food systems in Chhattisgarh.

# Fungi-Based Approaches for Green Product Development and Environmental Sustainability

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Fungi-based approaches are emerging as powerful tools for green product development and environmental sustainability due to the remarkable metabolic versatility, adaptability, and ecological functions of fungi. Fungi are capable of converting low-value agricultural and industrial residues into high-value, eco-friendly products, making them integral to sustainable biotechnological innovations and circular bioeconomy models. This study highlights the potential of fungi in the development of green products and their role in addressing key environmental challenges.

Fungal biomass and mycelium have gained considerable attention for the production of biodegradable materials, including packaging alternatives, construction composites, textiles, leather substitutes, and natural binders. These mycelium-based materials are renewable, lightweight, biodegradable, and require significantly lower energy inputs compared to conventional petroleum-based products. In addition, fungi are rich sources of industrially important enzymes, organic acids, pigments, biosurfactants, and secondary metabolites, which are increasingly utilized in green manufacturing, pharmaceuticals, agriculture, and cosmetics.

Beyond product development, fungi play a crucial role in environmental sustainability through processes such as biodegradation, biotransformation, and biosorption. Mycoremediation exploits fungal capabilities to detoxify pollutants including heavy metals, pesticides, dyes, plastics, and petroleum hydrocarbons from contaminated soils and water systems. Furthermore, fungi contribute to ecosystem stability by enhancing soil fertility, nutrient cycling, carbon sequestration, and plant health through symbiotic associations such as mycorrhizae.

Recent advances in fungal biotechnology, genomics, and fermentation techniques have accelerated the identification and optimization of fungal strains for sustainable applications. However, challenges related to large-scale production, process optimization, economic feasibility, and regulatory frameworks remain. Addressing these challenges through interdisciplinary research will be critical for the widespread adoption of fungi-based green technologies.

Overall, fungi-based strategies offer sustainable, nature-inspired solutions for green product development and environmental protection, contributing significantly to sustainable development goals and long-term ecological resilience.

**Keywords:** Fungi-based biotechnology, green product development, environmental sustainability, mycoremediation, circular bioeconomy.

**Silicon in Sustainable Agriculture: Silica Deposition Mechanisms in Grass Silica Cells**

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Silicon is a highly beneficial element that strengthens plant defenses against biotic and abiotic stresses. Thus, silicon can play an important role in sustainable agriculture. Plant roots take up silicon as silicic acid which gets concentrated in the plant body when water transpires. Concentrated silicic acid may deposit as solid silica at various locations in the plant body the mechanism of which varies according to the cell-type. Mostly silica is deposited on cell wall matrix creating a composite material. Silica is also deposited in the cell lumen of specialized epidermal cells called silica cells, in which silicification is templated by a protein known as siliplant1. A previous study hypothesized that lignification is a prerequisite for the lumen silicification of silica cells. To test this hypothesis, we examined and compared the silica cell silicification dynamics in the wild-type (BTx623) and lignin-deficient brown midrib (bmr6 and bmr12) mutants of *Sorghum bicolor*. Scanning electron microscopy coupled with energy-dispersive X-ray spectroscopy of mature sorghum leaves identified silicified silica cells in all the genotypes. Quantification of the silica cell-silicification status per unit length of leaf did not yield any significant differences among the genotypes. We further found that silica cells in bmr12 get silicified at an earlier stage than the WT and bmr6 mutant. These results suggest that altered lignin composition in bmr12 accelerates the silica cell silicification process. Comparison of total silica content in mature leaves displayed significant differences between the three genotypes. Silica content was highest in bmr12 while the lowest in the WT. These patterns suggest reduced lignification may promote overall silica accumulation rather than having a negative impact on the silicification process. Thus, enhanced silica deposition may possibly act as a compensatory structural adaptation in case of altered lignin content and composition.

**Multimodal Identification of the Poisonous *Mushroom Chlorophyllum molybdites* Using Morphology, Molecular Markers, and Image Analysis**

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Mushrooms are globally recognized as nutritionally rich food sources and valuable sources of bioactive compounds; however, morphological similarities between edible and poisonous species pose a significant challenge to public health and food safety. Misidentification is particularly common during early developmental stages, where diagnostic traits such as gill coloration and spore morphology are poorly differentiated. Accurate identification using integrated approaches is therefore essential for sustainable utilization, consumer safety, and responsible biodiversity management. In the present study, the poisonous mushroom *Chlorophyllum molybdites* was systematically characterized and compared with morphologically similar *Agaricus* species using an integrated morpho-molecular, biochemical, and image-processing framework. Field-collected specimens were examined through macroscopic and microscopic analyses, followed by molecular identification and biochemical profiling. Mycelial cultivation and spore isolation were optimized using Response Surface Methodology (RSM), generating 26 predicted experimental runs; eight optimized media conditions were selected for batch cultivation. Bioactive compounds extracted from cultivated biomass exhibited notable antimicrobial activity against human pathogenic bacteria. Antioxidant potential assessed using the DPPH assay showed significantly higher free-radical scavenging activity in the crude extracts than in the exopolysaccharide (EPS) fraction. While conventional biochemical reagent-based tests showed limited discriminatory power among closely related taxa, image-processing tools—including online/offline platforms and Android-based applications—demonstrated reliable species-level differentiation.The findings highlight the bioactive potential of *C. molybdites* while underscoring the importance of technological integration for accurate species identification. Image-based diagnostic approaches show strong promise for developing portable, low-cost, and user-friendly biosensing tools that contribute to public health awareness, sustainable bioresource management, and technology-enabled solutions for mushroom safety.

# A Study on Economic Feasibility of Hydroponic System for Growing Popular Vegetable Crops as per Indian Cuisine

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The demand for safe and quality produce in urban areas has triggered increasing interest in soilless cultivation, as made evident by the study on the economic viability of hydroponic systems for popular Indian vegetables. Through the analysis of capital investment costs, operational costs, yield performance, and market pricing for vegetables like tomatoes, spinach, mint, ginger, garlic, coriander, and so on, it evaluates financial viability. The design of "A" frame multilayer hydroponic system and a horizontal circulatory hydroponic system in a controlled environment is one such example of the approach. Notwithstanding the high capital costs involved, hydroponics can generate greater productivity, resource use efficiency, and profitability than traditional soil-based systems, as made evident by comparative studies. Preliminary findings indicate the potential for success in urban areas through optimal operations and market planning, offering policymakers and entrepreneurs data on successful vegetable production. Hydroponics is more economical than soil-based cultivation, as it maximizes resource use efficiency and market accessibility to generate greater output and profitability, according to the study. Feasible crops, profitability, break-even point, and policy guidelines for hydroponics are provided by the economic model.

**Keywords:** Economic feasibility, Hydroponic, Comparative, Soil-based methods, production, profitability, recommendations.

**Environmental Humanities and Global Convergence: Reimagining Sustainability for a Resilient Future**

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The pursuit of sustainability in an increasingly complex and interconnected world calls for a global convergence of knowledge systems that extend beyond conventional scientific and technological frameworks. This keynote lecture explores how environmental humanities serve as a critical bridge in reimagining sustainability by integrating ecological science, policy, technology, ethics, and cultural understanding to build resilient futures.

Global convergence for sustainability recognizes that environmental challenges such as climate change, biodiversity loss, and resource scarcity are not solely technical problems but deeply human ones. While advances in science and technology offer powerful tools for mitigation and adaptation, their effectiveness depends on social acceptance, ethical governance, and culturally grounded decision-making. Environmental humanities address this dimension by examining human–nature relationships through historical, philosophical, literary, and indigenous knowledge perspectives.

The transformative potential of interdisciplinary collaboration emerges where environmental sciences inform evidence-based action, technologies enable monitoring and innovation, and humanities provide moral frameworks and narratives that inspire responsibility and collective action. Case illustrations demonstrate how community participation, traditional ecological knowledge, and sustainability-oriented storytelling strengthen environmental governance and socio-ecological resilience, particularly in regions of the Global South.

By positioning environmental humanities at the center of global sustainability discourse, this talk argues for a holistic and inclusive model of development—one that aligns technological progress with ethical values and ecological integrity. The lecture concludes by proposing convergent strategies for academia, policymakers, and practitioners to foster resilient societies capable of responding adaptively to current and future environmental challenges.

**Keywords:** Resilience; Interdisciplinary Approaches; Climate Change; Ethical Governance; Indigenous Knowledge Systems; Sustainable Development

**Fungal-Based Eco-Friendly Bioplastics: From Isolation to Material Characterization**

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The widespread persistence of petroleum-based plastics in the environment has intensified the search for sustainable and biodegradable alternatives. Microbial bioplastics, particularly polyhydroxyalkanoates (PHAs), have emerged as promising substitutes, with fungi offering distinct advantages such as rapid growth, substrate versatility, and the ability to utilize low-cost agro-waste materials. The present study aimed to isolate fungal strains from plastic-contaminated soils, screen them for PHA production, and optimize laboratory-scale extraction and characterization of the resulting biopolymers.

Soil samples were collected from the Urkura industrial area adjacent to plastic manufacturing units, a site selected for its high microbial diversity under environmental stress. Fungal isolates were obtained using serial dilution and pour plate techniques and maintained on Potato Dextrose Agar (PDA). Preliminary screening for PHA accumulation was performed using Sudan Black B staining, where positive isolates exhibited intracellular lipid inclusions. Selected high-performing isolates, identified as *Aspergillus* and *Rhizopus* species, were cultivated in Mineral Salt Medium (MSM) supplemented with agro-industrial waste materials, including sugarcane bagasse, fruit peels, and potato peels, as carbon sources. The agro-waste substrates were processed through washing, drying, grinding, and sieving before incorporation into MSM at concentrations of 20–50 g/L.

Following 10 days of incubation, fungal biomass was harvested, dried, and subjected to ethanol-based solvent extraction, with polymer precipitation achieved using chilled methanol. Gravimetric analysis confirmed measurable PHA yields, reaching up to 75 mg from selected isolates. Qualitative confirmation of PHA was achieved through water insolubility and touch tests, indicating hydrophobic, waxy, plastic-like properties. Structural and thermal characterization using Fourier Transform Infrared Spectroscopy (FTIR) revealed characteristic PHA functional groups, while scanning electron microscopy (SEM) demonstrated polymer deposition and surface morphology. Thermogravimetric analysis (TGA) indicated initial thermal stability of the extracted biopolymers. The findings demonstrate that fungi isolated from plastic-contaminated soils can efficiently synthesize PHAs when cultivated on inexpensive agro-waste substrates. This study establishes a reproducible laboratory workflow

encompassing isolation, screening, extraction, and characterization of fungal bioplastics, highlighting their potential as eco-friendly alternatives to conventional plastics. Future studies will focus on fermentation optimization, biodegradability assessment, and material processing for industrial-scale applications.

**Keywords:** Bioplastics; Polyhydroxyalkanoates (PHA); Fungi; Agro-waste; Isolation; Screening; Extraction; Characterization; Sustainability.

**Business Plan and Marketing Strategies: A Key to Entrepreneurial Success**

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Business planning and effective marketing strategies are fundamental pillars of entrepreneurial success. A well-structured business plan serves as a comprehensive roadmap that defines an organization's vision, mission, goals, operational framework, financial projections, and long-term growth strategies. It provides direction and clarity, enabling entrepreneurs to anticipate potential challenges, manage risks, allocate resources efficiently, and evaluate performance systematically. Moreover, a detailed business plan enhances credibility and increases the likelihood of securing funding from investors, financial institutions, and other key stakeholders.

Complementing business planning, marketing strategies play a crucial role in ensuring that products and services reach the intended audience effectively. Through careful market research and analysis, entrepreneurs can identify target markets, understand customer preferences, and assess competitive forces within the industry. Strategic decisions related to branding, pricing, promotion, and distribution allow businesses to position themselves competitively and create strong value propositions. Effective marketing not only attracts customers but also fosters customer loyalty, strengthens brand identity, and supports sustainable growth.

In today's dynamic and highly competitive business environment, the integration of comprehensive business planning and innovative marketing strategies significantly enhances an enterprise's ability to survive, adapt, and thrive. Entrepreneurs who continuously refine their plans and marketing approaches are better equipped to respond to market changes and emerging opportunities. Therefore, mastering both business planning and marketing strategy development is essential for achieving long-term entrepreneurial success and organizational sustainability.

**Business, Technology, and Human Values: Is there a Convergence?**

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This talk will touch upon a few themes: business, technology, human values, and context and delve deeper into what each of these might mean. In the process of doing so, the quest will be to uncover what the central tenets of these are, where they are similar, where tensions emerge, and where they diverge from each other. While business often focuses on growth and efficiency, technology drives innovation and transformation, and human values remind us of what truly matters—such as dignity, fairness, well-being, and sustainability. The goal will be to arrive at a framework for these supposedly disparate areas of study and practices to work together for the betterment of humanity -- towards a world where there is adequate space for individual growth and expression, an emphasis on physical and mental health, and respect for the environment. The hope is to invite participants to think critically about how we can shape a future where progress is not only measured by economic or technological success, but also by the values we uphold as a society, and where individual happiness matters.

# Funded, Yet Failing: The Case for Market Architecture in Sustainable Innovation

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Sustainable innovation rarely fails at the point of invention. It fails later, after funding arrives and expectations rise. The ideas are sound. The capital is committed. The outcomes still fall short. Across Asia, the Middle East, and the United States, the same pattern repeats. New solutions prove themselves in pilots. They attract attention and investment. Early results look promising. Then momentum slows. Adoption fragments. Responsibility shifts across actors. Scale never fully arrives.

This talk examines why that moment keeps repeating. The problem is not ambition or intent. It is structure. Even when innovation and capital are performing at their peak, market architecture determines how far they go. Markets do not organize themselves around new ideas. Incentives must align across stakeholders. Institutions must adapt to new ways of operating. Clear pathways for adoption must exist before growth can take hold.

When these conditions are missing, capital accelerates exposure rather than durability. Investment amplifies fragility instead of impact. Sustainable innovation becomes funded, yet fragile.

By focusing on how markets actually behave under real constraints, the session reframes sustainability as a question of design rather than belief, and of architecture rather than money alone. We're not just asking how to fund better ideas but also how to build markets capable of carrying them over time.

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# *Abstracts*

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*Students, Researchers & Academicians*

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**Identification and Functional Evaluation of Host Proteins Interacting with Cucumber Mosaic Virus 2b Protein and Movement Proteins**

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Global warming has favoured the spread of new pests and pathogens into new geographical areas. Vector-mediated spread of plant viruses poses a significant threat to global food security by reducing both the quality and quantity of many economically important crops. Plant viruses with small genomes rely on various host factors throughout their life cycle, from replication to systemic spread. Identifying and functionally evaluating the role of host proteins as a susceptibility factor is an important step toward developing strategies for virus resistance. These host susceptibility factors present a highly effective approach to combating plant viruses by interfering with their replication, translation, and spread. Cucumber mosaic virus infects more than 1200 plant species and is spread by more than 60 aphid species. To identify the host factor essential for virus infection, we found that the small subunit of Rubisco (RBCS) from *Cucumis sativus* and *Nicotiana benthamiana* associates with the CMV MP and 2b proteins of the subgroup II strain in yeast cells, as assessed by yeast two-hybrid (Y2H). Furthermore, the bimolecular fluorescence complementation (BiFC) assay showed association of MP and RBCS complex near the cell borders, while the 2b and RBCS complex was found to associate close to the cell borders and in the nucleus. The study also revealed that CMV MP and 2b proteins

associate with each other. To elucidate the role of RBCS in CMV infection, we transiently knocked down RBCS in *N. benthamiana* using tobacco rattle virus-based virus-induced gene silencing (TRV-VIGS), which caused the leaves of silenced (TRV2:RBCS) plants to turn yellow, unlike the control (TRV2:00) plants. TRV2:RBCS plants showed a significant decrease in virus accumulation compared to TRV2:00 control plants upon CMV challenge inoculation, indicating a role for RBCS in CMV infection. The gene can be further evaluated in crop plants to assess its efficacy in conferring virus tolerance.

**An Automatic and Real-Time Pothole Detection and Traffic Monitoring System Using Smartphone-Based Smart Sensing**

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The rapid proliferation of smartphones has opened new possibilities for addressing complex transportation challenges in modern cities, including road accidents and traffic congestion. In many developing regions, the increasing number of vehicles combined with inadequate road maintenance has significantly contributed to unsafe driving conditions. Contemporary smartphones are equipped with powerful embedded sensors, such as accelerometers, which can be leveraged for intelligent road monitoring applications. This research presents a smartphone-based system for the automatic and real-time detection of potholes, along with continuous monitoring of traffic conditions. Sensor data collected during vehicle movement are processed using machine learning techniques, where a K-means clustering approach combined with support vector machines is employed to classify road surface anomalies and traffic states. Unlike earlier approaches that rely heavily on active user participation for data labeling and reporting, the proposed system operates passively and minimizes user intervention. Furthermore, the collected data are utilized to provide practical benefits to drivers, including early warnings to avoid potholes and real-time visualization of traffic conditions to support route selection. The effectiveness of the proposed framework is evaluated using publicly available datasets from the CRAWDAD repository and validated through real-world driving experiments conducted on urban roads in Ilorin. Experimental results demonstrate the feasibility and reliability of the system for real-time road condition assessment and traffic monitoring.

**Keywords**: Smart Road Sensing, Pothole Detection, Smartphone Sensors, Real-Time Monitoring, Traffic Condition Analysis, Machine Learning, Intelligent Transportation Systems, Road Infrastructure Maintenance

**Monitoring and Health Impact Evaluation of Urban Air Pollution in Raipur City, India**

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Rapid growth in industrial activities, expanding urban settlements, increased vehicular traffic, and the extensive use of fossil fuels have caused a serious decline in air quality in many urban and semi-urban regions. This study was designed to quantify the levels of major atmospheric pollutants and to examine their effects on both human health and environmental conditions.

The investigation employed an integrated approach involving on-site air monitoring, laboratory-based chemical analysis, and statistical evaluation. Ambient air samples were collected from selected monitoring locations over a continuous period of one year. Concentrations of particulate matter ($PM_{2.5}$ and $PM_{10}$), sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), carbon monoxide (CO), and ozone ($O_3$) were determined using standardized procedures recommended by the Central Pollution Control Board and the World Health Organization. Health records obtained from nearby hospitals were analyzed to explore associations between air pollution levels and the prevalence of respiratory and cardiovascular disorders.

The findings indicated that the yearly mean concentrations of $PM_{2.5}$ and $PM_{10}$ were above the limits specified in WHO air quality guidelines. A significant positive relationship was observed between elevated particulate matter levels and the occurrence of asthma, bronchitis, and chronic obstructive pulmonary disease. Analysis of seasonal trends showed that pollution levels were notably higher during winter, primarily due to temperature inversion and increased biomass burning. Vehicular exhaust was found to be the dominant source of nitrogen oxides and carbon monoxide in the region. The outcomes of this study offer valuable scientific input for policymakers to develop effective air quality management strategies and enhance public health protection.

**Keywords:** Statistical model, ambient air and particulate matter.

**Determinants of Electric Vehicle Adoption: Environmental, Economic, and Technological Perspectives**

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The rapid growth of environmental concerns, rising fuel costs, and technological advancements has accelerated interest in electric vehicles (EVs) as a sustainable alternative to conventional transportation. The adoption of electric vehicles (EVs) is essential for reducing carbon emissions and promoting sustainable transportation. This study examines the key determinants influencing EV adoption from environmental, economic, and technological perspectives. A mixed-methods approach was employed, with primary data collected through a structured survey administered to a sample of 230 potential vehicle consumers through surveys of potential EV consumers to assess their perceptions, preferences, and adoption barriers. Quantitative analysis was conducted to evaluate the relative impact of various factors, including environmental awareness, vehicle cost, long-term savings, battery performance, charging infrastructure, and vehicle range. Results indicate that while environmental concern motivates interest in EVs, actual adoption is largely driven by economic feasibility and technological reliability. High upfront costs, limited charging infrastructure, and concerns over battery range remain significant barriers. The study concludes that successful EV adoption requires addressing both economic and technological challenges, while promoting environmental awareness, to provide actionable insights for manufacturers and stakeholders to enhance consumer acceptance and accelerate the transition to electric mobility.

**Keywords:** Electric Vehicle, Environmental Sustainability, Economic Factors, Technological Factors

**Effect of $Dy^{3+}$ Doping on Green Emission in $Gd_2Zr_2O_7:Pr^{3+}$ Phosphors**

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A wide range of phosphor materials has been developed to improve the correlated color temperature (CCT) and color rendering index (CRI) of white light-emitting diodes (WLEDs). The effect of $Dy^{3+}$ doping on $Gd_2Zr_2O_7:Pr^{3+}$phosphors were investigated, and the materials exhibited green photoluminescence (PL), with emission characteristics strongly dependent on the $Pr^{3+}$ concentration. A $Dy^{3+}$ doping concentration of 4 mol% resulted in the maximum PL intensity. The $Gd_2Zr_2O_7:Pr^{3+}$, $Dy^{3+}$ phosphors were synthesized using a conventional solid-state reaction method. X-ray diffraction (XRD) analysis confirmed the formation of a cubic crystal structure. The PL emission spectrum showed a prominent peak at 494 nm, corresponding to the characteristic $Pr^{3+}$, $^3P_0 \rightarrow {}^3H_4$ transition.

**Keywords:** $Gd_2Zr_2O_7$: Pr, $Dy^{3+}$, XRD, Photoluminescence, CIE

**An Analysis of Historical Trends in Women's Higher Education in Raipur District after the Formation of Chhattisgarh State**

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The formation of Chhattisgarh State in 2000 marked a significant transition in educational development within Raipur District, particularly in relation to women's access to higher education. This study examines the historical trends of women's participation in higher education with special reference to science education, local knowledge systems, and sustainable community development. A descriptive mixed-method approach is employed using secondary data from Census records, higher education department reports, university archives, policy documents, and scholarly publications.

The analysis reveals a consistent increase in women's enrollment at undergraduate and postgraduate levels, alongside institutional expansion and diversification of academic disciplines. While early participation was largely confined to humanities and teacher education, recent decades demonstrate growing representation in science, commerce, management, and professional programs. Science education has enhanced women's scientific literacy, environmental awareness, and capacity to apply knowledge to local health, livelihood, and ecological challenges.

The integration of scientific learning with local knowledge practices has strengthened women's roles in community decision-making, health promotion, and environmental conservation. From a social work perspective, educated women act as key agents of change by encouraging evidence-based practices, social responsibility, and participatory development. Government initiatives such as scholarships, reservation policies, and women-focused educational schemes have played a crucial role in improving access and retention.

Despite these positive developments, socio-economic inequality, cultural constraints, and regional disparities continue to limit equitable participation. The study concludes that strengthening science education while valuing local knowledge is essential for promoting sustainable community development.

**Impact of Lead and Arsenic Air Pollution on Oxidative Stress Biomarkers in Liver Cancer in Raipur Chhattisgarh.**

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Air pollution in rapidly industrializing cities poses a serious threat to human health due to the presence of toxic heavy metals such as lead (Pb) and arsenic (As). Raipur, Chhattisgarh, experiences high levels of air pollution from coal-fired power plants, steel industries, vehicular emissions, and waste burning, resulting in elevated concentrations of airborne Pb and As. These metals enter the human body mainly through inhalation, accumulate in the liver, and induce oxidative stress by generating reactive oxygen species (ROS). Excess ROS disrupt antioxidant defense systems, activate lipid peroxidation pathways, damage cellular macromolecules, and promote inflammation and epigenetic alterations that may ultimately lead to liver injury and hepatocellular carcinoma.

**Women's STEM Education and Sustainable Development: A Post-2000 Policy Analysis from Raipur District**

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Women's participation in science and engineering education is a vital component of sustainable and inclusive development. Following the formation of Chhattisgarh State in 2000, Raipur District has experienced significant policy-driven changes in higher education aimed at improving women's access to technical and scientific disciplines. This study analyzes the social, economic, and cultural factors influencing women's enrollment in science and engineering programs and evaluates the effectiveness of educational policies and government schemes introduced after state formation. The research adopts a descriptive and analytical approach using secondary data from Census records, higher education statistics, policy documents, and scholarly literature. The findings indicate a gradual rise in women's participation in science, technology, and professional education, supported by scholarships, reservation provisions, digital learning initiatives, and institutional expansion. Social awareness and family encouragement have positively influenced educational aspirations, while economic limitations and digital inequality continue to restrict continuity for many students. Cultural expectations, though weakening, still affect women's choice of engineering and advanced scientific fields. The study further highlights that women educated in science and engineering contribute significantly to innovation, technological inclusion, and sustainable community development. The paper concludes that strengthening gender-responsive STEM policies, improving digital infrastructure, and promoting interdisciplinary sustainability-oriented education are essential for achieving ethical, inclusive, and long-term development. Women's science and engineering education thus emerges not only as a tool of empowerment but also as a strategic foundation for sustainable national progress.

**A Study on Sustainable Shopping Tourism in the Coastal Belt of Goa**

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Shopping tourism has become an important part of the tourism industry in coastal regions of Goa, playing a key role in enhancing visitor experience and supporting sustainable economic development. Local markets in coastal areas attract a large number of tourists, highlighting the appeal of shopping along with visits to beaches and heritage attractions. This study aims to analyse the service quality dimensions of shopping destinations in the coastal belt of Goa and to test their influence on tourist satisfaction in promoting sustainable development of the state. Primary data has been collected from 400 tourists visiting retail shopping areas in the coastal belt of Goa through the purposive sampling method using a structured questionnaire. Data analysis will be carried out using SPSS and SmartPLS. The findings of the study will help the retail businesses in improving service standards, enhancing tourist satisfaction, and strengthening sustainable shopping tourism practices.

**Keywords:** Shopping Tourism, Service Quality, Tourist Satisfaction, Sustainability

**Legal Education and Society are Interdependent for Sustainable Development in the Community. A Socio Legal Analysis.**

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It is a popular saying that, Law is an instrument of social change. From the time immemorial society has been uplifted and reformed with the suitable amendment and creation of new laws in the legal system for the sustainable development in the community. In the words of swami Vivekananda, Education is the manifestation of perfection already in man. Recently on the auspicious occasion of teacher's day, the honourable president of the India has messaged to the nation that, teaching is not a job but a mission. Probably the golden words of the president may be interpreted for achieving sustainable development in the community. The Goal is clearly visualized by the constitutional framers under the preamble of the Indian constitution. Law is the means and justice is the End. Sustainable development means meeting the present needs without compromising the future generations ability to meet their own balancing economic growth, social equity and environmental protection for a resilient future focussing on fair resource use, poverty eradication, inclusivity and Long term well-being for people and planet. It's a pathway to achieving Long term global goals like the United Nations Sustainable Development Goal. In the present article the researcher willing to study the role of legal education for the sustainable development of the community with its Historical advancement, in pre and post-independence period of India and global scenario. The study also will cover the concept of legal Aid, clinical Legal Education, Alternative Disputes Mechanism as the systematic development in the legal education sector and its applicability in the legal system.

**Perception and Buying Behaviour of Young Adults Towards Sustainable Products in Quepem Taluka, South Goa**

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In the context of increasing environmental concerns, sustainable or eco-friendly products have become an important part of responsible consumption, particularly among young adults aged 18–45. This study focuses on Quepem Taluka in South Goa, India, to examine the perception and buying behaviour of young adults towards sustainable products such as organic food, reusable items, eco-friendly apparel, and low-impact electronic goods. The study explores key factors influencing purchasing decisions, including environmental awareness, price sensitivity, brand preference, social influence, product availability, and perceived quality. A quantitative research approach is adopted, with primary data collected through structured questionnaires from young adults residing, studying, or working in Quepem Taluka. The findings are expected to highlight that while positive environmental attitudes support favourable perceptions of sustainable products, practical barriers such as higher prices and limited local availability may affect actual buying behaviour. The study offers useful insights for businesses, marketers, and policymakers to promote sustainable products effectively and encourage responsible consumption at the local level.

**Keywords**: Young adults, Perception, Sustainability, Buying behaviour

**Airborne Lead and Arsenic Pollution and Oxidative Stress-Mediated Liver Carcinogenesis in an Industrial City of Central India**

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Rapid industrialization in Raipur, Chhattisgarh, has resulted in elevated air pollution containing toxic heavy metals, particularly lead (Pb) and arsenic (As), posing significant risks to human health. These metals are primarily inhaled through particulate matter, accumulate in the liver, and induce oxidative stress by generating reactive oxygen species (ROS), which disrupt antioxidant defenses, promote lipid peroxidation, and contribute to hepatic injury and carcinogenesis. This longitudinal cohort study aims to evaluate the association between airborne Pb and As exposure and oxidative stress–related liver damage among adult residents of industrial, traffic-dense, and suburban regions of Raipur. Ambient and personal air monitoring will quantify metal exposure, while biomonitoring of blood, urine, hair, and nails will assess internal metal burden. Oxidative stress, DNA damage, and liver function will be evaluated using biomarkers including malondialdehyde, $F_2$-isoprostanes, 8-hydroxy-2′-deoxyguanosine, antioxidant enzymes, and liver enzymes. Advanced statistical and mixture-modeling approaches will be applied to determine individual and combined metal effects. The study is expected to provide region-specific evidence on metal-induced oxidative liver injury, supporting improved environmental health policies and early disease prevention strategies.

**Keywords:** Oxidative stress, lead, arsenic, antioxidant enzymes and lipid peroxidation

**Anganwadi Centres as Models of Sustainable and Responsible Public Service Management: A Qualitative Study**

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Anganwadi centres, functioning under India's Integrated Child Development Services (ICDS), play a significant role in delivering nutrition, health, and early childhood education services at the grassroots level. From a management perspective, these centres represent structured public service organizations that contribute to sustainable and responsible community development. This study examines Anganwadi centres as models of sustainable and responsible public service management using a qualitative research approach.

The study adopts a qualitative design employing content analysis, thematic analysis, and descriptive interpretation of secondary sources, including government policy documents, ICDS and POSHAN Abhiyaan reports, and existing research literature. Content analysis is used to examine sustainability-related provisions within policy frameworks, while thematic analysis helps identify key themes such as social sustainability, economic efficiency, environmental responsibility, and ethical service delivery. Descriptive analysis is applied to interpret these themes in the context of public service management.

The analysis reveals that Anganwadi centres significantly promote social sustainability through child nutrition, maternal health support, early childhood education, and women empowerment. Economically, the centres function as cost-effective public service units that strengthen human capital and contribute to long-term economic resilience. Environmentally, Anganwadi centres encourage the use of locally available resources and promote hygiene and sanitation awareness at the community level. The study concludes that Anganwadi centres operate as responsible public service organizations by integrating management principles with sustainability practices to achieve inclusive community development.

**Keywords:** Anganwadi Centres, Sustainable Management, Responsible Public Service, Qualitative Study, Content Analysis, Thematic Analysis, ICDS

# A Qualitative Study of Goa Heritage Houses and Their Role in Promoting Heritage Tourism in Goa

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Heritage tourism forms an integral component of Goa's tourism landscape, reflecting the state's rich cultural, architectural, and historical legacy. Alongside beaches, Goa's built heritage particularly traditional heritage houses plays an important role in offering authentic cultural experiences and supporting sustainable tourism development. In this context, the present qualitative study examines the income-generating potential and management challenges of Goan heritage houses and their role in promoting heritage tourism in Goa. The research focuses on five selected heritage houses to understand how these properties contribute to tourism while preserving cultural and architectural heritage. Primary data were collected exclusively from heritage house owners through in-depth interviews using a semi-structured interview guide, supported by secondary sources such as tourism reports and policy documents. Thematic analysis was employed to identify patterns related to income sources, management practices, maintenance issues, and operational constraints. Findings reveal that while heritage houses possess considerable potential to generate tourism income, high restoration costs, limited marketing support, lack of professional guidance, and inadequate policy incentives pose significant challenges. The study highlights the need for owner-centric support mechanisms, improved promotional strategies, and targeted government initiatives to strengthen heritage tourism and ensure long-term conservation.

**Keywords:** Heritage tourism, Goan heritage houses, Qualitative research, Income potential, Management challenges, Sustainable tourism.

**Redefining Human Values for Sustainable Living in Kavita Kane's Novels**

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In the present time, human society faces numerous challenges, both in the physical environment and in the mental sphere, with unwanted elements accumulating and concealing the true nature of human beings and society. In such a situation, discussions on sustainable living have become increasingly important, and literature plays a significant role in this context. This paper examines selected novels by Kavita Kane, based on the *Mahabharata* and the *Ramayana*, to explore the struggles undertaken by human beings to live with resilience and freedom through textual analysis. Although Kane's protagonists are female, in the context of sustainable living they are viewed as humans beyond gender. The paper highlights the struggles of Kane's female protagonists, focusing on the human effort required to achieve sustainable living.

**Keywords:** Women, struggle, *Ramayana*, *Mahabharata*, resilience, society, mythology.

# Comparison Between Result of Cloud Forensic Through Credential Based and Token Based Acquisition

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## Abstract

The increasing reliance on cloud computing has introduced new challenges in digital forensics, particularly in the acquisition and analysis of evidence. This study presents a comparative analysis of cloud forensic investigations conducted through credential-based access versus token-based access methods. Credential-based forensics, which relies on user authentication credentials, often faces limitations due to privacy laws, multi-factor authentication, and dynamic credential management. In contrast, token-based approaches—using access tokens or API keys—offer more granular, session-specific access and improved traceability of interactions. The research evaluates both methods in terms of data integrity, accessibility, reliability, and forensic soundness across different cloud environments. Findings indicate that token-based forensics provides superior evidence authenticity and reduced exposure to credential theft risks, although it requires more sophisticated token management and validation mechanisms. The paper concludes that a hybrid forensic framework integrating both methods can enhance the efficiency and reliability of cloud forensic investigations.

**Keywords:** Cloud computing; Digital forensics; Credential-based access; Token-based access; Multi-factor authentication.

**Implementation of Ethical AI Framework for Financial Risk Prediction and Decision Transparency in Banking System**

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Artificial intelligence and machine learning techniques are now widely used in the banking sector to support financial risk prediction and credit decision-making. Although these technologies improve efficiency and accuracy, they also raise important ethical concerns, including biased predictions, limited transparency, and weak accountability. This paper presents an Ethical AI framework designed to address these challenges while maintaining reliable predictive performance. The study evaluates several machine learning models, namely Logistic Regression, Decision Tree, Random Forest, and XG Boost, using the German Credit dataset. To reduce the impact of class imbalance and biased outcomes, the Synthetic Minority Oversampling Technique (SMOTE) is applied during data preprocessing. In addition, fairness evaluation measures and explainability mechanisms are incorporated to better understand model behaviour and decision logic. The experimental results show that the proposed framework enhances decision transparency and reduces bias without significantly affecting model accuracy. The findings suggest that integrating ethical principles with machine learning models can support more responsible, trustworthy, and regulation-compliant financial risk prediction systems.

**Keywords:** Ethical AI, Financial Risk Prediction, Explainable AI, Fairness, Transparency, Machine Learning, Banking Systems

# Video Forensic Authentication in the Age of Deepfakes: Emerging Challenges and Scientific Responses

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Video authentication and forensic analysis have become pivotal in digital investigations due to the widespread use of video evidence in legal, security, and media contexts. Traditional forensic methods rely on technical markers such as compression artifacts, frame-level inconsistencies, sensor noise patterns, and temporal coherence to detect tampering, splicing, or illicit editing. These approaches historically enabled forensic practitioners to distinguish between genuine and manipulated footage with reasonable reliability. However, the advent and rapid evolution of generative artificial intelligence have introduced profound challenges, particularly through deepfake and synthetic video technologies that leverage advanced neural networks like generative adversarial networks (GANs) and diffusion models to produce highly realistic yet fabricated content. Such deepfake videos can convincingly mimic faces, gestures, speech, and actions, thereby undermining the foundational assumptions of many forensic techniques and automated detectors. Recent developments highlight how even state-of-the-art detection algorithms struggle with high-quality or compressed deepfake videos, often yielding high false-negative and false-positive rates, and are vulnerable to adversarial modifications designed to evade detection.

The implications extend beyond technical detection to social, legal, and policy domains. Governments worldwide are responding to deepfake threats with regulatory and enforcement initiatives. For example, as per news published in “The Guardian” newspaper- in the United Kingdom, pilot software projects are being deployed in advance of the 2026 Scottish and Welsh elections to detect and report deepfake election disinformation to authorities and the public, while seeking legally enforceable removal powers for such content. As per news published in “The Times of India” newspaper- In India, law enforcement recently registered a cybercrime case over an AI-generated deepfake video misusing the images and voices of political figures,

illustrating the real-world harm of synthetic media on public perception and national discourse. Additionally, as per news published in “The Verge” newspaper- legislative efforts such as the U.S. DEFIANCE Act aim to empower victims of non-consensual deepfake content with legal recourse against creators of such material. These instances underscore how deepfake video dissemination has become a tangible concern for governments, spurring the development of policies, legal frameworks, and technological countermeasures aimed at preserving video integrity and societal trust.

Addressing these multifaceted challenges demands interdisciplinary solutions that include robust and adaptive forensic detection frameworks, comprehensive benchmark datasets reflective of in-the-wild deepfakes, enhanced legal standards for forensic admissibility, and proactive public awareness campaigns. Only through coordinated technical, legal, and policy responses can the integrity and credibility of video evidence be safeguarded in the era of synthetic media. In this context, parametric analysis guided by the expertise of scientific forensic experts plays a critical role in resolving deepfake video challenges by systematically modelling, quantifying, and interpreting spatiotemporal, physiological, and generative parameters that remain difficult for synthetic systems to perfectly replicate.

**Keywords:** Video Forensics; Deepfake Detection; Synthetic Media; Synthetic Speech; Parametric Forensic Analysis; Generative AI; Digital Evidence Integrity.

**Redefining Marginality: A Study of Socio-Economic Upliftment of the Selected Tribal Community in Goa**

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Tribal communities in Goa continue to experience socio-economic marginality amid rapid modernization and developmental transitions. The tribal coalitions play a significant role in preserving cultural heritage and promoting academic empowerment as paths to inclusive and sustainable development. This study seeks to redefine marginality by examining the role of selected tribal coalition in Goa, with particular reference to Adivasi Sanghatna, in promoting and preserving the cultural heritage of the Scheduled Tribe (ST) community, academic empowerment and scholarly enrichment. Primary data were collected from 60 active members of the selected tribal coalition using purposive sampling. Structured questionnaires and interviews focused on the activities, their impact, and the challenges encountered in promoting tribal welfare. Findings indicate that the selected tribal coalition namely Adivasi Sanghatna contributes to sustaining traditional practices, enhancing access to educational opportunities, and strengthening community cohesion, thereby contributing to social inclusion and human- centered development. The study underscores the importance of the selected tribal coalition in fostering sustainable development, academic empowerment, and socio-cultural resilience among Goa's tribal population.

**Keywords:** Tribal coalitions, Socio-economic marginality, Adivasi Sanghatna, Cultural heritage, Academic empowerment, Sustainable development

# Climate Change Mitigation: Strategies for Reducing Carbon Footprint and Promoting Sustainable Development

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Climate change has emerged as one of the most critical global challenges of the twenty-first century, primarily driven by anthropogenic greenhouse gas emissions resulting from fossil fuel combustion, industrial activities, and land-use changes. Reducing carbon footprints while ensuring sustainable development has therefore become a central objective of global climate policy and research. This paper critically examines key climate change mitigation strategies that contribute to emission reduction and promote long-term sustainability. Drawing upon recent peer-reviewed literature, international reports, and empirical studies, the research analyzes renewable energy transitions, energy efficiency improvements, carbon capture, utilization and storage (CCUS), nature-based solutions, and policy instruments such as carbon pricing and climate finance.

The study highlights that large-scale deployment of renewable energy technologies, particularly solar and wind power, combined with improvements in energy efficiency across buildings, industry, and transport sectors, can significantly reduce global emissions. Complementary strategies such as CCUS and ecosystem-based approaches play a vital role in addressing residual and hard-to-abate emissions while offering co-benefits for biodiversity and livelihoods. The paper further explores the alignment of mitigation strategies with the United Nations Sustainable Development Goals (SDGs), emphasizing the importance of equity, just transition, and inclusive growth.

Despite technological progress, the research identifies major challenges, including scalability constraints, financial and technological gaps in developing countries, and weak policy implementation. The paper concludes that an integrated, multi-sectoral mitigation framework supported by strong governance, international cooperation, and equitable climate finance is essential to achieve net-zero emissions and advance sustainable development in line with the Paris Agreement goals.

**Marketing and Consumer Insight for a Sustainable Future**

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Marketing and consumer insight play a crucial role in shaping a sustainable future by influencing responsible production, ethical consumption, and long-term value creation. As environmental degradation, climate change, and social inequality intensify, businesses are increasingly expected to adopt sustainable marketing practices that align organizational goals with societal and environmental well-being. Understanding consumer insights—such as attitudes, motivations, values, and purchasing behaviour—enables marketers to design strategies that promote eco-friendly products, transparency, and sustainable lifestyles. Sustainable marketing goes beyond short-term profit maximization and emphasizes customer education, trust-building, and stakeholder engagement. By leveraging data-driven consumer insights, companies can encourage green purchasing decisions, reduce waste, and foster brand loyalty rooted in ethical responsibility. This approach not only enhances competitive advantage but also contributes to achieving global sustainability goals. Therefore, integrating marketing strategies with consumer insight is essential for driving behavioural change and ensuring a balanced and sustainable future for businesses, consumers, and the planet.

**Keywords:** Consumer Insight, Corporate Social Responsibility (CSR), Environmental Responsibility, Ethical Consumption, Green Consumer Behaviour, leveraging Sustainability, Sustainable Development, Sustainable Marketing.

# Embedded Finance as a Catalyst for Business Model Innovation: A Literature-Based Study

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Embedded finance means integrating financial services such as payments, lending, insurance, investments etc into non-financial platforms to give a seamless user experience and hassle free service delivery. This integration is made by using API (Application Programming Interface)- based financial services i.e. essentially plug-ins that enable effortless access to financial services, products and capabilities within various platforms. This has emerged as a major business-model innovation that reshapes customer journeys and revenue models across industries. This paper aims to provide a literature-based analysis of embedded finance, working on industry reports and research papers to define the concept. The major components include embedded payments, lending, insurance, investing, and banking-as-a-service. This works to identify enablers (APIs, BaaS, fintech partnerships) and possible problems (regulation, risk, and data/privacy). Using secondary data from industry reports, academic articles, and research papers on the area and market studies, this paper presents a thematic data analysis of embedded finance. An attempt has been made to interpret the findings in the context of business model innovation, and to provide actionable conclusions and act as a guide for future research.

**Keywords:** Embedded Finance, Embedded Payments, Embedded Lending, Embedded Insurance, Banking-As-A-Service, Platform Banking, Embedded Finance Business Model, Financial Inclusion.

**Fintech Accessibility and Cooperative Synergies: Conceptualizing Artisan Empowerment for Sustainable Livelihoods**

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This study develops a conceptual framework to examine the interconnected roles of fintech accessibility and cooperative facilitation in enhancing the empowerment of artisan communities and promoting sustainable livelihoods. Drawing on the Capability Approach, Diffusion of Innovation theory, and Social Capital theory, the framework positions fintech accessibility as a foundational driver of financial inclusion, digital engagement, and market integration. Cooperative facilitation is conceptualized as a mediating construct that reinforces collective agency, institutional support, and participatory governance. The moderating influence of trust and digital literacy is incorporated to account for behavioural and contextual factors shaping the adoption and effective utilization of fintech solutions. The framework culminates in artisan empowerment as the central dependent variable, with sustainability articulated as a long-term developmental outcome encompassing economic resilience, social equity, and cultural continuity. By integrating technological, social, and institutional dimensions, this model offers a strategic lens for researchers, policymakers, and development practitioners to design inclusive interventions tailored to the evolving needs of artisan communities in digitally transitioning economies.

**Keywords**: Fintech, cooperatives, artisan empowerment, trust, digital literacy, sustainability, India.

**Circular Economy Adoption in MSMEs: A Study of Implementation Challenges and Sustainable Growth Opportunities in Chhattisgarh**

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In recent years Micro Small Medium Enterprises (MSME) in India is been a crucial contributor of India's GDP with 30.1% Gross Value Added. Chhattisgarh a resource intensive region for MSMEs, yet faces multiple barriers while implementing circular economy in MSMEs' operations. Synthesizing the secondary data form MSMEs' annual report, policy reports and academic literature this paper examine the sustainable expedition obstructs while implementing circular economy among MSMEs in Chhattisgarh. Based on the analysis of national schemes such as MSME-SPICE and regional industries, the study underlines the key obstacles including inadequate awareness of circular economy principles, financial constraints due to high investment cost and limited credit access, obsolete infrastructure restricting tech advancements and segmented governance lacking enforcement. Secondary sources highlight Chhattisgarh's mining-dominated economy contributing environmental strains like high carbon emission and water conflicts, which exaggerate the above challenges. The findings underscore the low scheme implementation and the need for targeted interventions. The study concludes that raising awareness, smooth financing and advocating policy alignment could accelerate circular economy adoption, strengthening green growth and competitiveness for Chhattisgarh's MSMEs. Recommending collaborative stakeholder network and skill development to bridge these gaps, contributing to India's broader sustainability goals.

**Keywords:** MSME, Circular Economy, Sustainable Business Transformation, Chhattisgarh.

# Role of Digital Marketing Strategies for Circular Economy: A Comparative Study on Fast Fashion vs. Electronics Industries

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Digital marketing strategies increasingly facilitate circular economy across global industries. This comparative study examines digital marketing strategies employed by fast fashion and electronics industries to promote circular economy principles during 2020-2025. Secondary data analysis encompasses industry reports, corporate sustainability documentation, academic literature, and digital marketing performance indicators. The study investigates social media campaigns, influencer collaborations, content marketing strategies, and e-commerce platforms encouraging product repair, reuse, and recycling behaviors. Findings reveal distinct sectoral approaches: fast fashion brand utilize visual storytelling and social media platform for sustainability – focused brand repositioning, whereas electronics manufactures emphasize technological innovation and product take- back schemes through educational content strategies. Both industries encounter comparable challenge including green washing allegations, attitude-behavior gaps in consumer purchasing patterns, and campaign impact measurement difficulties. Analysis of leading organizations identifies best practices and common pitfalls in circular economy digital marketing implementation. Outcomes provide empirical insights for marketing practitioners, sustainability professionals, and policymakers developing initiatives to advance sustainable consumption patterns.

**Keywords:** Digital marketing, Circular economy, Fast fashion, Electronics industry, Sustainability

**AI and IoT Enabled Menstrual Health Monitoring Framework for Predictive and Preventive Women Healthcare**

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Menstrual health is an important but often neglected part of women's healthcare, especially in areas with limited medical services and health knowledge. Irregular menstrual patterns and related symptoms can signal serious health issues, like anaemia or hormonal imbalances, which often go unnoticed until they become severe. This paper presents a menstrual health monitoring framework that uses AI and IoT technology to focus on predictive and preventive women's healthcare.

The proposed system gathers both physiological and self-reported health data through mobile apps and optional IoT-based wearable sensors. These include information on cycle duration, pain levels, fatigue, and physical activity. The data is sent to a cloud-based platform, where machine learning algorithms analyze menstrual cycle patterns and assess potential health risks. Predictive models identify unusual patterns and create early health alerts, allowing for timely medical advice and lifestyle changes.

A simple interface offers personalized insights and reminders, while anonymized dashboards help healthcare providers monitor community health. The framework aims to make healthcare more sustainable by lowering the chances of late-stage medical issues, increasing awareness, and enabling scalable digital health solutions. Future efforts will focus on integrating hormonal testing devices, detecting reproductive disorders like PCOS, and using privacy-friendly distributed learning methods.

**Keywords:** Artificial Intelligence, Internet of Things (IoT), Menstrual Health Monitoring, Predictive Healthcare, Women's Healthcare Systems, Sustainable Healthcare Systems

**Assessing Microfinance-Driven Financial Inclusion towards Sustainable India: Outreach, Portfolio Quality and Operational Challenges**

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Microfinance Institutions (MFIs) play a pivotal role in advancing financial inclusion in India by extending formal credit access to underserved and low-income households. This study assesses microfinance-driven financial inclusion by studying outreach, portfolio quality, and operational challenges faced by MFIs. Using a secondary-data-based descriptive and analytical approach, the study draws evidence from MFIN Micrometer reports, Sa-Dhan Bharat Microfinance Reports, and relevant RBI/NABARD publications. Outreach growth is assessed through indicators such as the number of active borrowers and geographic spread. Portfolio quality is evaluated using repayment risk by studying outstanding loans trends and collection performance. In addition, the study synthesises the major operational challenges faced by Microfinance Institutions, including loan disbursement, KYC collection, loan closures and related processes. It is expected that the study will show that continued financial inclusion requires not just increased outreach, but also better risk management and operational performance. The results provide MFIs and policymakers with information to support inclusive, resilient microfinance growth for the sustainable growth of India.

**Keywords:** Microfinance Institutions, MFIs, Microfinance, Financial Inclusion, Portfolio Quality, Repayment Risk, Sustainable Development.

**Sustainable Mycelium-Based Biocomposites from *Ganoderma lucidum* Utilizing Agricultural Waste Materials**

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The present study reports the development and characterization of eco-friendly mycelium-based composites using *Ganoderma lucidum* grown on selected agricultural waste substrates. Locally available lignocellulosic residues, including sawdust, rice husk, and coconut coir, were employed as nutrient sources to support fungal colonization and composite formation. The fungal mycelium acted as a natural bio-binder, interlocking the substrate particles to produce lightweight and fully biodegradable composite materials. The fabricated composites were evaluated for key physical, mechanical, and thermal properties, including density, moisture absorption, compressive strength, and thermal stability. The results indicated that substrate composition significantly influenced the structural integrity and mechanical performance of the composites, while the extensive mycelial network provided a uniform and interconnected matrix that enhanced bonding and material cohesion. Overall, the findings demonstrate that *Ganoderma lucidum*-based mycelium composites represent a promising sustainable alternative to conventional petroleum-based materials for potential applications in packaging and low-load construction. This approach contributes to agricultural waste valorization and supports the advancement of renewable, environmentally responsible biomaterials.

**Keywords:** Mycelium-based composites; *Ganoderma lucidum*; Agricultural waste; Biodegradable materials; Sustainable biomaterials

**Primary Screening and Optimization of LDPE Powder Concentration for Fungal-Mediated Biodegradation**

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Low-density polyethylene (LDPE) is a widely used synthetic polymer and a major contributor to persistent plastic pollution due to its resistance to natural degradation. Fungi, owing to their robust enzymatic systems and ability to form surface-associated growth, are considered promising candidates for LDPE biodegradation. The present study aimed to carry out primary screening and optimization of LDPE powder concentration to evaluate fungal isolates for their biodegradation potential. Fungal isolates were cultivated in mineral salt medium containing different concentrations of finely powdered LDPE as the sole carbon source. Optimization and selection were performed based on visible fungal growth in broth (turbidity and biomass formation), extent of biofilm development on LDPE particles, and comparison with abiotic controls to exclude non-biological effects. Growth responses were qualitatively graded and used as indicators of LDPE utilization efficiency. The screening results revealed marked isolate-specific and concentration-dependent variation in growth behavior, with certain isolates exhibiting moderate to heavy biomass formation and dense biofilm development on LDPE, while others showed negligible growth. Isolates demonstrating consistent growth and biofilm formation in the absence of abiotic changes were identified as potential LDPE degraders. This optimized primary screening approach provides a reliable framework for selecting strong fungal candidates for subsequent secondary screening, enzymatic analysis, and detailed LDPE biodegradation studies.

**Keywords:** Fungal isolates; LDPE; biofilm formation; optimization; primary screening; plastic biodegradation.

**Aquatic Biomass-Derived Biopolymers: Integrating Phytoremediation for Sustainable Development and Circular Bioeconomy**

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Sustainable bioplastic production from aquatic and semi-aquatic plant biomass advances science for sustainable development by countering plastic pollution and converting fast-growing, invasive biomass into biodegradable alternatives. These plants proliferate in nutrient-polluted waters, performing phytoremediation to capture excess nutrients and heavy metals without using arable land, thus enabling a circular economy that restores aquatic ecosystems while supplying raw materials. Unlike persistent petroleum plastics that generate marine debris and microplastics harming global biodiversity, these bioplastics degrade naturally, cut greenhouse gas emissions, and reveal reduced environmental impact through life cycle analyses. Production features pretreatment via drying, grinding, and alkali extraction to recover polymers such as starch and cellulose, which form composites through casting or extrusion, yielding materials with superior tensile strength and minimal water uptake. Matching synthetic plastics in flexibility, durability, UV protection, and barrier performance, they biodegrade up to 45% faster in soil, though obstacles like high energy needs, biomass inconsistency, and market scaling remain addressable by wastewater biorefineries and biotechnological improvements. Embracing worldwide sustainability priorities, this method trims invasive control expenses and drives global bio-economies via packaging and agricultural innovations in biomass-rich regions.

**Keywords:** Sustainable bioplastics, Phytoremediation, Circular economy, Biodegradable polymers, Life cycle assessment, Wastewater biorefineries, Invasive species management, Bioeconomy innovation, Polymer extraction

**Role of FinTech in Rural Development Strategy and Sustainable Vikshit Bharat 2047**

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This study looks at how FinTech is emerging as a pivotal force in India's rural development strategy, crucial for achieving the vision of a developed 'Vikshit Bharat 2047'. Despite of significant government efforts, financial exclusion remains a pervasive challenge in rural India, hindering economic growth and persistent poverty. This study examines how FinTech can revolutionize access to financial services, foster sustainable development, and empower rural communities. FinTech encompassing mobile banking, digital payments like UPI, and platforms for micro-lending and insurance, are instrumental in bridging the gap between traditional financial institutions and underserved populations. Government initiatives such as the Pradhan Mantri Jan Dhan Yojana and Digital India have laid a robust digital public infrastructure that supports this transformation, significantly increasing bank account penetration and digital transaction, especially in rural areas. It facilitates multiple Sustainable Development Goals, notably poverty alleviation, the promotion of gender equality via women-led self-help groups, and the advancement of sustainable agriculture through customized financial instruments. FinTech plays a crucial role in integrating rural India into the formal financial ecosystem and foster Sustainable Vikshit Bharat 2047.

**Keywords:** FinTech, Sustainable Development, Vikshit Bharat, Rural Economies Development.

**MSME Incentives Under Old and New Industrial Polices in Chhattisgarh: A Comparative Study**

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Micro, Small and Medium Enterprises (MSMEs) play an important role in the development of any region, especially in a growing economy like Chhattisgarh, by contributing to the employment generation, industrial output and inclusive growth. State Industrial Policies significantly impact the MSME performance by creating a positive environment for sustainable development. This paper presents a comparative evaluation of the MSME incentive framework under the old industrial policy (2019-24) and the current industrial development policy (IDP) (2024-30) of Chhattisgarh. This study uses secondary data to examine variations in the incentives and support provided to MSMEs. It compares various subsidies, SGST reimbursement, infrastructure support, and special provisions for women, ST/SC and backwards region-based entrepreneurs. MSME performance indicators, including enterprise registrations, investment flows, employment trends, and regional distribution, are utilised evaluate the policy outcomes. The study identified a transition from an incentive-driven industrial promotion model to a framework focused on competitiveness, ease of doing business, inclusivity, and sustainability. This paper contributes to understanding industrial policy by highlighting how an evolving MSME incentive structure shapes changing development priorities and provides recommendations to enhance the effectiveness of an MSME-centric industrial policy in Chhattisgarh.

**Keywords:** MSMEs, Industrial policy, Incentives, Chhattisgarh, Industrial Development Policy, Secondary data

**Cool Roof Technology for Sustainable Buildings in India: A Review of Passive Ventilation and Community Energy Systems**

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This review outlines the need to green the building strategies in curbing the rapidly increasing urban energy demand and carbon footprint in India. Combining the recent studies of cool roofs, passive ventilation in high-rise buildings, and energy optimization at the level of a neighborhood, the findings prove that there has been evidence of performance, feasibility, and long-term advantages. Cool roofs indicate high temperature surface temperature reductions of 10-26 °C, indoor cooling of 1-4 °C, and brief payback periods of 1.3 2 years, and effective integrated passive design measures can produce 30-47 °C reductions in whole-building energy consumption. Even moderately sized cities, Urban-scale modelling also establishes that a mass deployment of cool roofs can counterbalance climate-driven cooling loads and prevent close to 191,000 metric tons of $CO_2$ each year of city-scale cooling loads, such as Ahmedabad. At the neighborhood level, district cooling and community renewable-energy systems offer 25-30% lifecycle cost savings and enhance urban climate resilience. However, GRIHA and IGBC rating systems help incorporate these strategies as part of the sustainability policy framework in India. The review outlines several gaps to be addressed in the future: a lack of long-term field validation, a sufficiently small amount of research on non-residential applicability, and a lack of knowledge of how urban heat-island interactions should work. Sealing these gaps is a mechanism that is crucial to scaling the solutions across the nation. Future opportunities involve the introduction of cool roofs as mandatory within the urban development codes, the enforcement of the ECBC, and the increase in investment in the infrastructure of energy on the district scale in the tier-1 and tier-2 cities. Advancing real-world monitoring, cross-sector research, and climate-responsive design innovation will be vital to accelerate India's transition toward net-zero emissions by 2070 and ensure sustainable, energy-efficient urban growth.

**Impact of Excessive Mobile Use on Children's Behavior and Mental Health**

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Excessive mobile phone use among children has become a growing public health concern. This study examines the impact of prolonged mobile screen exposure on children's behavior and mental health. Using a descriptive survey design, data were collected from 50 school-aged children through the Screen Time Questionnaire (STQ) and Smartphone Addiction Scale–Short Form (SAS-SF). Results revealed that 66% of children used mobile phones for more than four hours daily, and 32% showed high levels of smart phone addiction. Findings indicate a strong relationship between excessive mobile use and behavioral disturbances such as irritability, attention deficits, sleep problems, and emotional instability. The study highlights the need for parental monitoring, digital hygiene, and balanced screen-time habits to promote healthy development.

**Keywords:** Screen Time, Behavioral Problems, Mental Health, Smartphone Addiction,

**A phytochemical rich plant and health benefits of *Hibiscus Sabdariffa*: A Review**

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*Hibiscus Sabdariffa* is also known as Ambadi in Chhattisgarh. This is tropical plant phytochemically rich with great potential of health benefit. This review study aims to collect and summarize the current present evidence based on the plant ability to help and manage high blood pressure and diabetes also. A broad search in PubMed, Science Direct, and Google Scholar the studies covered from 2010 to 2022, focusing on its nutritional and phytochemical values, effect on health and use in as an ingredient in food products.

The result we found *Hibiscus Sabdariffa* is rich in total phenolic acid, flavonoids and anthocyanins, which shows a strong antioxidant activity. Its extracts can block the α-amylase and α-glucosidase enzymes, boost insulin sensitivity and lower the blood pressure. This plant also promotes vasodilation and support heart health when added or make to foods like some beverages gives its natural color or add lightly sweetened baked goods- it offers a favourable way to create a value-added or fortified food products with real health benefits.

Overall, this review highlights the potential of Hibiscus Sabdariffa as a powerful, phytochemical rich ingredient for developing functional foods that support metabolic and cardiovascular health.

**Key words:** phytochemical properties, anti-diabetic, anti-hypertensive, food fortification.

**Reverse Pharmacology: A Paradigm Shift for Current Scenario of New Drug Discovery**

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Natural products of Ayurveda offer a vast potential for novel phytomolecules with clinical activity and regarded as safe and commonly used in many acute and chronic illness. In India, Ayurveda is availed of by more than 70% of the population. Ayurvedic Pharmacoepidemiology, Observational therapeutics and Reverse Pharmacology paths have led to significant hits, leads and drug candidates for several diseases. Reverse Pharmacology is the integrating science of developing candidate drugs from clinical to experiential hits and leads by trans-disciplinary exploratory studies and ultimately to understand the mechanism of action at different pathological stages of biological organisms and confirm candidate drugs experimental to clinical use on the basis of safety, efficacy and acceptability on relevant science. This approach of Reverse Pharmacology has also been adopted globally by several researchers. A plea is made to look at the revolution in drug discovery and development.

**Keywords:** Reverse Pharmacology, Ayurveda, Drug Discovery, Therapeutics, Safety.

# Impact of Balanced Diets on Prevention of Lifestyle Diseases

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Lifestyle diseases such as obesity, diabetes, cardiovascular disorders, and hypertension have emerged as major public health challenges worldwide, particularly in rapidly urbanizing societies. The role of nutrition in preventing these conditions is increasingly recognized, with balanced diets serving as a cornerstone of health promotion. A balanced diet, characterized by adequate intake of macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals), supports optimal physiological functioning and reduces risk factors associated with lifestyle diseases. Diets rich in fruits, vegetables, whole grains, lean proteins, and healthy fats contribute to maintaining healthy body weight, regulating blood glucose levels, and improving lipid profiles.

Conversely, excessive consumption of processed foods, refined sugars, and saturated fats has been linked to metabolic disorders and chronic inflammation, which accelerate disease progression. Evidence from epidemiological studies highlights that populations adhering to balanced dietary patterns, such as the Mediterranean or plant-based diets, demonstrate lower incidence of lifestyle diseases. Moreover, balanced nutrition enhances immunity, reduces oxidative stress, and promotes mental well-being, thereby offering holistic protection against disease.

In developing societies, where dietary transitions often favor convenience foods over traditional nutrient-dense meals, awareness and education about balanced diets are critical. Public health initiatives focusing on nutrition literacy, food fortification, and community-based interventions can significantly reduce disease burden. Ultimately, balanced diets represent a sustainable, cost-effective strategy for preventing lifestyle diseases, underscoring the need for integrated efforts by individuals, families, and policymakers to promote healthier eating habits.

**Keywords**: lifestyle, diet, metabolic disorder, diseases.

**Marital Psychology of Adults in a Developing Society**

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Marital psychology in adults within developing societies examines the dynamic interplay between individual psychological needs, cultural expectations, and socio-economic transformations. Marriage, traditionally viewed as a cornerstone of social stability, is increasingly influenced by modernization, urbanization, and shifting gender roles. Adults navigating marital relationships in such contexts often face the dual challenge of preserving cultural traditions while adapting to new societal norms. Psychological aspects such as emotional intimacy, communication, conflict resolution, and role negotiation become central to marital satisfaction and stability.

In developing societies, economic pressures, migration, and exposure to global values reshape marital expectations. Women's increasing participation in education and the workforce contributes to evolving power dynamics, while men are challenged to redefine traditional roles. These transitions can foster greater equality and partnership but may also generate stress, misunderstandings, and marital discord. Furthermore, limited access to counseling and mental health resources often leaves couples to rely on family networks or informal support systems. Research highlights that marital psychology in such settings is not static but adaptive, reflecting resilience and creativity in coping strategies. Adults demonstrate a blend of traditional values—such as commitment and familial responsibility—with modern aspirations for personal fulfilment and autonomy. Understanding these psychological processes is crucial for policymakers, educators, and mental health professionals to design culturally sensitive interventions that strengthen marital bonds. Ultimately, marital psychology in developing societies underscores the importance of balancing tradition with progress to promote healthy, enduring relationships.

**Keyword**: mental health, adults, developing society, traditional values.

# An Analytical Study of the Role of Education and Social Work in Sustainable Development

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Sustainable development focuses on balancing economic progress, social inclusion, and environmental protection to ensure a better quality of life for future generations. Education and social work are two fundamental forces that significantly contribute to this process. Education promotes sustainable development by developing critical thinking, environmental awareness, ethical values, and life skills necessary for responsible citizenship. It prepares individuals to understand global challenges such as poverty, climate change, inequality, and resource depletion, and encourages sustainable behaviors at both individual and collective levels.

Social work plays a vital role in translating sustainability principles into practical action by working directly with communities and vulnerable groups. Social workers promote social equity, empowerment, participatory development, and access to basic services, which are essential for long-term sustainability. Through community-based interventions, advocacy, and policy support, social work strengthens social cohesion and resilience. This paper emphasizes that the integration of education and social work is essential for achieving sustainable development, as both contribute to building inclusive, environmentally responsible, and socially just societies.

**Keywords**: Sustainable Development, Education, Social Work, Social Justice, Sustainable Development Goals (SDGs),

# Change in Child Psychology in Nuclear Families After Covid

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Child psychology in the context of nuclear families examines how children's emotional, cognitive, and social development is influenced by the immediate environment of parents and siblings. The nuclear family, consisting typically of two parents and their children, provides a compact and focused setting for growth. Within this structure, children often receive concentrated parental attention, consistent routines, and a sense of security that supports identity formation and self-confidence. Such an environment can foster independence, responsibility, and resilience, as children learn to navigate challenges with limited external support.

However, the absence of extended family members may reduce opportunities for intergenerational learning, shared caregiving, and broader socialization. This can sometimes lead to feelings of isolation, increased parental stress, or overdependence on parents for emotional regulation. Psychological outcomes in nuclear families are therefore shaped by the balance between nurturing care and the limitations of a smaller support system. Research highlights that while nuclear families can promote strong emotional bonds and effective communication, they may also expose children to heightened vulnerability during crises such as parental conflict, economic instability, or health emergencies.

Understanding child psychology in nuclear families is essential for educators, psychologists, and policymakers. It enables the design of interventions that strengthen resilience, encourage healthy peer interaction, and provide external support where family structures are limited. Ultimately, the nuclear family remains a critical unit in shaping children's psychological well-being, requiring both parental awareness and societal support to ensure holistic development.

**Keyword**: Child, Psychology, COVID, Family.

**Medicinal Plants: Integrate Traditional Knowledge with Modern Scientific Research**

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Ayurvedic medicines have been in use since ancient times. Keeping this in our mind, the herbs found in rural areas are also capable of curing many of diseases. These herbs have not yet been identified in urban areas and urban areas are unable to reap their benefits. Keeping these factors in mind, we can make these herbs available to the people through advanced technology. Advanced technology involves collection of herbs, subsequent extraction, and identification of phytochemicals, observe their biological activities, including chromatographic techniques, spectroscopic techniques, thermal analysis, elemental and structural techniques and bioanalytical characterization. Through this advanced technology, herbs found in rural areas can be recognized the urban areas and can be used to treat many diseases.

# Green Chemistry in Pharmaceutical Drug Development: A Sustainable Path for Global Health

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The pharmaceutical industry plays a critical role in improving global health; however, conventional drug development and manufacturing processes frequently rely on hazardous chemicals, non-renewable resources, and energy-intensive reactions, leading to environmental pollution, high production costs, and potential health risks. Green chemistry provides a sustainable and innovative framework for redesigning pharmaceutical processes to minimize environmental impact while maintaining drug quality, safety, and therapeutic efficacy. This review highlights the application of green chemistry principles in pharmaceutical drug development, with emphasis on the use of environmentally benign solvents, renewable feedstocks, safer reagents, reusable catalysts, and atom-efficient synthetic pathways for the production of active pharmaceutical ingredients (APIs). Process intensification techniques such as flow chemistry, microwave-assisted synthesis, and biocatalysis, along with green analytical methods, are discussed as effective strategies for reducing solvent consumption, waste generation, and energy demand throughout the drug life cycle. The integration of these approaches not only enhances environmental sustainability but also improves workplace safety, regulatory compliance, and economic efficiency in pharmaceutical manufacturing. Moreover, green chemistry contributes significantly to global health by enabling cost-effective drug production, minimizing pharmaceutical waste, and supporting the development of sustainable healthcare systems, particularly in resource-limited regions. Recent case studies from the literature demonstrate the successful industrial implementation of green chemistry practices in pharmaceutical synthesis and scale-up processes. These advancements directly support the achievement of Sustainable Development Goals related to good health, responsible consumption and production, and environmental protection. This review concludes that the systematic adoption of green chemistry principles in pharmaceutical drug development is essential for promoting sustainable innovation and ensuring the availability of accessible, eco-friendly, and high-quality medicines for future generations.

**Evaluation of Biomedical Applications of Green Synthesized Zinc Oxide Nanoparticles**

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Green synthesis of zinc oxide nanoparticles (ZnO-NPs) using plant-derived biomolecules has emerged as a sustainable and eco-friendly approach in nanobiotechnology. Plant-mediated synthesis utilizes phytochemicals such as flavonoids, phenolics, alkaloids, and terpenoids as natural reducing and stabilizing agents, enabling the formation of biocompatible ZnO-NPs with controlled size and morphology. The present study evaluates the biomedical potential of green-synthesized ZnO nanoparticles with emphasis on their therapeutic and diagnostic applications. Biosynthesized ZnO-NPs exhibit enhanced biological activity compared to chemically synthesized counterparts due to surface functionalization by plant metabolites. These nanoparticles demonstrate significant antibacterial and antifungal efficacy against pathogenic microorganisms through reactive oxygen species (ROS) generation and zinc ion release, leading to membrane disruption. Furthermore, green-synthesized ZnO-NPs show promising anticancer activity by inducing oxidative stress, mitochondrial dysfunction, and apoptosis, while exhibiting reduced toxicity toward normal cells. Additional biomedical applications include antioxidant, antidiabetic, wound healing, skin protection, and drug delivery systems. Recent advancements also highlight their role in bioimaging, biosensing, and theranostic platforms. Overall, the evaluation underscores that plant-mediated ZnO nanoparticles represent a promising class of sustainable nanomaterials for advanced biomedical applications, offering improved efficacy, biocompatibility, and environmental safety, thereby supporting their potential translation into future nanomedicine and clinical applications.

**Keywords:** Green Synthesis; Phytochemicals; Zinc Oxide Nanoparticles; Reactive Oxygen Species; Nanomedicine.

**Knowledge and Practices Regarding Food Safety and Hygiene among Street Food Vendors in Raipur, Chhattisgarh**

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Street foods play an important role in meeting the daily food needs of urban populations, especially in developing cities like Raipur, Chhattisgarh. they are affordable, easily accessible, and provide livelihood opportunities for a large number of vendors. however, improper food handling, poor hygiene practices, and lack of awareness about food safety can increase the risk of foodborne illnesses among consumers. this study aims to assess the level of knowledge and practices related to food safety and hygiene among street food vendors in Raipur, Chhattisgarh.

A descriptive cross-sectional study was conducted among street food vendors operating in different areas of Raipur city. data was collected using a self-planned structured questionnaire that included information on socio-demographic characteristics, knowledge of food safety principles, personal hygiene, food handling practices, and cleanliness of utensils, waste disposal, and storage methods. observational checklists were also used to assess actual hygiene practices at vending sites. the collected data were analyzed using appropriate statistical tools to identify gaps between knowledge and practices.

the findings of the study revealed that while a moderate level of awareness regarding basic food safety concepts existed among many vendors, the actual implementation of hygienic practices was often inadequate. common issues observed included improper handwashing, lack of protective clothing, unhygienic storage of raw and cooked foods, and poor waste management. factors such as low educational status, lack of formal training, and absence of regular health inspections were found to influence food safety practices.

The study concludes that there is a clear need for targeted food safety education, regular training programs, and strict monitoring by local authorities to improve hygiene standards among street food vendors. enhancing food safety practices will not only protect public health but also improve consumer confidence and the overall quality of street-vended foods in Raipur.

**Influence of Micro Celebrities on Consumer Purchase Decision**

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This study deals with the perceptions of audiences about micro-celebrities and their influence on consumer buying behaviour. This study uses quantitative methodology through a structured survey questionnaire. With a sample of 139 people, the study describes how audiences engage with content from micro-influencers, particularly in the beauty, skincare and lifestyle categories. It analyses why people like influencer content, why they trust it, and how this content impacts their purchasing decisions. The study also considered demographic factors such as age and gender, which indicate which audiences are more influenced by micro-celebrity content. Analysis of the data revealed that young adults, especially females, are more impacted by content from micro-influencers. In addition, the study also finds that factors such as authenticity, reliability and consistent engagement play an important role in building audience trust. The findings reflect that the audience relies on influencer recommendations but prefers content that is natural and not over-promotional.

**Keywords:** Micro-celebrities, Social Media Influencers**,** Consumer Buying Behaviour**,** Brand Promotion**,** Instagram, YouTube

**Role of Social Media Generation on Healthy Food Practices among Teenage Girls**

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The problem of malnutrition in still hampering the health status of school going girls in Chhattisgarh state is also one of the amongst suffering malnutrition as well as anemia. In order to promote dietary practices in girls, it is necessary to explore individual participation of dietary intake and understand the wide range of factors which influences their dietary habits. Keeping these factors in mind what Sup group and web site is developed. The format of groups and content of website will be finalized with the help of senior nutritionist and dietitians

Higher secondary School from 9 -12 classes will be selected as a sample from what app Group Sun ri sakhi will be developed to communicated and educated the girls about healthy food practices interested of using long direction and does and doesn't will be used small messages for effective communication as social media is an effective tools to calculate and communicated the messages. To enhance the knowledge related to healthy food practices website will be focus on basic food group related to healthy categories substitute and hygienic. The result of pilot survey on 20 girls showed positive impact as all girls were communicating with researcher. All above primary abstraction evident that such medium can be a use as part of nutrition education, will be help full in promoting healthy food practices of the girls.

**Keywords**: nutrition education, social media and anemia.

**ITS-Based Molecular Analysis and Environmental Importance of *Phellinus rimosus*, A Wood-Decaying Fungus**

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*Phellinus Rimosus* (Berk.) Pilát is a perennial, wood-decaying Basidiomycete belonging to the family Hymenochaetaceae and plays a significant role in forest ecosystems as a white-rot fungus. accurate identification of this species based solely on morphological characters is often challenging due to phenotypic plasticity and close resemblance to allied taxa within the *Phellinus* sensu Lato Complex. in the present study, molecular characterization of *P. rimosus* was carried out using the Internal Transcribed Spacer (ITS) region of nuclear ribosomal DNA, The accepted universal DNA barcode for fungi. genomic DNA was extracted from basidiocarp tissues, and the ITS1–5.8S–ITS2 Region was amplified using universal primers ITS1 and ITS4. The Obtained ITS sequences were compared with reference sequences available in GenBank and subjected to phylogenetic analysis. The ITS-Based phylogeny revealed clear clustering of *P. rimosus* with related taxa of Hymenochaetaceae, while also indicating genetic divergence within morphologically identified specimens, suggesting possible cryptic diversity. in addition to molecular identification, the study highlights the environmental importance of *P. rimosus* in lignin degradation, nutrient recycling, carbon turnover, and maintenance of forest health. the findings emphasize the necessity of ITS-based molecular tools for accurate species identification and for understanding the ecological significance of wood-decaying fungi in natural ecosystems.

**Keywords:** *Phellinus rimosus*, ITS r-DNA, Molecular Identification, Wood-Decaying Fungi, Environmental Importance, Hymenochaetaceae

# Green Chemistry in Pharmaceutical Drug Development: A Sustainable Path for Global Health

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Green chemistry is transforming pharmaceutical drug development by minimizing environmental impact while improving health outcomes. This approach focuses on designing sustainable processes and products that reduce waste, energy consumption, and hazardous substances. By applying green chemistry principles, the pharmaceutical industry can reduce its carbon footprint, improve worker safety, and create more efficient and cost-effective processes. This review highlights the importance of green chemistry in pharmaceutical development, showcasing examples of successful implementations and discussing future directions for sustainable innovation. The pharmaceutical industry is embracing green chemistry to minimize its environmental footprint while improving global health outcomes. Green chemistry principles focus on designing sustainable processes and products that reduce waste, energy consumption, and hazardous substances. This approach has led to the development of innovative, eco-friendly pharmaceuticals and manufacturing processes. By applying green chemistry, the industry can reduce its carbon footprint, improve worker safety, and create more efficient and cost-effective processes. This review highlights the importance of green chemistry in pharmaceutical development, showcasing examples of successful implementations and discussing future directions for sustainable innovation.

**Keywords:** Green chemistry, Pharmaceutical development, Sustainability Environmental impact, Waste reduction.

# Caffeine Consumption Pattern and Its Effect on Sleep Quality among Young Individuals

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Caffeine is one of the most widely consumed psychoactive substances and is commonly found in tea, coffee, energy drinks, soft drinks, and chocolate products. Young individuals, particularly students and early working adults, often consume caffeine to enhance alertness, improve concentration, and manage academic or occupational stress. However, excessive intake or consumption at inappropriate times may negatively affect sleep quality, which is vital for physical and mental well-being.

This cross-sectional observational study assessed caffeine consumption patterns and their impact on sleep quality among 100 individuals aged 18–30 years. Data were collected using a structured questionnaire covering socio-demographic details, types and frequency of caffeine intake, daily consumption, and timing. Sleep quality was evaluated using a standardized tool measuring sleep duration, sleep latency, disturbances, and daytime dysfunction.

The findings revealed that most participants consumed caffeine daily, primarily through tea and coffee, followed by energy drinks and carbonated beverages. Many reported evening or late-night consumption, especially during periods of academic stress. Poor sleep quality was common, characterized by reduced sleep duration, delayed sleep onset, frequent awakenings, and daytime fatigue. Statistical analysis showed a significant association between higher and late-evening caffeine intake and poorer sleep quality. The study emphasizes the need for awareness and moderation to promote healthy sleep practices among young individuals.

**Keywords**: Caffeine intake, Sleep quality, Young adults, Stimulant beverages, Daytime sleepiness

**Role of the National Education Policy (2020) in Environment Sustainability**

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For the better future we need to sustain the environment first. For the sustaining environment, education is the best way to sustain environment. Keeping environment protection in mind, the government has given the responsibility to the National education policy 2020 to raise awareness among people, so that the work of environmental sustainability reaches all sections of the population. As the world grapples with the climate change, deforestation and pollution, sustainable practice have become crucial for nation like India. We need to learn how to deal with waste material so we can be more productive with things.

**Keywords:** Sustain Environment, protection, NEP 2020.

**Cell Wall Degrading Enzymes of *Phytophthora* as a Potential Target for Anti- fungal (Anti-Oomycete) Agents**

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*Phytophthora* belongs to the genus of plant infecting oomycetes commonly called as water molds, and considered as an important plant pathogen. Members of this species causes infections to several agricultural crops and causes huge economic loss. This group of microbes resembles fungi but different from true fungi. It's a soil and water borne oomycetes causing root rot, collar rot, fruit rot and blight. This plant pathogen has a very wide host range including field crops like Soybean, Chickpea and Cotton. Fruits crops like Citrus, Grapes and apples. Among vegetables Brinjal, Onion, cabbage and Cauliflower. *Phytophthora* produces several Cell Wall Degrading enzymes (CWDEs) like Cellulases (Endo-glucanases and Beta glucosidases), Pectinases (Polygalacturonases and Pectate lyases), and Cutinases to enter and infect the plant cells. Polygalacturonases cause hydrolysis and breakdown of pectin backbone. Pectate lyases cleaves pectin layer by elimination mechanism. Cellulases breaks internal cellulose bonds and damages structural integrity of plant cell. Cutinases targets cuticle and breaches the waxy plant surface to infect the plants. Even though plants produce inhibitors to stop these CWDEs as a part of their immunity, *phytophthora* continuously upgrades their CWDEs to neutralizes these inhibitors. Presently available anti-oomycete agents target specific enzymes (proteins) or cellular metabolism to control the infection caused by *Phytophthora* Phenylamides targets RNA polymerase I and inhibits rRNA synthesis in *Phytophthora* but as per the reports point mutations in the RNA polymerase I alters the binding pocket and develops the resistance. Benzamides and Piperidinyl thiazole groups of chemicals targets cytoskeleton and Oxysterol binding proteins but it is noted that accumulation of mutations in these target enzymes making *Phytophthora* resistant to theses chemical agents. Structure prediction (secondary and tertiary) of CWDEs by using in silico methods and Docking studies using different antifungal chemicals can help to design target specific and novel antifungal (anti-oomycete) agents to control Phytophthora infections.

# उत्तर वैदिक काल प्राचीन भारतीय इतिहास का एक परिवर्तनकारी युग

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उत्तर वैदिक काल प्राचीन भारतीय इतिहास का एक परिवर्तनकारी युग था, जिसे एक घुमंतू पशुपालक समाज से अधिक स्थायी कृषि-आधारित समाज की ओर संक्रमण द्वारा चिह्नित किया गया। राजनीति के क्षेत्र में कबीलाई व्यवस्था से क्षेत्रीय राज्यों और राजतंत्र का विकास हुआ, राजा का पद वंशानुगत होने लगा। राजा को सम्राट, एकराट कहा जाने लगा और राजसूय यज्ञ से राज्याभिषेक होने लगा। अश्वमेध, जैसे जटिल यज्ञों का प्रचलन बढ़ा, जिससे पुरोहितों की शक्ति में वृद्धि हुई। उत्तर वैदिक काल में ऋग्वैदिक युग की लोकप्रिय सभाओं का महत्व घटने लगा और राजशक्ति का उदय हुआ। भारतीय सामाजिक व्यवस्था का आधार वर्णाश्रम व्यवस्था है। यद्यपि वर्ण व्यवस्था की नींव ऋग्वेद काल में पड़ चुकी थी परन्तु यह स्थापित उत्तरवैदिक काल में ही हुई। उत्तर वैदिक काल में जाति व्यवस्था पूरी तरह से विकसित हो गई थी और वर्ण व्यवस्था मजबूती से स्थापित हो गई थी। धार्मिक ग्रंथ यजुर्वेद, सामवेद, अथर्ववेद की रचना हुई और वेदों का संकलन हुआ। उत्तर वैदिक काल में ही प्रजापति और विष्णु जैसे देवता प्रमुख हुए, इंद्र और अग्नि का महत्व घटा। यह लेख उत्तर वैदिक युग के राजनीतिक, आर्थिक ,धार्मिक और सामाजिक क्षेत्र में हुए परिवर्तनों का विस्तृत अध्ययन प्रस्तुत करता है। जिसने आगे चलकर भारतीय संस्कृति और राजनीति को आकार दिया।

**Ethics, Humanity, and Social Responsibility in Pharmacy Practice**

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Effective health care requires collaboration between patients and physicians and other health care professionals. Open and honest communication, respect for personal and professional values, and

sensitivity to differences are integral to optimal patient care. Ethics and responsibility are expressions that should characterize professional practice in many sectors of society responsible pharmacist at the present stage of the pharmaceutical industry development. The materials of the study were results of a sociological survey of pharmacy specialist. Education in pharmacy includes both the development of ethical sensibility and the gain of scientific knowledge. This abstract explores how human values and professional ethics are intrinsically linked in the context of pharmacy education, illuminating how the incorporation of these ideas fosters ethical and conscientious pharmacists. Ethics, humanity, and social responsibility form the core of modern pharmacy practice, transforming the role from mere product dispensing to patient-centered care. Pharmacists are viewed as highly trustworthy professionals, with 66% of people rating their ethical standards as high. They act as the final check in the healthcare system, balancing clinical, legal, and moral obligations to ensure patient safety and improve public health. To recognize the consumer's health and wellbeing as their first priority, and utilize knowledge and provide compassionate care in an appropriate and professional manner. Among the qualities that characterize a person's relationship with other people, to the team, the main positions are "patience", "self-control behavior" and "communicability". The lowest rank showed "compassion" and "sensitivity". Ethical reasoning that can be applied to (the practice of) pharmacy. Only general principles, based on accepted values in western society, lead to guidelines for ethical behavior. Such essential values are personal autonomy, democracy and solidarity. The principle of non-maleficence can be derived from these. Results of this analysis can be applied to health care and pharmacy practice.

**Keywords:** Professionalism, Justice, Empathy, Trust, Public Health, Pharmacovigilance.

**A Review on Sustainable Pharmaceutical Manufacturing and Green Technologies**

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The terms "green engineering" and "green or sustainable chemistry" are now widely used to characterize the trend toward more ecologically friendly industrial goods and chemical processes. The chemical industry's shift to "greener" raw materials, alternative organic synthetic methods, biocatalysis, reduced use of hazardous organic solvents, increased yields, and reduced waste was mainly focused on industrial process economy, but it also included worker and consumer protection and environmental pollution reduction. The pharmaceutical industry looks for manufacturing methods with green credentials, reduced regulatory risk, and a smaller environmental impact. More "green" procedures and cutting-edge technological operations are being adopted by the pharmaceutical sector. Many large pharmaceutical companies in industrialized nations have research departments that are developing novel "green" techniques, biocatalysis reactions, less solvents, and waste output reductions while also implementing safety and health standards to safeguard their employees. Promoting the four pillars of change—safety, efficiency, reliability, and economy—is seen as a competitive advantage.

**Keywords**: Sustainable, biocatalyst, greener, efficiency.

**Sustainable and Responsible Business: Integrating Ethics, Environment and Economic Value**

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Growing environmental issues, social injustices, and ethical concerns in international markets have led to the emergence of sustainable and responsible business as a crucial paradigm. By combining economic success with social responsibility and environmental care, this study explores the idea of sustainable and responsible company. It illustrates how businesses are increasingly implementing sustainability-driven methods to minimize negative externalities and produce long-term benefit for users. The study examines significant topics such corporate social responsibility (CSR), environmental sustainability, ethical governance, and stakeholder engagement using a selection of literature and case studies from multinational organizations. According to the research, companies that implement ethical standards not only improve their operational effectiveness and brand image but also gain a sustained competitive edge. By highlighting sustainability's strategic significance rather than treating it as a compliance necessity, the study adds to the expanding conversation on sustainability. The results indicate that although sustainable businesses are essential to the green economy, more concerted efforts by the government, business society as a whole and civil society are required to expand their influence internationally. The findings suggest that while sustainable enterprises play a crucial role in the green economy, more coordinated efforts between government, industry, and civil society are needed to scale their impact globally.

**Keywords:** Green economy, sustainable enterprises, financial and regulatory frameworks, technological innovations, civil society ESG.

**Digital transformation and AI in pharmacy for sustainable healthcare**

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Digital transformation and artificial intelligence (AI) are playing a transformative role in modern pharmacy practice, contributing significantly to the development of sustainable healthcare systems. As healthcare demands increase due to population growth, chronic diseases, and rising treatment costs, the pharmacy sector must adopt innovative technologies to improve efficiency, safety, and accessibility while minimizing environmental and economic burdens. Digital transformation enables pharmacies to shift from traditional, manual processes to data-driven, technology-enabled models of care. One of the most important aspects of digital transformation in pharmacy is the adoption of electronic health records (EHRs), e-prescribing, and integrated pharmacy information systems. These tools allow pharmacists to access accurate patient medication histories, monitor therapy outcomes, and collaborate effectively with physicians and other healthcare professionals. E- prescribing reduces medication errors caused by illegible handwriting and incomplete information, while also improving prescription turnaround time. By minimizing paper-based processes and manual documentation, digital systems support environmental sustainability and operational efficiency. Artificial intelligence further enhances these digital advancements by enabling intelligent analysis of large and complex datasets. In drug discovery and development, AI algorithms accelerate the identification of potential drug candidates by analyzing molecular structures, biological pathways, and clinical data. This reduces the time, cost, and resource consumption associated with traditional drug development processes. AI also plays a vital role in personalized medicine, where patient- specific data such as genetics, lifestyle, and medical history are used to tailor drug therapy, leading to better treatment outcomes and reduced adverse drug reactions. In clinical pharmacy practice, AI-powered clinical decision support systems assist pharmacists in identifying drug–drug interactions, contraindications, and dosing errors.

**Keyword:** Artificial Intelligence(AI), Digital Health Technologies, Personalized Medicine, Pharmacy Automation, Sustainable Healthcare Systems.

**AI in Pharmacy: Transforming Drug Development and Patient Care**

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The use of Artificial Intelligence (AI) is quickly changing different sectors, and the pharmaceutical sector is also included. AI is progressively utilized to automate, enhance, and tailor numerous facets of the pharmacy sector, spanning from drug discovery to medication dispensing. AI to transform the pharmacy sector by analyzing the present and upcoming uses of AI within the industry. We will explore the applications of AI in drug discovery, personalized medicine, drug safety and quality assurance, inventory management, and patient counselling. We will address the difficulties and restrictions of AI within the pharmacy sector, including data privacy issues ,ethical impasses, and regulatory obstacles. The previous pharmacy system depended on manual operations and human judgment, whereas the new AI pharmacy system streamlines routine activities, offers tailored treatment plans, and lowers expenses while enhancing patient results. Nonetheless, it is crucial to make certain that AI is utilized ethically and responsibly, and that its effects on the workforce and society are thoroughly evaluated. The primary advantage of incorporating AI into applications in the pharmacy sector is enhanced precision and effectiveness in patient treatment. Thus, Artificial Intelligence (AI) can revolutionize pharmacy by enhancing drug discovery, optimizing treatments, and improving patient outcomes. Some major AI applications include: Predicting drug interactions and side effects, personalizing medication regimens based on patient data, streamlining clinical trials and approvals, Enabling precision medicine through data analysis etc.

**Keywords:** Artificial Intelligence (AI), pharmacy, medication regimens, drug interactions, data analysis.

**Pharmacoeconomics and the Availability of Reasonably Priced Medications**

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A significant area of health research that examines the price and worth of medications and medical services is called pharmacoeconomics. It facilitates comparing the financial effects of various medications and therapies in light of their efficacy, safety, and results. Pharmacoeconomics' primary goal is to make sure that the little resources available for healthcare are used effectively to benefit patients and society as a whole. A significant worldwide health challenge is the availability of reasonably priced medications, particularly in poorer nations where a huge portion of the populace cannot afford pricey medications. Proper healthcare is hampered by high drug costs, a lack of health insurance, and a shortage of generic medications. Pharmacoeconomic studies are essential for finding affordable medications and encouraging the use of less expensive substitutes without sacrificing quality of treatment. Pharmacoeconomics helps governments, hospitals, and healthcare providers make decisions by using techniques like cost-effectiveness analysis and cost-benefit analysis. These studies assist legislators in creating more effective drug price regulations, enhancing reimbursement schemes, and promoting the manufacture and usage of generic medications. Patients can thereby obtain necessary medications at reduced prices. Additionally, by enhancing access to life-saving medications for all societal segments, pharmacoeconomics advances healthcare equity. By cutting wasteful spending, it also promotes sustainable healthcare systems. All things considered, pharmacoeconomics is an essential instrument for increasing everyone's access to reasonably priced medications and guaranteeing high-quality healthcare.

**Keywords:** Pharmacoeconomics, generic medications, health insurance, legislator, Patients

**Diversity of Ascomycetes Fungi from Parwa forest, District Yavatmal**

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Parwa forest, situated in the southern tropical dry deciduous forests of Maharashtra, in Yavatmal District exemplifies a vibrant ecological environment marked by a variety of vegetation, including teak (*Tectona grandis*L), mahua (*Madhuca longifolia* (L.) JF Macbr.) and extensive Bamboo groves. These elements collectively enhance the soil's organic matter and create diverse microhabitats that favour fungal colonization. Fungi belonging to the phylum Ascomycota are important for nutrient cycling, the decomposition of plant litter, and symbiotic relationships within forest ecosystems. Though, their diversity in numerous protected areas across the region has not been thoroughly explored. This study involved systematic field surveys and laboratory identifications conducted across various microhabitats (leaf litter, decaying wood, and bark substrates) within the region during both the wet and dry seasons. Standardized sampling methods, along with isolation and morphologicalidentification techniques, were utilized to document the diversity of Ascomycetes. The findings revealed a rich collection of Ascomycetous taxa, encompassing saprophytic, endophytic, and pathogenic ecological groups. Preliminary results suggest significant representation from genera such as, *Xylaria, Chaetomium, Hypoxylon, Rhytidhysterium, Nectria, Pseudographis,* and several cup fungi, with seasonal variations in species composition likely influenced by moisture levels and substrate quality. Quantitative study of diversity indices, indicated a moderate to high level of fungal diversity. Specially, litter substrates exhibited the highest species richness, emphasizing the critical role of decomposing plant material as a reservoir for fungal biodiversity. The relationships observed between fungal communities and environmental factors, such as pH, moisture content, and organic carbon levels, underscore the impact of abiotic conditions on the distribution of Ascomycetes. The results of this research provide foundational data for understanding fungal biodiversity within dry deciduous forests, highlight the ecological importance of Ascomycetes in various ecosystem processes, and advocate for their inclusion in comprehensive biodiversity conservation strategies.

**AI in Drug Discovery and Development**

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Drug discovery has conventionally relied on synthesis and subsequent biological evaluation in animal test systems. This required significant time, effort and cost in the drug discovery process. Further development of selected molecules viz., clinical trials and formulation development also contributed to significant costs and efforts. The boom in artificial intelligence (AI) has opened new opportunities leveraging the power of AI. Today, multiple AI tools that perform literature review, data analysis and report writing. AI has also been integrated with chemoinformatics and structural biology to screen existing and new molecules for biological activity without synthesising the target compounds. AI integration with pharmacogenomics and clinical data could pave the way for identification of drug activity determinants including possible side effects. Despite these potential applications, AI still has its share of limitations and is continuously being improved through improvements in algorithms, bigger training data sets and agentic systems.

**Integrating Traditional Medicine with Modern Pharmaceutical Sciences**

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Scientifically sound and long-lasting strategy for enhancing healthcare systems across the globe is to combine traditional medicine with contemporary pharmaceutical sciences. Centuries of empirical knowledge and widespread use of natural resources for illness prevention and treatment form the foundation of traditional medical systems including Ayurveda, Unani, Siddha, Traditional Chinese Medicine, and indigenous healing techniques. These systems offer an extensive collection of natural goods and medicinal plants that may have therapeutic effect. By using cutting-edge scientific techniques including phyto-chemical screening, pharmacological evaluation, toxicological assessment, standardization, quality control, and clinical trials, modern pharmaceutical sciences significantly contribute to the validation of this traditional knowledge. Stress how this kind of integration ensures the safety, effectiveness, and reproducibility of traditional medicines, bridging the gap between them and evidence-based medicine. Utilizing contemporary analytical methods aids in the identification of bioactive substances, comprehension of their mechanisms of action, and enhancement of dose forms for better patient adherence. Additionally, by providing innovative lead compounds that may be accessible and affordable, especially in developing nations, this integrated strategy aids in drug discovery and development. Combining pharmaceutical sciences and traditional medicine fosters innovation and international acceptance while also aiding in the preservation of traditional knowledge. Overall, this interdisciplinary integration improves the quality of contemporary healthcare systems by strengthening healthcare delivery, promoting the discovery of safe, effective, inexpensive, and sustainable therapeutic agents, and encouraging the sensible use of natural medicines.

**Keyword:** Traditional medicine, health care, Sustainable, quality control, clinical trials.

**Mathematical Modelling and Efficient Solution of Multi-Objective Transportation Problems Using a Normalized Weighted Heuristic Approach**

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Multi-objective transportation problems involve optimizing conflicting objectives such as cost and time simultaneously. This paper introduces a normalized weighted heuristic approach to solve a bi-objective transportation problem efficiently. The proposed method transforms multiple objectives into a comparable scale through normalization and combines them using a weighted aggregation technique. A least-weight allocation strategy is then applied to obtain an efficient solution with minimal computational effort. A numerical example is used to demonstrate the applicability of the proposed approach. The results are compared with classical transportation methods such as the North-West Corner Method, Vogel's Approximation Method, and MODI method. The comparative study shows that the proposed heuristic produces solutions very close to the optimal solution while maintaining simplicity and computational efficiency.

**Keywords:** Supply Chain Transportation, Heuristic Optimization Technique, Transportation Network Analysis, Cost and Time Minimization.

**The Scientific Examination of Animal Behaviour Focuses on the Actions and Reactions of Animals in Response Raipur Chhattisgarh**

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Humans have been taking advantage of animals since the beginning of time. Due to their vulnerability and inability to defend them, animal resources have been misused. Even though India's diverse wildlife has given rise to many biodiversity hotspots, human encroachment on forest areas has been persistent, leading to conflicts between humans and animals. Animal cruelty manifests in various ways, with the most prevalent forms being the mistreatment of both land and water animals, the abuse of performing animals, and the cruelty inflicted on smaller creatures residing in and around human environments. Whether it involves an individual harming a neighbor's cat, the hoarding of sick or dying animals, or a household that leaves a freezing, starving dog tied outside during winter, stories of animal cruelty make headlines globally every day. Animal cruelty can present itself in numerous ways, including basic neglect, severe neglect, intentional abuse, animal hoarding, organized exploitation, ritualistic abuse, or sexual assault against animals. The issue of cruelty towards animals cannot be ignored, as it has been shown to have significant repercussions, ranging from connections to other criminal activities to inflicting severe suffering on animals that lack advocates. Addressing the threat of animal cruelty is a journey that must be undertaken, with everyone having a part to play, including the government, NGOs, and society at large. This article explores the issue of animal cruelty worldwide.

**Keywords:** Animal abuse, cruelty, measurement, freezing, animal behaviour.

**Value Chain and Market Assessment of Amaranthus *(Ramdana)* in Chhattisgarh and Uttarakhand: Opportunities for Value Addition and Super Nutrition**

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Amaranthus (*Amaranthus graecizans* and *Amaranthus caudatus* L.) is a traditional, climate-resilient crop cultivated in the hill regions of Uttarakhand and the tribal plains and plateaus of Chhattisgarh. Despite its high nutritional value and adaptability to low-input, rainfed systems, amaranthus remains underutilized and is largely consumed seasonally within traditional dietary practices. This study assesses the amaranthus value chain in major production clusters of both states, examining production, processing, and marketing stages. A participatory mixed-methods approach was adopted, involving Focus Group Discussions, Key Informant Interviews, and secondary data analysis from relevant stakeholders and institutions. The study identifies key constraints related to production efficiency, processing infrastructure, and market linkages, while highlighting opportunities for value addition and improved market integration. Strengthening the amaranthus value chain can enhance farmer incomes, promote nutrition-sensitive agriculture, and support climate-resilient livelihoods in Uttarakhand and Chhattisgarh.

**Keywords:** Value chain; Value addition; Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs),

**Environmental Factors' Effects on Silkworm Cocoon Development and Rearing**

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A key component of sericulture is raising silkworms (*Bombyx mori*), and the quality of cocoon production is greatly influenced by a number of environmental conditions. The complex effects of temperature, humidity, light, and air quality on silkworm rearing and cocoon formation are examined in this study. As it affects physiological functions including eating, metabolism, and cocoon spinning, temperature is crucial to the growth and development of silkworms. Variations in humidity have an impact on the general health and quality of the silk, as well as the activity of the silk glands and the texture of the cocoon. Silkworms' circadian rhythm is regulated by light, an often-ignored aspect that also affects their feeding and spinning habits. Additionally, maintaining ideal circumstances throughout the whole life cycle depends on air quality, which includes ventilation and oxygen levels. This study attempts to clarify the complex connections between these environmental elements and their combined impact on silkworm rearing and cocoon production by an extensive examination of the body of existing literature and practical observations. It is anticipated that the results will provide insightful information to researchers, policymakers, and Seri culturists, promoting a more sophisticated comprehension of sustainable silk production methods.

**Keywords:** *Bombyx mori*, silkworm, cocoon production, sericulture, environmental considerations

# हिन्दी साहित्य मे पारिस्थितिक चेतना

पुरूषोत्तम कुमार काबरा
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यह शोध आलेख मानवीय अस्तित्व और प्रकृति के उस चिरंतन संबंध का अन्वेषण करता है जो सभ्यता के उषाकाल से ही अटूट रहा है। शोध का केंद्रीय तर्क यह है कि हिंदी साहित्य में प्रकृति मात्र एक अलंकरण या पृष्ठभूमि नहीं है, अपितु वह 'पारिस्थितिक चेतना' की संवाहक है। आदिकाल के वीर-काव्य से लेकर छायावाद के दार्शनिक मानवीकरण तक, साहित्य ने सदैव मनुष्य को प्रकृति के प्रति संवेदनशील बनाया है। आदिकाल में जहाँ प्रकृति का चित्रण वीरता और श्रृंगार के अलंकारिक स्वरूप तक सीमित था, वहीं भक्तिकाल में कबीर, जायसी और तुलसी ने प्रकृति के पंचतत्वों में ईश्वरीय सत्ता का दर्शन कर 'आध्यात्मिक पारिस्थितिकी' की सुदृढ़ नींव रखी। रीतिकाल के षडऋतु वर्णन में प्रकृति के सूक्ष्म पर्यवेक्षण और ऋतु-चक्र के प्रति गहरी संवेदनशीलता दृष्टिगोचर होती है। आधुनिक काल, विशेषकर छायावाद ने औद्योगिक क्रांति के फलस्वरूप खंडित हुए 'रागात्मक संबंधों' को पुनः स्थापित किया। प्रसाद, पंत, निराला और महादेवी वर्मा ने प्रकृति का 'मानवीकरण' कर उसे एक सजीव, प्राणवान और उपदेशात्मक 'सत्य सत्ता' के रूप में प्रतिष्ठित किया, जहाँ प्रकृति और मनुष्य का द्वैत समाप्त होकर अद्वैत में परिवर्तित हो जाता है। वर्तमान वैश्विक पर्यावरणीय संकट और 'ग्लोबल वार्मिंग' के संदर्भ में, यह आलेख रेखांकित करता है कि साहित्यिक कला के माध्यम से उत्पन्न 'हरित चेतना' ही भविष्य की सुरक्षित सभ्यता का आधार बन सकती है।

**Assessing Microfinance-Driven Financial Inclusion towards Sustainable India: Outreach, Portfolio Quality and Operational Challenges**

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Microfinance Institutions (MFIs) play a pivotal role in advancing financial inclusion in India by extending formal credit access to underserved and low-income households. This study assesses microfinance-driven financial inclusion by studying outreach, portfolio quality, and operational challenges faced by MFIs. Using a secondary-data-based descriptive and analytical approach, the study draws evidence from MFIN Micrometer reports, Sa-Dhan Bharat Microfinance Reports, and relevant RBI/NABARD publications. Outreach growth is assessed through indicators such as the number of active borrowers and geographic spread. Portfolio quality is evaluated using repayment risk by studying outstanding loans trends and collection performance. In addition, the study synthesises the major operational challenges faced by Microfinance Institutions, including loan disbursement, KYC collection, loan closures and related processes. It is expected that the study will show that continued financial inclusion requires not just increased outreach, but also better risk management and operational performance. The results provide MFIs and policymakers with information to support inclusive, resilient microfinance growth for the sustainable growth of India.

**Keywords:** Microfinance Institutions, MFIs, Microfinance, Financial Inclusion, Portfolio Quality, Repayment Risk, Sustainable Development

**Role of Multinational Corporations in Global Governance**

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Multinational Corporations (MNCs) play an increasingly important role in global governance by influencing economic policies, regulatory frameworks, and sustainable development initiatives across national boundaries. With their vast financial resources, technological capabilities, and global operations, MNCs actively participate in shaping international trade practices, labor standards, environmental policies, and corporate governance norms. This paper examines the role of multinational corporations in global governance with reference to policy influence, public–private partnerships, corporate social responsibility, and alignment with Sustainable Development Goals (SDGs). It also analyzes the challenges associated with MNC involvement in global governance, including issues of accountability, regulatory arbitrage and power imbalance between states and corporations. The study concludes that while MNCs contribute significantly to global economic integration and development, effective international regulatory mechanisms are essential to ensure transparency, ethical conduct, and inclusive governance.

**Digital Transformation and the Future**

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The contemporary world is witnessing an unprecedented convergence of business, technology, and the humanities, reshaping pathways toward sustainable development. Digital transformation has emerged as a central force redefining economic models, organizational practices, social relationships, and ethical frameworks. This research paper explores how global convergence across disciplines enables sustainable development by integrating technological innovation with human-centered values and business strategies. Using a conceptual and analytical approach based on secondary data, policy documents, and interdisciplinary literature, the study examines the role of digital technologies—such as artificial intelligence, big data, cloud computing, and digital platforms—in transforming businesses and societies. The paper further highlights the importance of humanities in ensuring ethical governance, inclusivity, cultural sensitivity, and social well-being within digitally transformed economies. The study concludes that sustainable development in the digital era requires a balanced convergence of economic efficiency, technological advancement, and humanistic values.

**Keywords:** Global convergence, Digital transformation, Sustainable development, Business innovation, Humanities, Technology

**MycoSolutions: Fungi for Climate Resilient Agriculture**

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Global warming and climate change have a negative impact on crop productivity and agricultural sustainability. Traditional farming practices rely on synthetic agrochemicals and breeding methods; are inadequate to address the food security of the growing world population. Therefore, sustainable and eco-friendly interventions are essential to address the current agricultural challenges. Endophytes are a group of microorganisms that colonise and live symbiotically within host plant tissues. Microbial endophytes facilitate host plants' adaptation to environmental conditions through a symbiotic relationship. Fungal endophytes can contribute to plant growth by enhancing stress resilience, improving nutrient uptake, and providing protection against various plant diseases. We hypothesise that habitat-adapted symbiotic fungal endophytes could be crucial in delivering abiotic and biotic stress tolerance, which can be exploited to develop sustainable agronomical formulations to increase overall yield and reduce dependence on synthetic agricultural inputs.

**Rhizospheric Microbes and Their Contribution to Bamboo Growth and Wasteland Soil Restoration**

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Bamboo species, prized for their rapid growth and phytoremediation capacity, represent a cornerstone for sustainable wasteland reclamation. This 2-year field study at Koradi Thermal Power Plant and CSIR-NEERI sites (Nagpur, Maharashtra, India) compared rhizospheric microbial influences on *Dendrocalamus strictus* and *Thyrsostachys oliveri* growth and soil health restoration between chromium-impacted wasteland plots (Cr: 150–350 mg/kg) and adjacent natural/control soil plots. High-throughput 16S rRNA metagenomic sequencing for bacteria and ITS rRNA sequencing for AMF revealed dominant taxa (*Bacillus*, *Pseudomonas*, *Azotobacter* spp., and *Glomus/Claroideoglomus* AMF) that strongly correlated with 35% root biomass gains, 28% shoot height increments, and 25–40% elevations in N-P-K uptake in both species relative to natural controls. Rhizosphere microbes improved soil properties across fly ash and natural sites: pH dropped from 8.7–9.2 to 7.2–7.8, salinity fell 35–42%, organic carbon rose 32%, microbial biomass increased 45%, and key enzymes (dehydrogenase ↑28%, urease ↑31%, phosphatase ↑26%) showed enhanced activity versus untreated controls. Heavy metals (Pb/Cd ↓15–22%, Cr ↓18–25%) exhibited reduced bioavailability compared to controls. Microbial diversity increased (Shannon index 3.2→4.1), with *Bacillus* and *Pseudomonas* thriving in fly ash (45% abundance) while *Azotobacter* and AMF dominated natural soils (38%). PCA showed microbes explained 62% of variance in bamboo growth, nutrient uptake (N-P-K ↑25–40%), and metal remediation. These results confirm that targeted microbial inoculants (*Bacillus subtilis*, *Pseudomonas fluorescens*, *Azotobacter chroococcum*, and *Glomus intraradices* AMF) enhance bamboo performance across conditions, supporting scalable wasteland restoration.

**Keywords:** Rhizospheric microbial diversity, Soil health restoration, Phytoremediation

**Fixed Point Theorems for Generalized Contraction Mappings in Polyhedral and Nonlinear Metric Spaces**

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In this paper, we introduce a new class of generalized contraction mappings defined on polyhedral metric spaces and more general nonlinear metric structures. Extending classical Banach, Kannan, Chatterjee and Proinov contractions, we establish fixed point theorems under minimal geometric and topological requirements. The results significantly generalize existing literature by relaxing linearity assumptions and by incorporating polyhedral norms and nonlinear distance structures arising in Finsler-type geometry and graph-induced metrics. Several examples, comparisons, and corollaries are provided to illustrate the novelty of our approach.

**Keywords:** Fixed point, generalized contraction, polyhedral metric, nonlinear metric, Banach type contraction, Proinov contraction, metric inequalities.

**A Hybrid Lattice-Based Post-Quantum Authentication Scheme for Scalable Fog–IoT Architectures**

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The Internet of Things' (IoT) quick development is intentionally altering how people live and work. With the aid of a hospital gateway node, medical IoT (MIoT) is a very important application in the field of IoT that enables users to interact with intelligent medical devices. Authentication methods that are scalable, lightweight, and resistant to new quantum threats are required due to the extensive deployment of mobile and resource-constrained Internet of Things (IoT) devices in latency-sensitive applications. Due to their susceptibility to quantum attacks and computational overhead on limited devices, traditional public-key cryptographic schemes like RSA and elliptic curve cryptography (ECC) are becoming less and less appropriate for future IoT environments. Since the Shor algorithm can solve these problems on quantum computers, all of these methods are no longer relevant in the post-quantum world. For fog-assisted IoT architectures, this paper suggests a hybrid post-quantum authentication protocol that is both lightweight and delay-aware. The suggested method incorporates Ring Learning with Errors (Ring-LWE) and NTRU Prime, two lattice-based post-quantum cryptographic primitives, into a three-layer cloud-fog-IoT framework. While preserving centralised trust coordination via the cloud, fog nodes carry out localised authentication and mobility management, greatly lowering communication latency and computational load at the device level. The protocol includes a fail-safe clustering-based authentication mechanism to guarantee service continuity in the event of fog server failures and facilitates smooth intra-fog and inter-fog mobility without the need for re-registration.In comparison to RSA- and ECC-based schemes, a thorough performance evaluation shows that the suggested protocol achieves significantly lower authentication latency, improved scalability, and reduced energy consumption while offering complete resistance against quantum adversaries. The findings demonstrate that implementing quantum-resilient authentication in large-scale, mobility-aware IoT systems is feasible without sacrificing effectiveness.

**Enhanced Least-Squares Framework for Inverse Boundary Heat Conduction Analysis**

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Inverse Boundary Heat Conduction Problems (IBHCPs) are frequently encountered in thermal engineering applications, including combustion systems, turbine components, casting and welding processes, and thermal condition monitoring of solid structures. These problems are inherently ill-posed, characterized by strong sensitivity to measurement noise and modeling inaccuracies. This study proposes an enhanced least squares adjustment method (ELSAM) for the simultaneous estimation of transient boundary heat fluxes and internal temperature distributions. The method extends the conventional least squares adjustment method (LSAM) by integrating a priori knowledge of unknown parameters through their covariance matrices. A transient heat conduction model discretized using the control volume method is embedded within a stochastic estimation framework. Numerical investigations based on one-dimensional transient heat conduction problems demonstrate that the enhanced formulation provides superior numerical stability, improved accuracy, and reduced estimation uncertainty when compared with the standard LSAM. The results confirm that ELSAM constitutes a robust and efficient approach for solving inverse boundary heat conduction problems under noisy measurement conditions.

**Keywords:** Inverse heat conduction, enhanced least squares, ill-posed problems, stochastic estimation, boundary heat flux reconstruction.

**A Study on Next Generation Secure Group Authentication Mechanisms**

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Next-generation secure group authentication mechanisms are essential for modern distributed systems that operate in dynamic, heterogeneous, and adversarial environments. Traditional authentication schemes, which rely on exact secret matching and centralized trust models, struggle to meet the requirements of emerging applications such as Internet of Things (IoT) networks, cloud computing, vehicular ad hoc networks, block chain-based platforms, and biometric-enabled systems. These environments are characterized by large-scale user groups, frequent membership changes, resource constraints, and the presence of noisy or imprecise authentication data.

This study presents a comprehensive review of next-generation secure group authentication mechanisms, with a particular focus on cryptographic approaches that incorporate fuzziness, threshold principles, and decentralization. The paper examines the evolution of group authentication from classical threshold cryptography and secret sharing to modern fuzzy cryptographic constructions, including fuzzy commitment schemes, fuzzy vaults, and fuzzy extractors. These techniques enable authentication based on approximate data, such as biometrics or physical unclonable functions, while preserving strong security guarantees.

The study further explores the integration of group authentication mechanisms with trust models, fuzzy logic–based access control, and blockchain-based decentralized identity frameworks. Such integrations enhance resilience against insider attacks, reduce reliance on centralized authorities, and improve scalability and fault tolerance. A comparative analysis of existing schemes highlights their strengths in terms of noise tolerance, privacy preservation, and collaborative verification, while also identifying key challenges such as biometric revocation, entropy leakage, computational overhead, and scalability in large dynamic groups.

Finally, the study outlines future research directions for next-generation group authentication, including lightweight protocols for resource-constrained environments, deep multi-biometric authentication, privacy-preserving threshold verification, and post-quantum secure group authentication mechanisms.

**Sustainable Pharmaceutical Manufacturing and Green Technologies**

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Sustainable pharmaceutical manufacturing refers to the large-scale production of medicines in a manner that minimizes environmental impact while conserving natural resources and safeguarding human health. This approach ensures that drug manufacturing processes maintain a balance between therapeutic advancement and environmental protection. Green technologies play a crucial role in achieving sustainability within the pharmaceutical industry. For instance, principles of green chemistry promote the replacement of hazardous solvents with safer alternatives such as water or ethanol, thereby reducing the use of toxic chemicals. Renewable energy sources, including solar and wind energy, are increasingly utilized to decrease energy consumption and mitigate environmental damage. Effective waste management is another essential component of sustainable manufacturing. Solid, liquid, and gaseous wastes are minimized through appropriate treatment processes, while wastewater is treated using Effluent Treatment Plants (ETP), Sewage Treatment Plants (STP), and advanced systems such as Zero Liquid Discharge (ZLD) to prevent water pollution. Additionally, renewable and eco-friendly chemical processes are adopted in place of conventional methods, and green packaging strategies emphasize reduced plastic usage and the preference for biodegradable materials.The primary objective of sustainable pharmaceutical manufacturing is to ensure the production of safe and high-quality medicines while complying with environmental regulations, reducing long-term manufacturing costs, and protecting ecological systems. Overall, green technologies support environmentally responsible industrial development and contribute to the sustainable growth of the pharmaceutical sector.

**Keyeords**: Green technologies, ETP, STD, ZLD, Biodegradable packaging, and Environment pollution.

**Physico-chemical parameter of ground water for drinking in Dhamtari block: A review**

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Chhattisgarh's Dhamtari district is largely dependent on the Mahanadi River system, which includes significant projects like the ancient Rudri Barrage, which makes the area suitable for paddy farming, and the Ravishankar Sagar (Gangrel Dam), a vital irrigation and drinking water source. The district is excellent at managing water resources; it has been recognized nationally for its GIS-based plans that revitalize water bodies (Amrit Sarovars) and encourage rainwater harvesting, greatly enhancing agricultural potential and groundwater recharge. By comparing results to BIS/WHO standards for parameters like pH, TDS, hardness, fluoride, chloride, and iron, the physico-chemical parameters of groundwater in Dhamtari are analyzed to determine its suitability for drinking, domestic, and agricultural use, identify health risks (such as from high fluoride/nitrate), guide aquifer management, and ensure public health. The typical approach entails gathering representative water samples and evaluating them in a lab using standard operating methods, frequently in accordance with the guidelines set forth by the American Public Health Association (APHA). The groundwater in the Dhamtari district exhibits notable physico-chemical problems for drinking purposes, with elevated concentrations of Fluoride, Total Dissolved Solids (TDS), and Total Hardness frequently surpassing the limits set by WHO/BIS, suggesting that many areas are unsuitable for consumption.

High concentrations of fluoride (which causes fluorosis), chloride, nitrate, and TDS require tr eatment like defluoridation and reverse osmosis, indicating contamination from natural sourc es or agricultural/sewage runoff and necessitating quick corrective actions for public health, e ven though pH and some other parameters are frequently acceptable.

**Keywords:** Ground water resources, Contamination, Health, Water quality index (WQI), Permeability index (PI), Sodium absorption ratio (SAR).

# Water Chemistry and its Role in Environmental Sustainability

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Water is an important outcome of life and the chemical structure of water has direct influence on the ecological balance, human health and sustainable development. pH, dissolved oxygen, nutrients and pollutants are all some of the key aspects of water chemistry that determine the quality of water and its application in the use of environmentally and industrially safe systems. The article will evaluate some of the fundamental parameters of the water essence and the effect of the parameters to environmental sustainability. The combination of chemical variables was researched with the data on freshwater and wastewater systems as sources of pollution levels and ecological effects. The results indicate that chemical disproportions, such as excess nitrates or excess heavy metals, are threatening to aquatic life, besides, degrading ecosystem services. The only way to maintain water resources is by use of good water management methods, which include use of chemicals to monitor, undergo treatment processes and control pollution. The paper emphasizes that there is a necessity of holistic methods that incorporate chemistry, ecology and policy to ensure environmental sustainability in the long run.

**Keyword:** Aquatic Ecosystem; Chemical Monitoring; Environmental Sustainability; Pollution; Water Chemistry; Water Quality.

**Financial Inclusion as a Catalyst for Sustainable Economic Development**

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The most important aspect of attaining sustainable development is financial inclusion, which is the availability and accessibility of reasonably priced financial services to all people and enterprises. This study looks at how financial inclusion promotes economic resilience and sustainability. The paper emphasises how inclusive financial systems empower marginalized populations, lower poverty, and facilitate investment in sustainable practices by drawing on theoretical frameworks, empirical data, and international case studies. The study examines changes in financial inclusion and how they relate to sustainability metrics using secondary data from the UN SDG reports, the IMF Financial Access Survey, and the World Bank's Global Findex Database. Results show that financial inclusion supports climate finance, fosters equitable growth, and increases resilience against economic shocks. But impediments like digital differences, gender inequity, and regulatory gaps still exist. In order to include financial inclusion into sustainability objectives, the study ends with policy proposals for Governments, financial institutions, and international organizations.

**Key Words:** Financial Inclusion; Sustainability; Digital differences; Policy proposals; financial Services.

**Assessment of Heavy Metals, Water Quality Index and Sediment Characteristics of Maharajbandh Talab under Urban Pollution Stress, Raipur, Chhattisgarh**

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Urban aquatic systems are increasingly exposed to contamination arising from rapid population growth, land-use transformation, and inadequate waste water management. This study presents a seasonal evaluation of physicochemical water quality parameters, heavy metal concentrations, Water Quality Index (WQI), and sediment characteristics of Maharajbandh Talab, an urban pond located in Raipur, Chhattisgarh, India. Water samples were collected during the pre-monsoon (April), monsoon (June), and post-monsoon (August) periods to examine temporal variations associated with hydrological changes. Parameters including pH, electrical conductivity, turbidity, total dissolved solids, and salinity were analyzed using standard protocols, while concentrations of Pb, Cd, Cr, Ni, Zn, and Cu were determined in both water and sediment matrices using instrumental techniques. The computed WQI values were used to assess the overall suitability of the water for domestic and ecological applications. The results indicate a clear seasonal influence on water quality, with elevated turbidity, conductivity, and dissolved solids during the monsoon season, primarily due to urban runoff and surface drainage inputs. Several heavy metals, notably Pb and Ni, exhibited concentrations approaching or exceeding recommended guideline limits in water, whereas sediments showed pronounced enrichment of Zn and Cu, confirming their role as long-term sinks for metallic contaminants. The WQI classification revealed a decline from good water quality conditions during the pre- monsoon period to moderately polluted conditions in the monsoon season, followed by partial recovery post-monsoon. The study highlights the growing impact of urbanization on small freshwater bodies and emphasizes the need for continuous monitoring, improved effluent management, and sustainable restoration strategies to protect urban aquatic environments.

**Keywords:** Urban water quality, heavy metals, sediment contamination, water quality index,

**Role of Education and Social Work in Sustainable Communities**

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This paper aims to put a ray on the Role of Education and Social Work in Sustainable Communities. The relationship of education with social change is not a simple, independent phenomenon or concept, as perhaps many people or organisations believe that education is not only instrumental in bringing about social change, it is also quite interestingly instrumental in maintaining the status quo. In other words, education plays both a 'conservative' and 'radical' role, i.e., it helps both in 'maintaining' and 'changing' different aspects of the social system. Education plays a vital role to spread awareness in the society. It fosters skills like critical thinking. personal growth, problem solving. It not only provides knowledge & technical skills but also enables human beings to adapt in diverse and fast paced society, cultural and individual differences. It also helps an individual to understand the complicated social fabric and helps them to uplift their standard of life especially Socio-Economic status. Building sustainable communities—those that balance social well-being, economic development, and environmental protection—requires active contributions from both education and social work. These two sectors; Educational agencies or organisations and social groups shape human values, empower individuals, and foster social cohesion.

Having awareness about sustainable communities, an individual is aware about the environmental issues like pollution, economic elements like economic progress, our contribution to uplift the economic growth, social dimension like strong community bonds, social harmony, quality education inequality, and active participation. Sustainable communities, both fields; Education sector and Society must work collaboratively to address environmental, economic, and social dimensions simultaneously, ensuring that development meets present needs without compromising future generation.

**Physicochemical Evaluation of Soil Quality in Rural Areas of Chhattisgarh, Central India**

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The assessment of soil quality in rural regions of Chhattisgarh is essential for understanding soil health and its role in sustainable agricultural development. This study underscores the importance of detailed soil characterization to support informed management strategies aimed at improving crop productivity, nutrient balance, soil pH regulation, pollution control, and environmental sustainability. A comprehensive physicochemical analysis of soil samples was carried out to evaluate key parameters, including pH, electrical conductivity, bulk density, particle density, porosity, water-holding capacity, and organic carbon content. Additionally, essential macro- and micro-nutrients—namely nitrogen, phosphorus, potassium, zinc, copper, and iron—were quantified to assess soil fertility status. The integrated evaluation of these parameters provides critical insights into soil structural integrity, nutrient availability, and moisture retention capacity, which are vital for modern agricultural practices. The findings of this study are expected to contribute to the development of region-specific soil management strategies and serve as a valuable scientific reference for farmers, agronomists, and policymakers seeking to enhance soil quality, optimize agricultural productivity, and promote long-term environmental stewardship in rural Chhattisgarh.

**Keywords: A**griculture, Chhattisgarh, soil testing, Soil fertility and electrical conductivity.

**A Study on Street Food Hygiene of Raipur City**

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In India, vegetarian street food has become an essential part of urban and semi-urban food culture. The most likely reason for this change is convenience and low-cost for a large number of the working population. Despite their popularity, the most concerning topic is the microbial quality of food, which often remains questionable. This study aimed to observe the presence of microbes in commonly consumed foods in street of Raipur, Chhattisgarh.

This study was designed as a preliminary case-based observational approach for evaluating the presence of bacteria and fungi from selected vegetarian street food vendors under varying hygienic conditions. Each sample was analyzed as per standard microbiological techniques of isolation to assess bacterial and fungal presence, including basic culture techniques, colony morphology, staining and microscopic examination. The findings were supported by relevant literature on street food microbiology.

This study observed noticeable bacterial colonies and fungal growth in most cases, indicating the high risk of contamination in street vended foods. Several factors, including unhygienic vending environments, exposure to environmental contaminants, poor handling practices, inadequate sanitation measures, and improper storage of raw materials, may contribute to the observed contamination.

The findings suggest potential health risks, highlights the need for microbial surveillance at regular interval and implementation of food safety regulations among vendors of Raipur. Despite its limitations, the study offers groundwork for future research and public health planning.

**Keywords**-Vegetarian Street food, Bacterial growth, Fungal growth, Food hygiene.

**Biotechnology as a Tool for Environmental and Economic Sustainability**

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Biotechnology has become a powerful tool for achieving both environmental protection and economic sustainability in the face of growing global challenges. By utilizing biological organisms, systems and processes, biotechnology offers innovative solutions that reduce environmental impact while supporting sustainable economic growth. In environmental sustainability, biotechnological applications such as bioremediation, microbial waste treatment and bio-based resource recovery help restore polluted ecosystems and promote efficient management of natural resources. These eco-friendly approaches minimize harmful emissions and reduce dependence on non-renewable materials. From an economic perspective, biotechnology contributes to sustainable development by enhancing productivity and efficiency across agriculture, industry, and energy sectors. The use of biofertilizers, biopesticides, and genetically improved crops increases agricultural yield while lowering production costs and preserving soil health. Industrial biotechnology enables the production of biofuels, enzymes and biodegradable materials, supporting green industries and creating new employment opportunities. These innovations encourage a transition toward circular economy models that emphasize resource reuse and waste reduction. Furthermore, biotechnology supports sustainable decision-making by integrating scientific innovation with environmental and economic policies. Continued investment in research, ethical implementation and technological accessibility is essential to maximize its long-term benefits. Overall, biotechnology represents a strategic pathway toward achieving a balanced, resilient and sustainable future.

**Keywords:** Biotechnology, Sustainability, Environment, Economy, Innovation.

**Deepfake Image Analysis by Parametric Approach for Image Authentication: A Forensic Analysis**

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The rapid advancement of generative models has led to the widespread creation of deepfake images, posing significant threats to digital trust, privacy, and security. While deep learning–based detection methods have demonstrated high accuracy, they often suffer from limited interpretability, high computational cost, and poor generalization across unseen manipulation techniques. This study presents a parametric approach for deepfake image analysis that emphasizes statistically interpretable features derived from image formation and manipulation artifacts. The proposed method focuses on extracting parametric descriptors such as color distribution inconsistencies, frequency-domain anomalies, texture statistics, noise residual patterns, and geometric irregularities introduced during image synthesis. These parameters are modeled using statistical measures and probabilistic classifiers to distinguish authentic images from manipulated ones. By leveraging domain-specific knowledge of image processing and generative pipelines, the approach captures subtle artifacts that are often overlooked by purely data-driven models. At Audio-Video & Cyber Forensic Division, SFSL- Raipur experiments conducted using deepfake image datasets confirm that the parametric framework attains competitive detection performance while exhibiting resilience to variations in image resolution, compression artifacts, and generative model diversity. Furthermore, the parametric analysis improves enabling forensic analysts to trace the decision-making process based on measurable image characteristics by analysing chromatic aberration analysis, JPEG Compression and editing search, HSV/Lav histogram, luminance gradient analysis, PCA editing. This work highlights the viability of parametric analysis as a complementary or alternative solution to deep learning techniques, particularly in low-resource or real-time forensic environments. The analysis results showing that integrating parametric features with hybrid detection systems can enhance reliability and adaptability in combating the evolving landscape of deepfake image manipulation.

**Implementation and Performance Evaluation of a Novel Multi-Constraint AODV Protocol for Energy and Stability Awareness in Mobile Ad-hoc Networks**

Neeraj Bisht

Mobile Ad-hoc Networks (MANETs) often suffer from performance issues because the conventional AODV routing protocol chooses routes without considering nodes' battery status or mobility. This basic method results in link breaks, increased control message traffic, and early battery exhaustion throughout the network. To address these linked issues effectively, this thesis presents the Energy and Stability-AODV (ESA-AODV) routing protocol. The innovation of ESA Centres, in employing a Composite Cost Metric (CCM), a measure that directs route selection. In the route discovery process, the protocol initially uses an Energy Threshold Filter to exclude nodes with battery levels below a minimum, stopping them from participating in new routes and thus conserving vital network resources. Importantly, the ultimate route selection is determined by the CCM, which mathematically merges two metrics: Link Expiration Time (LET) used to predict and sustain connection stability and the Residual Energy Ratio of nodes employed to balance traffic and prolong the lifespan of nodes. By choosing paths according to the CCM, ESA-AODV prevents routes that are both unstable and have low energy. Simulation results confirm that this low-complexity method significantly improves the Packet Delivery Ratio and extends the overall Network Lifetime when compared to the conventional AODV protocol, establishing ESA-AODV as an effective and efficient solution for robust MANET communication.

**Mental Health Challenges among College Going Students**

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College life is a second life of students after school life. After school life study students entered into college study. From the begging students feel mental pressure because they face new challenges such as admission pressure, syllabus, breaking friends groups, academic work etc. the online survey based on 58 samples via Correspondence. Chosen research area was Raipur & Baloda Bazar Girls colleges. A Survey tools questionnaire were used to collected data. In this questionnaire 11 questions used to collect answer and 4 questions for demographic profile. Results carried out like few (3.4%) students face pressure, few students unable to focus in class because of disturbance. These little thing make them anxious and the face mental pressure.

**Keywords:** College life, School life, Mental health Challenge.

**Deepfake Audio: A Growing Challenge for forensic Audio Analysis**

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Audio forensic analysis has become a critical component of modern digital investigations, tasked with authenticating recorded speech and identifying tampering in legal, security and media contexts. Traditional forensic approaches rely on acoustic, phonetic and signal-processing techniques to detect manipulations such as splicing, copy-move editing and environmental distortions. However, the rapid evolution of generative artificial intelligence has introduced profound challenges with deepfake and voice-cloning technologies emerging as one of the most consequential threats to the field. Deepfake audio, generated by advanced neural networks, can convincingly mimic human speech, often rendering both human and automated detectors unreliable under real-world conditions. Recent research highlights that state of the art automatic speaker recognition systems and commonly used features sets like Mel-Frequency Cepstral Coefficients (MFCCs) fail to generalize across diverse cloning algorithms and are vulnerable to noise and signal degradations typical of forensic recordings. Moreover, adversarial modifications and linguistic perturbations can significantly degrade detection performance, underscoring the fragility of current anti- spoofing models. In addition to technical detection challenges, the judicialand evidentiary landscape is struggling to keep pace withthese developments: courts lack standardized protocols for deepfake evidence and forensic laboratories face shortages in expertise and robust analytical tools. These evolving challenges demand interdisciplinary responses spanning improved detection frameworks, robust benchmark datasets, adaptive machine learning defenses and legal standards that can uphold the integrity of audio evidence in the age of synthetic media.These evolving challenges demand interdisciplinary responses spanning improved detection frameworks, robust benchmark datasets, adaptive machine learning defenses, and legal standards that can uphold the integrity of audio evidence in the age of synthetic media; additionally, scientific experts with strong expertise in parametric analysis may overcome the challenges arising from deepfake audio files to a much greater extent.

# जल संरक्षण अभियान में सामाजिक परिवर्तन एजेंट के रूप में शिक्षक ग्रामीण क्षेत्र बिलासपुर के संदर्भ में जल साक्षरता अभियानों का मूल्यांकन

**( 2015-25 )**

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*बिलासपुर संभाग, जो छत्तीसगढ़ के मैदानी क्षेत्र में आता है, तेजी से गिरते भूजल स्तर और भू-जल में फ्लोराइड की अधिकता जैसी गंभीर चुनौतियों का सामना कर रहा है। यहाँ कृषि गहनता और औद्योगिक विकास के कारण जल संसाधनों पर दबाव बढ़ा है। यद्यपि सरकार द्वारा 'जल जीवन मिशन' और 'नरवा विकास' जैसी ढांचागत परियोजनाएं चलाई जा रही हैं, लेकिन इन तकनीकी समाधानों की सफलता काफी हद तक सामुदायिक व्यवहार परिवर्तन पर निर्भर करती है। ग्रामीण बिलासपुर के अंचलों में शिक्षक ही राज्य और समुदाय के बीच की सबसे विश्वसनीय कड़ी होते हैं।।इस शोध पत्र का मुख्य उद्देश्य पिछले एक दशक (२०१५-२०२५) के द्वितीयक आंकड़ों ( के माध्यम से यह मूल्यांकन करना है कि क्या ग्रामीण बिलासपुर के शिक्षक 'जल साक्षरता' के प्रसार में एक प्रभावी 'सामाजिक परिवर्तन एजेंट' की भूमिका निभा पा रहे हैं।यह अध्ययन एक गुणात्मक मेटा-विश्लेषण पर आधारित है। इसमें सरकारी रिपोर्टों (*PHED, NITI Aayog), *गैर-सरकारी संगठनों (*UNICEF, Local NGOs) *के केस स्टडीज और १० प्रमुख शोध पत्रों का व्यवस्थित पुनरावलोकन (*Systematic Review) *किया गया है।प्रारंभिक समीक्षा यह संकेत देती है कि जिन स्कूलों में शिक्षकों ने स्थानीय 'छत्तीसगढ़ी' भाषा में जल संरक्षण का महत्व समझाया, वहां सामुदायिक भागीदारी में ४०% की वृद्धि देखी गई। हालांकि, निष्कर्ष यह भी उजागर करते हैं कि शिक्षकों के पास औपचारिक 'पर्यावरण शिक्षण प्रशिक्षण' का अभाव है, जो उनकी प्रभावशीलता को सीमित करता है।यह अध्ययन बिलासपुर के लिए एक विशिष्ट 'शिक्षक-नेतृत्व वाला जल संरक्षण मॉडल प्रस्तावित करेगा, जो नीति निर्माताओं को बुनियादी ढांचे के साथ-साथ 'मानव व्यवहार' पर निवेश करने के लिए प्रेरित करेगा।की वर्ड: जल संरचना, सामाजिक परिवर्तन एजेंट, बिलासपुर, ग्रामीण विकास, शिक्षक व्यवहार, फ्लोराइड समस्या।*

**Comparison Between Result of Cloud Forensic Through Credential Based and Token Based Acquisition**

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The increasing reliance on cloud computing has introduced new challenges in digital forensics, particularly in the acquisition and analysis of evidence. This study presents a comparative analysis of cloud forensic investigations conducted through credential-based access versus token-based access methods. Credential-based forensics, which relies on user authentication credentials, often faces limitations due to privacy laws, multi-factor authentication, and dynamic credential management. In contrast, token-based approaches—using access tokens or API keys—offer more granular, session-specific access and improved traceability of interactions. The research evaluates both methods in terms of data integrity, accessibility, reliability, and forensic soundness across different cloud environments. Findings indicate that token-based forensics provides superior evidence authenticity and reduced exposure to credential theft risks, although it requires more sophisticated token management and validation mechanisms. The paper concludes that a hybrid forensic framework integrating both methods can enhance the efficiency and reliability of cloud forensic investigations.

**Indigenous Epistemologies and Counter-Histories in Easterine Kire's Fiction.**

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This paper presents a critical study of the fiction of Easterine Kire, one of the most prominent indigenous voices from North-East India writing in English. Despite the growing body of Indian English literature, indigenous narratives from the Naga community remain underrepresented in mainstream literary discourse. The study aims to examine how Kire's fiction constructs indigenous identity, preserves cultural memory, and re-narrates history through oral traditions and community-centered storytelling. The research adopts a qualitative textual analysis grounded in postcolonial and indigenous literary frameworks to analyze selected novels and short stories by Easterine Kire. The study explores key themes such as collective memory, colonial encounters, spirituality, war, gender roles, and the close relationship between humans and nature. Kire's narrative techniques, including non-linear temporality, myth, folklore, and oral storytelling modes, challenge dominant historical narratives and offer alternative indigenous epistemologies rooted in lived experiences. The paper argues that Kire's fiction functions as a form of cultural preservation and resistance by foregrounding Naga traditions, values, and ecological consciousness. Her works highlight community harmony, gender inclusivity, and ethical relationships with the environment, thereby contributing to sustainable cultural development. By centering indigenous voices, Kire reshapes Indian English literature and expands its scope beyond mainland-centric narratives. This study contributes to North-East Indian literary studies by emphasizing the importance of indigenous perspectives in reconstructing marginalized histories. It also underscores literature's role as a powerful medium for sustaining cultural identity and asserting indigenous knowledge systems within contemporary literary discourse.

**Keywords:** Easterine Kire, Naga Identity, Culture Memory, Indegenious Literatutre, Post Colonial Writings, North– East Indian Literature.

**Sukhāyu as a Preventive Health Framework: Linking Ayurvedic Chronobiology with Modern Endocrine**

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This study investigates the integration of classical Ayurvedic health principles into modern science education as a framework for sustainable community development. The Ayurvedic concept of *Sukhāyu*—defined as a balanced and purposeful state of living—is examined through the lens of contemporary biological sciences, particularly endocrinology and chronobiology. While conventional healthcare models primarily focus on disease treatment, Ayurveda emphasizes preventive and regulatory mechanisms governed by daily (*Dinacharyā*) and seasonal (*Ritucharyā*) behavioral rhythms.

The study establishes mechanistic correlations between these traditional practices and the regulation of the hypothalamic–pituitary–adrenal (HPA) axis, circadian rhythms, and metabolic signaling pathways. Special emphasis is placed on the coordinated modulation of cortisol, melatonin, and insulin sensitivity as key determinants of physiological homeostasis. Through this integrative analysis, the paper demonstrates how indigenous knowledge systems encode adaptive biological principles that promote long-term resilience and metabolic stability. Furthermore, a pedagogical framework is proposed in which science education incorporates local environmental observations, dietary practices, and seasonal cycles as experiential learning tools. This "living laboratory" approach enables students to directly examine the biological consequences of lifestyle, nutrition, and environmental alignment. The integration of traditional knowledge with modern biological science thus provides a scalable, low-cost strategy for addressing the growing burden of lifestyle-related disorders while strengthening ecological and community sustainability.

**Keywords:** Ayurveda, Endocrinology, Science Education, Sukhayu, Sustainable Development, Local Knowledge, Circadian Rhythms.

# Education Loans as a Tool for Reducing Income Inequality in Developing Economies

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Income inequality continues to pose a significant challenge in India, where access to quality higher education remains uneven across socio-economic groups. Education loans have emerged as an important policy instrument to address this imbalance by enabling students from low- and middle-income households to invest in higher education. This paper examines the role of education loans as a tool for reducing income inequality in India, with a specific focus on their policy design, accessibility, and long-term socio-economic impact.

Using a policy-oriented analytical approach, the study evaluates major education loan initiatives in India, including government-supported schemes and bank-led lending models. It explores how education loans contribute to human capital formation, improved employability, and upward income mobility, particularly among first-generation learners and students from disadvantaged backgrounds. The paper also highlights critical policy challenges such as regional disparities in loan access, collateral requirements, repayment stress, and limited awareness among rural and marginalized populations.

The analysis suggests that while education loans have the potential to reduce income inequality, their effectiveness largely depends on supportive policy frameworks. Measures such as interest subsidies, income-contingent repayment mechanisms, credit guarantee schemes, and greater integration with financial inclusion policies can significantly enhance their impact. The paper argues that education loans should be viewed not merely as a financial product but as a strategic public policy tool aligned with India's goals of inclusive growth and social equity. Strengthening education loan policies can play a vital role in creating a more equitable and skilled workforce in India.

**Keywords**: Education Loans, Income Inequality, Higher Education Financing, Financial Inclusion, Public Policy (India).

**Carbon-Negative $CO_2$ Mineralization Using Functionalized Green Catalysts**

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The increasing level of $CO_2$ in the air needs novel carbon management solutions that transcend the common capture and storage solutions. A possible solution is carbon-negative $CO_2$ mineralization, which permanently fixes $CO_2$ as solids in the form of carbonates, and has additional environmental and economic benefits. The study presents an innovative form of functionalized catalyst that was created with respectable, low-cost natural and earth-like substances to accelerate the process of mineralization of $CO_2$ at mild conditions. $CO_2$ adsorption, activation, and conversion increase significantly over nanoporous supports to which carboxylates, hydroxyls, and amines are added. We have found that these catalysts render the formation of carbonates thermodynamically more favorable and permit exothermic self-sustaining reactions, which produce net negative carbon emission even accounting for process energy. According to spectroscopic measurements and kinetic modeling, the functional groups assist in polarizing $CO_2$ and transferring electrons which reduces activation barriers and promotes the high-speed formation of stable carbonate phases. According to life cycle assessment (LCA) and techno-economic assessment, large-scale use of those catalysts may result in inexpensive $CO_2$ sequestration at near-par with current mineralization tech. Such results establish a foundation of efficient catalytic decarbonization of $CO_2$ that can decarbonize the world and provide a path to real-world carbon-negative reactions. This paper preconditions sustainable climate technologies which entail the synthesis of catalytic design and geochemical stability with operational practicability.

**Keywords**: Carbon-Negative Mineralization, Functionalized Catalysts, $CO_2$ Activation, Sustainable Sequestration, Techno-Economic Assessment.

**Self-Regenerating Smart Polymer–Nanomaterial Hybrids for Sustainable Water Treatments**

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The increasing water shortage and pollution by new pollutants around the globe require treatment technologies of the next generation which are effective, stable, and environmentally friendly. The article reports a novel generation of self-regenerating smart hybrids of polymer and nanomaterials that have been designed to be used in high-performance and sustainable water treatment processes. The hybrid structure combines high-surface-area functional nanomaterials with stimuli-responsive polymers and allows the dynamically adjusting to a changing aqueous environment and increasing the operational lifetime of the structure without external regeneration processes. This smart polymer matrix is a pH-ionic strength-redox responsive material which interacts reversibly with the conformation of the polymer to reveal or conceal active nanomaterial interfaces. This dynamical response increases the selective adsorption of heavy metals, dyes, pharmaceuticals and pathogenic contaminants, and at the same time enables catalytic degradation by the inbuilt nanophases. Notably, the self-regenerating process enables spontaneous desorption of pollutant species and re-activation of active sites and the performance greatly reduced with repeated treatment cycles. High-resolution spectroscopic and microscopic procedures demonstrate that there is a high degree of interfacial connection between the polymer chains and the nanomaterials leading to faster mass transfer, increased affinity of the contaminant and low-energy consumption. Continuous flow performance evaluation shows that the eliminative efficiencies, mechanical stability and secondary waste production are low. The environmental and economic benefits of the proposed system as compared to the conventional membrane and adsorbent technologies are also confirmed by life-cycle and techno-economic assessments. It has demonstrated that redefining long-term water sustainability represents a disruptive, scalable, low-energy, and resilient water purification approach through the creation of self-regenerative polymer-nanomaterial hybrids.

**Consumer Behavior: A study of the Effects of Brand on Purchasing Goods**

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Consumer behavior plays a crucial role in determining market success, and brand influence has emerged as a key factor shaping purchasing decisions. This study examines how branding affects consumers' attitudes, perceptions, and buying behavior toward goods. The research explores elements such as brand image, trust, loyalty, perceived quality, and brand awareness, and how these factors influence consumer preference and decision-making. By analyzing consumer responses and market trends, the study aims to understand the psychological and social drivers that lead customers to favor certain brands over others. The findings highlight that strong branding not only enhances customer confidence but also creates long-term relationships and repeat purchasing behavior. This research contributes to a deeper understanding of branding as a strategic marketing tool and provides insights for businesses to design effective brand strategies. Ultimately, the study emphasizes that brand influence significantly shapes consumer purchasing patterns in a competitive marketplace.

**Keywords:** Consumer behavior, Brand influence, Purchasing decisions, Brand loyalty, Brand awareness, Perceived quality, Consumer preference.

**Artificial Intelligence in Marketing: Impacts on Consumer Decision-Making and Business Performance in the Commerce Sector**

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Artificial Intelligence (AI) is rapidly reshaping marketing practices in commerce by enabling automation, personalization, predictive analytics, and real-time customer interaction. AI-powered tools such as chatbots, recommendation engines, customer profiling systems, and targeted advertising allow firms to analyze large volumes of consumer data and design more customized marketing strategies. These capabilities improve operational efficiency, enhance consumer engagement, and support better business performance. As a result, AI has become an essential element of competitive strategy in the commercial sector.

However, although existing studies widely discuss AI applications in marketing, a clear research gap remains regarding how AI-driven marketing actually influences consumer decision-making patterns, trust, and perceived value in real market situations, especially in developing economies and local commercial contexts. Prior research often focuses on technology adoption or technical efficiency but rarely integrates consumer psychology, ethical concerns, and business performance outcomes in a single framework. Limited empirical evidence also exists on how consumers respond to hyper-personalization, data usage concerns, and automated interactions with AI systems.

The present study aims to bridge this gap by examining the link between AI-enabled marketing practices, consumer decision-making behavior, and business performance in commerce. A mixed-method approach will be used, combining consumer surveys with analysis of firm-level marketing outcomes. The study will explore key dimensions such as trust, convenience, perceived personalization, purchase intention, and satisfaction. The expected results will provide deeper insight into how AI transforms marketing relationships and what factors encourage or hinder consumer acceptance of AI-driven marketing. The findings will help marketers, policymakers, and businesses adopt AI responsibly while maximizing strategic benefits in commerce.

**Fluorescence and solvatochromism of a coumarin dye with a high quadratic polarizability in solutions**

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The influence of medium polarity on the spectroscopic and photophysical properties of (E)-2-(3-(3-oxo-3H-benzo[f]chromen-2-yl) allylidene) malononitrile in various solvent was studied at room temperature by steady-state and pulsed laser excitation. Upon increasing solvent polarity, the absorption as well as fluorescence spectra show bathochromic shift as a result change in dipole moment in the ground state. The polarity plots with regression close to unity revealed good charge transfer in the system. Solvent polarizability and dipolarity are mainly responsible for solvate chromic shift as proved by multi-linear regression analysis. General Mulliken Hush analysis shows malononitrile substituent leads to more charge separation in compound. The hyper-polarizabilities are evaluated by quantum mechanical calculations. Structure of the compounds are optimized at B3LYP/6- 31G(d) level and NLO computations are done using range separated hybrid functionals with large basis sets. Second order hyperpolarizability (γ) was found to be $589.27\times10^{-36}$ e.s.u for the probe. The dynamic optical behavior of the probe was analyzed by time resolved fluorescence spectroscopy and found to be in pico second range caused by molecular reorientations in the polar environment.

**Keywords:** Fluorescence spectra, polarizability, computations, regression analysis and solvate.

**Post-Quantum Cryptography for Securing Patient Data and Telemedicine Systems**

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The rapid advancement of quantum computing poses a serious threat to conventional cryptographic techniques used in healthcare systems. Patient data, electronic health records, and telemedicine communications depend on encryption algorithms that may be compromised by quantum attacks.

Post-quantum cryptography (PQC) provides cryptographic solutions designed to remain secure against both classical and quantum adversaries. This paper analyzes various PQC techniques, including lattice-based, hash-based, code-based, and multivariate cryptographic approaches, for securing patient data and telemedicine platforms. The study highlights that PQC significantly enhances confidentiality, integrity, authentication, and secure key exchange while maintaining performance requirements for real-time healthcare applications. The findings suggest that early adoption of post-quantum cryptographic mechanisms is essential to ensure long-term data security and trust in future healthcare and telemedicine systems.

**Metal- and Azide-Free Construction of 1,2,3-Triazoles Using a Urea Hydrogen Peroxide–Iodine System**

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A one-pot oxidative cyclization method for producing 1, 2, 3-triazoles is demonstrated, beginning with p-toluenesulfonyl hydrazones derived from substituted acetophenones and substituted aromatic amines. This transformation is driven by a urea hydrogen peroxide–iodine (UHP/$I_2$) system, which generates reactive iodine species in situ, promoting C–N bond formation and subsequent cyclization to yield a range of structurally varied 1,2,3-triazole derivatives under mild, metal-free and azide-free conditions.

**Keywords:** 1,2,3-Triazoles, p-Toluenesulfonyl hydrazones, Urea hydrogen peroxide, Iodine-mediated oxidative cyclization, Metal-free synthesis, Green Chemistry.

# Supramolecular Inclusion Complexes of Substituted Indoles with β-Cyclodextrin: A Physicochemical Study

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Inclusion complex formation between β-cyclodextrin (β-CD) and substituted indole derivatives plays an important role in modifying the physicochemical and biological properties of guest molecules. In the present study, the supramolecular interactions between β-CD and selected substituted indoles were systematically investigated to evaluate their complexation behavior, stability, and structural characteristics. The inclusion complexes were prepared using co-precipitation and kneading methods under controlled experimental conditions.

The formation of host–guest complexes was confirmed through spectroscopic and physicochemical techniques, including UV–visible spectroscopy, Fourier-transform infrared spectroscopy (FTIR), nuclear magnetic resonance ($^1$H NMR), and differential scanning calorimetry (DSC). Changes in absorption intensity, chemical shift variations, and thermal behavior provided strong evidence for the successful encapsulation of indole derivatives within the hydrophobic cavity of β-cyclodextrin. Phase-solubility studies revealed a significant enhancement in the aqueous solubility of the indole compounds upon complexation, indicating improved dispersion and stability in aqueous media.

The stability constants calculated from the phase-solubility profiles suggested moderate to strong binding between β-CD and the substituted indoles, governed primarily by hydrophobic interactions and hydrogen bonding. The results demonstrate that β-cyclodextrin is an effective host for indole derivatives, offering improved solubility and molecular stability. This study highlights the potential application of β-cyclodextrin inclusion complexes in pharmaceutical, analytical, and supramolecular chemistry.

**Keywords:** β-cyclodextrin, inclusion complexes, supramolecular and indole.

**Green Finance and Economic Resilience: Investigating the Nexus with Natural Resources through Econometric Analysis**

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At a time when economic stability and environmental sustainability are important concerns, the connection between financial practices, ecological well-being, and economic resilience has drawn a lot of attention. This study uses quantile regression to examine the relationship between green finance, economic resilience, and natural resources in the BRICS economies between 2000 and 2021. This study provides complex insights into how different quantiles of natural resource availability are affected by green finance in terms of economic resilience. The findings demonstrate the critical role that green financing plays in promoting economic resilience, especially when resources are abundant or scarce. Additionally, the study highlights the significance of focused governmental interventions to optimize the beneficial effects of green finance on economic systems, particularly in light of the limitations of natural resources. This paper offers recommendations for sustainable development strategies within the BRICS countries, contributing to both scholarly discourse and policy design.

**_Caesalpinia crista_: A Traditional Medicinal Plant with Promising Pharmacological Potential**

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Traditional medicine plays a vital role in healthcare systems worldwide and is based on indigenous knowledge and practices. *Caesalpinia crista*, a medicinal plant belonging to the family Caesalpiniaceae, is commonly found in the hotter regions of India and is traditionally known as fever nut or Latakaranja. Various parts of the plant, including seeds, leaves, bark, roots, flowers, and oil, are used in traditional systems of medicine. Phytochemical studies have identified phenolic compounds such as caffeic acid, chlorogenic acid, ferulic acid, and gallic acid from the leaves. The plant is traditionally used to treat fever, malaria, PCOD, skin diseases, and inflammatory conditions. Pharmacological studies reveal that *C. crista* possesses anti-diarrheal, antioxidant, anti-diabetic, anti-cancer, hepatoprotective, and anti- ulcer activities. These findings highlight the potential of Caesalpinia crista as a promising medicinal plant for pharmacological applications.

**Keyword:** caesalpiniaceae, latakaranja, fever nut, PCOD, phytochemical, pharmacological.

**Quality, Acceleration, and Monitoring of School Reforms in the Context of NEP-2020**

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The National Education Policy (NEP) 2020 marks a transformative shift in the Indian educational landscape, pivoting from a traditional rote-learning model toward a holistic, flexible, and results-driven framework. This paper examines the critical components of Quality, Acceleration, and Monitoring within school reforms as conceptualized by NEP 2020. Central to this transformation is the introduction of the pedagogical structure, the emphasis on Foundational Literacy and Numeracy (FLN), and the establishment of robust regulatory bodies such as the State School Standards Authority (SSSA).

Through a systematic review of contemporary literature and empirical case studies—including state-level initiatives like Gujarat's *Gunotsav 2.0*—this study explores how the School Quality Assessment and Accreditation Framework (SQAAF) and digital platforms like NISHTHA are being utilized to enhance accountability and transparency. The analysis highlights that while the policy provides a sophisticated roadmap for quality assurance, its success is tethered to overcoming significant implementation gaps, including regional resource disparities, digital divides, and the need for continuous teacher professional development. The paper concludes that a participatory approach, involving data-driven governance and community engagement, is essential to accelerate learning outcomes and ensure equitable quality across India's diverse educational ecosystem.

**Keywords:** NEP 2020, School Education Reforms, Quality Assurance, SQAAF, Educational Monitoring, Foundational Literacy and Numeracy (FLN), Teacher Professional Development, Accountability, SSSA, Digital Transformation in Education.

**Integrating Emerging Technologies with Scientific Research for Regional Sustainability**

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Regional sustainability has become a critical priority in the face of rapid environmental degradation, climate change, resource depletion, and socio-economic inequalities. Integrating emerging technologies with scientific research offers innovative and practical solutions to address these complex regional challenges. Technologies such as Artificial Intelligence (AI), Internet of Things (IoT), Geographic Information Systems (GIS), remote sensing, big data analytics, renewable energy systems, and biotechnology enable more accurate data collection, efficient resource management, and evidence-based decision-making. When combined with scientific research, these tools enhance monitoring of environmental changes, improve agricultural productivity, optimize water and energy use, reduce waste generation, and support disaster risk management.

This interdisciplinary approach promotes sustainable development by strengthening local governance, empowering communities, and encouraging smart infrastructure planning. Emerging technologies also facilitate real-time assessment and predictive modeling, allowing policymakers and researchers to design adaptive strategies tailored to regional needs. Furthermore, collaboration between scientists, technologists, and stakeholders ensures that technological advancements are socially inclusive, economically viable, and environmentally responsible.

Thus, the integration of emerging technologies with scientific research serves as a transformative pathway for achieving long-term regional sustainability. It not only improves efficiency and innovation but also supports balanced development that safeguards natural resources for future generations.

**Keywords:** Regional Sustainability, Emerging Technologies, Scientific Research, Artificial Intelligence (AI), Internet of Things (IoT).

**Sustainable Pharmaceutical Manufacturing and Green Technologies**

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The pharmaceutical industry faces mounting pressure to reduce its environmental footprint while maintaining stringent quality standards and meeting global healthcare demands. Traditional pharmaceutical manufacturing processes are resource-intensive, generating significant chemical waste, consuming large volumes of water and energy, and contributing to environmental pollution. The adoption of green technologies and sustainable practices has emerged as a critical imperative for the industry's future.

Green chemistry principles are revolutionizing pharmaceutical production by promoting the design of safer chemical syntheses that minimize hazardous substances and reduce waste generation. Key innovations include biocatalysis, which employs enzymes to enable reactions under milder conditions with higher selectivity, and continuous flow manufacturing, which offers improved process control, reduced solvent usage, and enhanced energy efficiency compared to traditional batch processing.

Solvent recovery and recycling systems are being implemented to dramatically reduce organic solvent consumption, while advances in analytical technologies enable real-time monitoring and optimization of manufacturing processes. The integration of renewable energy sources, such as solar and wind power, into production facilities further decreases carbon emissions. Water recycling systems and zero-liquid discharge technologies address the critical challenge of water conservation.

The pharmaceutical industry is also exploring biotechnology-driven approaches, including microbial fermentation and plant-based production platforms, which offer inherently more sustainable alternatives to conventional chemical synthesis. While economic considerations and regulatory compliance present challenges, the convergence of environmental responsibility, regulatory incentives, and technological innovation is driving a fundamental transformation toward sustainable pharmaceutical manufacturing that balances patient needs with planetary health.

**Study and Survey of Medicinal Plants in Baar Navapara Mahasamund**

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The present study was conducted to document the diversity and traditional usage of medicinal plants in Baar Navapara, located in the Mahasamund district of Chhattisgarh, India. The region is characterized by rich floristic diversity and a long-standing tradition of plant-based therapy among local communities and tribal groups. Field surveys were carried out from *[insert survey period]* using structured questionnaires, direct observation, and interviews with traditional healers, elders, and knowledgeable villagers to gather ethnobotanical information. Plant specimens were collected, identified, and authenticated with the help of standard botanical references.

A total of 23 medicinal plant species belonging to six families were recorded, encompassing herbs, shrubs, trees, and climbers. These species were utilized by the local population for the treatment of a wide range of ailments, including gastrointestinal disorders, respiratory problems, skin diseases, fever, wounds, and musculoskeletal pain. Leaf, bark, root, fruit, and whole plant parts were commonly used, and the predominant modes of preparation included decoctions, pastes, infusions, and direct application. Quantitative indices such as Use Value (UV), Informant Consensus Factor (ICF), and Fidelity Level (FL) were calculated to assess the relative importance and consensus on plant uses.

The findings highlight the significant ethnomedicinal knowledge present in Baar Navapara and underscore the importance of these plant resources for primary healthcare. The study also emphasizes the need for conservation strategies and sustainable utilization practices to preserve both biological diversity and traditional knowledge systems in the face of environmental and socio-economic pressures.

**A study of e-commerce packaging for sustainable marketing with Indian consumers**

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E-commerce is growing apace in India, and with it, the quantum of packaging waste is also adding. This study explores how e-commerce companies can make their packaging more sustainable to appeal to Indian consumers. We will look at what consumers suppose about eco-friendly packaging, what influences their purchasing opinions, and how companies can use sustainable packaging as a marketing tool.

The study aims to

- Understand Indian consumers' stations towards sustainable packaging.
- Identify factors that impact their buying opinions.
- Give suggestions for e-commerce companies to follow sustainable packaging practices.

By understanding consumer preferences e-commerce companies can reduce waste, enrich their brand image, and attract environmentally-conscious consumers.

**Keywords:** e-commerce, sustainable packaging, consumer behavior, India.

**Digital Transformation and the Future of Work**

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Digital transformation is changing the way organizations work and manage their workmen. The use of technologies such as robotics, automation, artificial intelligence, digital platforms, and data systems is reshaping job roles, work processes, and management practices. From an HR perspective, the future of work requires new skills, flexible work arrangements, and continuous learning. Remote and hybrid work models are becoming common, and performance management is shifting from time based supervision to outcome based/productivity evaluation. While digital transformation helps organizations improve efficiency, decision making, and employee engagement, it also creates challenges such as skill gaps, job insecurity, and resistance to change. HR play a key role in managing this transition by focusing on reskilling, employee well-being, ethical use of technology, and inclusive workplace policies. This study emphasizes the importance of strategic HR practices and adaptive leadership in building a future-ready workforce and ensuring sustainable organizational growth.

**Effect of Edible Fruits of Chhattisgarh on Mental Health of Human Population**

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Human brain has evolved with unique physiological and behavioral characteristics, such as thoughts, emotions, memory, and consciousness beside sensations. Deteriorations of these brain function as a function of age is a common phenomenon. But now a days increase medication and busy life style increases the ageing in population. Consequently, health problem related with aged population has also increased enormously. Apart from various health issues that generates with ageing, Alzheimer's disease (AD) is one of the major one. India is facing exceptional population aging due to expansion in life span which deteriorates the mental health of young population also. Currently acetylcholinesterase inhibitor molecules are used as drug for the treatment of this dreaded disease. Since these drugs have side effects, alternative therapeutic practice is being explored to check or delay the Alzheimer's disease. Of late fruit extracts of some edible fruits have been reported to inhibit acetylcholinesterase activity. In present study, 30 wild fruits were collected from the nearby forest and villages of Chhattisgarh state and after thorough cleaning stored in deep freezer till the experiment. For analysis stored fruit extract was taken and incubated with enzymes acetylcholinesterase and the AChE activity was estimated by the colorimetric method. The extractions were carried out in both the conditions of the fruit ripe and unripe because some of those fruits are taken in either condition depending upon its flavor and benefits. Analysis of the inhibition activity between aqueous and methanol extracts showed a significantly higher AChE inhibition activity in unripe than ripe fruits in most of the fresh fruit extracts. Detection of higher inhibition by unripe fruits extract suggests that, the active phytochemicals might be declining among these fruits during ripening process. On the basis of the present finding it can be suggested that regular consumptions of this high inhibition activity unripe as compare to ripe fruits will not only postpone the onset of the disease but also restrict further deterioration and AD can be managed without any side effects.

**Keywords:** Acetylcholinesterase Inhibition, Wild fruits, Chhattisgarh, Mental health.

**A Field Study Conducted in the Bilaspur District of Chhattisgarh, India, Examined the Function and Usage of Foods High in Prebiotics in Daily Life**

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In addition to characterizing the prebiotic content of frequently consumed green vegetables and locally prepared food items, this field-based study examined the knowledge, habits, and usage of prebiotic-rich diets among rural households in Bilaspur district, Chhattisgarh. We sampled 60 houses in nine villages using a mixed-methods approach that included focus groups, household surveys, direct observation, and laboratory analysis of chosen samples. The results indicate that although only 40% of people are formally aware of the word "Prebiotic," they frequently use traditional prebiotic sources, such as green vegetables, tubers, and fermented foods. After hot-water extraction and ethanol precipitation, laboratory screening of six popular leafy greens (samples gathered fresh from markets and home gardens) revealed significant oligosaccharide and inulin-type fractions, supporting the possibility of local diet-based prebiotic interventions. Community education, the inclusion of prebiotic-rich vegetables in neighbourhood kitchen gardens, and more extensive clinical research to assess health effects are among the recommendations.

Keywords: Prebiotics, Fieldwork, Leafy vegetables.

**Identifying Medicinal Herbs Found in Rural Areas and Utilizes Their Medicinal Value Through Advance Technology**

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Ayurvedic medicines have been in use since ancient times. Keeping this in our mind, the herbs found in rural areas are also capable of curing many of diseases. These herbs have not yet been identified in urban areas and urban areas are unable to reap their benefits. Keeping these factors in mind, we can make these herbs available to the people through advanced technology. Advanced technology involves collection of herbs, subsequent extraction, identification of phytochemicals, observe their biological activities, including chromatographic techniques, spectroscopic techniques, thermal analysis, elemental and structural techniques and bioanalytical characterization. Through this advanced technology, herbs found in rural areas can be recognized outside the urban areas and can be used to treat many diseases.

**A Study on Responsible and Sustainable Branding in the Age of Social Media FOMO**

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Social media has become an influential space for branding, shaping how consumers perceive and interact with brands. One significant concept emerging from this environment is Fear of Missing Out (FOMO), which affects consumer attention, emotions, and responses to brand communication. In the context of branding, social media FOMO plays an important role in influencing how consumers perceive value, urgency, and relevance of brands.

This study aims to understand the concept of social media FOMO in the context of branding and to examine the concept of responsible and sustainable branding. The study is theoretical in nature and is based on an in-depth review of existing research papers, academic articles, and secondary sources related to FOMO, branding, responsibility, and sustainability. By analysing previous studies, the research explores how FOMO-driven branding practices relate to the broader principles of responsibility and sustainability.

The study highlights that while FOMO can enhance brand visibility and consumer engagement, it may also conflict with the values of responsible and sustainable branding if used excessively. The findings from existing literature suggest the need for a balanced branding approach that considers ethical responsibility and long-term sustainability alongside consumer influence.

**Role of Union Budget in Strengthening GST Framework for Global Tax Convergence and Sustainable Economic Development**

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The Union Budget plays a crucial role in shaping the fiscal architecture of a country by aligning taxation policies with national and global economic objectives. Since the implementation of the Goods and Services Tax (GST), successive Union Budgets have focused on strengthening the GST framework to enhance revenue efficiency, transparency, and compliance. GST, as a unified indirect tax system, contributes significantly to the harmonization of domestic tax structures with global best practices, thereby promoting international tax convergence.Through budgetary measures such as rationalization of tax rates, expansion of the tax base, digitization of compliance systems, and simplification of return filing procedures, the government aims to enhance ease of doing business and encourage formalization of the economy. These reforms not only increase fiscal stability but also support sustainable economic development by generating stable revenue for public expenditure on infrastructure, social welfare, and environmental sustainability initiatives. Furthermore, budgetary emphasis on technology-driven tax administration, anti-evasion mechanisms, and cooperative federalism strengthens the effectiveness of GST in integrating India with global trade systems. However, continuous policy evaluation and structural adjustments remain essential to balance revenue generation with economic equity. Thus, the Union Budget acts as a strategic instrument in reinforcing GST reforms to achieve global tax harmonization and long-term sustainable growth.

**Keywords:** Union Budget, GST Reform, Global Tax Convergence, Sustainable Development, Fiscal Policy.

**Savings, Consumption and Investment Behaviour of Young Earners in a Digital Economy: With Special Reference to Raipur Division**

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The emergence of the digital economy has significantly transformed financial behaviour patterns, particularly among young earners. In recent years, the rapid growth of digital payment systems, fintech platforms, online banking, and investment applications has reshaped the way individuals manage their income, savings, consumption, and investment decisions. This study examines the savings, consumption, and investment behaviour of young earners with special reference to Raipur Division. Raipur Division, being one of the rapidly developing regions with increasing urbanization and digital penetration, provides a relevant context to analyze how technology-driven financial services influence economic behaviour. The study explores whether digital accessibility encourages disciplined saving and informed investment practices or promotes higher consumption due to the ease of digital spending. It further investigates the role of financial literacy, income level, occupation, risk tolerance, and awareness of digital financial instruments in shaping financial decisions among youth. The research also evaluates the extent of participation of young earners in investment avenues such as mutual funds, stock markets, fixed deposits, insurance, and emerging digital assets. While digital financial inclusion enhances convenience and access to diversified investment opportunities, concerns related to over-spending, lack of financial planning, and speculative behaviour remain significant. The findings of the study aim to provide policy insights for financial institutions, fintech companies, and policymakers to promote responsible financial behaviour and sustainable wealth creation among young earners in the Raipur Division, thereby contributing to inclusive and sustainable economic development.

**Keywords:** Digital Economy, Young Earners, Savings Behaviour, Investment Patterns, Raipur Division.

**Radioisotope Therapy**

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Radioisotope therapy (RIT) is a medical treatment that utilizes radioactive isotopes to target and treat various types of diseases, primarily cancer. This therapy involves the use of radioactive materials that emit radiation to destroy or damage abnormal cells while minimizing harm to surrounding healthy tissues. The most common applications of RIT include the treatment of thyroid cancer, endocrine tumors, and certain hematological malignancies. By introducing a radioactive isotope into the body, often attached to a molecule that selectively binds to cancer cells, RIT delivers targeted radiation therapy. This localized radiation destroys tumor cells and reduces the risk of metastasis. The therapeutic isotopes used, such as iodine-131, yttrium-90, and radium-223, differ in their half-lives and radiation types, providing flexibility based on the disease's location and stage. Despite its advantages, including non-invasive administration and potential for reduced side effects, challenges remain, such as the risk of radiation exposure to healthy tissues, potential toxicity, and the availability of suitable isotopes. Ongoing research continues to improve the efficacy, precision, and safety of radioisotope therapies, expanding their application in oncology and other medical fields. RIT holds promise for precision medicine, providing a tailored approach to cancer treatment. With its potential to improve patient outcomes and quality of life, RIT is an exciting area of research in oncology. Future studies will focus on optimizing RIT protocols and exploring new applications in cancer therapy.

**Keywords**: Radioisotope therapy (RIT), oncology, thyroid cancer, endocrine tumors and hematological malignancies.

**Enhanced Biosynthesis and Characterization of Fungal Melanin Under Submerged Fermentation for Sustainable Industrial Applications**

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Melanin is a naturally occurring biopolymer pigment widely present in living organisms and is valued for its photoprotective, antioxidant, and physicochemical stability characteristics. Microbial synthesis of melanin, especially from fungal sources, provides a sustainable, environmentally friendly, and cost-effective alternative to synthetic pigments for various industrial applications. In this investigation, melanin production from two fungal strains (Jashpur and Bilaspur), sourced from the Amity Institute of Biotechnology, Amity University Chhattisgarh, was optimized under submerged culture conditions. Optimization was performed through systematic modulation of key physicochemical parameters, including temperature (20–55°C), pH (3–11), carbon sources (fructose, glucose, maltose, sucrose, cellulose), nitrogen sources (yeast extract, beef extract, urea, peptone, ammonium sulphate), and mineral sources (copper sulphate, zinc sulphate, calcium sulphate, ferrous sulphate, potassium chloride). Melanin was recovered from dried fungal biomass using alkaline extraction followed by acid precipitation and purification. The statistical significance of the optimization process was evaluated using ANOVA, while pigment characterization was carried out using UV–Visible spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM). Optimized culture conditions led to a substantial increase in melanin yield, with peak production achieved in glucose-based media supplemented with yeast extract and peptone, along with calcium sulphate and zinc sulphate, at pH 6.0 and an incubation temperature of 20°C. The isolated pigment displayed characteristic spectroscopic features, amorphous structural morphology, and high stability under light exposure, thermal variation, and acidic/alkaline environments, highlighting its strong potential as a sustainable natural pigment for industrial and biotechnological applications.

**Keywords**: Fungal Melanin, Microbial pigment, Pigment characterization, Sustainable.

**Green Finance and Sustainable Investment Strategies**

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Green finance has emerged as a fundamental approach to promote sustainable development and environmental protection within the modern financial system. This paper examines the concept of green finance and analyzes sustainable investment strategies that contribute to economic growth while effectively reducing environmental risks. With increasing global concerns regarding climate change and resource depletion, financial institutions and investors are rapidly shifting capital toward eco-friendly projects, including renewable energy, green bonds, sustainable infrastructure, and ESG-based (Environmental, Social, and Governance) investments. The study is based on a comprehensive analysis of secondary data collected from research articles, government reports, and financial publications. It highlights the critical role of green financial instruments, policy support, and robust regulatory frameworks in encouraging responsible investment practices. The research further evaluates the multi-faceted benefits of sustainable investment strategies, such as long- term profitability, significant risk reduction, and positive environmental impact.

Despite the positive momentum, the study identifies several challenges that hinder the growth of green finance, including a general lack of awareness, high initial transition costs, limited transparency in reporting, and existing regulatory gaps. The paper concludes that strong policy support, financial innovation, and increased investor awareness are essential for strengthening sustainable investment practices. Ultimately, green finance plays a crucial role in balancing economic development with environmental sustainability, ensuring long-term financial stability for the global economy.

# A study of Ways to overcome the Challenges of Financial Sustainability Faced by Start Ups

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Financial sustainability for startups, especially during the initial 5-year "Valley of Death," hinges on consistent, positive sales performance, strong financial solvency, and strategic pricing. Key factors influencing this viability include access to external funding (venture capital, bank support), skilled human capital, and supportive government policies. The paper aims to suggest ways to develop sustainability through mentorship, adaptability and ESG compliance. Cooperation through mentorship aids in navigating early-stage challenges. Startups must adapt to rapid technological changes and market trends. Adhering to environmental, social, and governance (ESG) standards is increasingly important for securing investment.

**Keywords:** Mentorship, Adaptability & ESG Compliance.

**Ethical Foundations and Social Accountability in Contemporary Pharmacy Practice**

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Pharmacy practice is evolving beyond medication dispensing toward a patient-centred model that demands strong ethical foundations, humanistic values, and social accountability. This paper explores the critical role of ethics, humanities, and social responsibility in shaping contemporary pharmacy practice. Ethical decision-making in pharmacy extends beyond regulatory compliance to include issues such as informed consent, patient confidentiality, equitable access to medicines, and responsible use of emerging technologies, including artificial intelligence (AI).

The integration of humanities—such as philosophy, sociology, and communication studies—enhances pharmacists' empathy, cultural competence, and moral reasoning, enabling them to respond effectively to diverse patient needs. With the growing use of AI in prescription screening, drug interaction checks, and clinical decision support systems, pharmacists must ensure transparency, prevent algorithmic bias, and safeguard patient data privacy. While AI improves accuracy and efficiency, human oversight remains essential to uphold accountability and patient trust.

Social responsibility in pharmacy also encompasses public health advocacy, promotion of rational drug use, environmental stewardship, and efforts to reduce health disparities. Pharmacists serve as accessible healthcare professionals who can influence community health outcomes through patient education, vaccination campaigns, chronic disease management, and ethical stewardship of antimicrobial use. By embedding ethics, humanities, and responsible AI practices into pharmacy education, the profession can ensure compassionate, equitable, and sustainable healthcare delivery.

**Keywords**: Pharmacy practice, Ethical decision making, Patient centered care, Humanities in healthcare, Social responsibility, Artificial intelligence in pharmacy

**Development of eco-friendly Biodegradable Sanitary Pads Using Plant Fibers**

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Menstrual hygiene products are essential for women's health, yet the extensive use of conventional sanitary pads composed of synthetic polymers and plastic-based materials has resulted in serious environmental and waste management issues. These materials are non-biodegradable and may also cause discomfort and skin-related problems due to poor breathability and chemical residues. The present study focuses on the development of an eco-friendly and biodegradable sanitary pad using plant-derived fibers as a sustainable alternative to conventional materials. Plant fibers rich in cellulose were extracted, processed, and utilized to form an absorbent core with good hydrophilicity, softness, and fluid retention capacity. The biodegradable sanitary pad was developed by assembling a natural Fiber–based absorbent layer along with biodegradable top and bottom layers using eco-compatible binders. The plant fibers exhibited effective absorption and retention of menstrual fluid while maintaining air permeability and skin-friendly characteristics. The use of renewable plant fibers not only reduces dependency on petroleum-based products but also supports sustainable waste management and environmental protection. The developed biodegradable sanitary pad demonstrates the potential of plant-based biomaterials in providing a safe, affordable, and environmentally sustainable solution for menstrual hygiene management. This study highlights the importance of integrating biological resources with human health needs to promote eco-conscious personal care products.

**Keyeords:** Biodegradable Sanitary Pad, Plant Fiber-Based Absorbent Core, Cellulose-Rich Fibers, Eco-Friendly Menstrual Hygiene, Sustainable Biomaterials, Natural Fibers, Environmental Sustainability

# A Theoretical Framework for Personalized Learning using Knowledge Graphs and Cognitive Modelling

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Personalized learning aims to tailor educational content, learning paths, and instructional support to the individual needs, abilities, and cognitive states of learners. Traditional learning systems often rely on static content delivery and fail to capture the complex relationships among learning concepts and the evolving knowledge state of students. To address these limitations, this paper proposes a theoretical framework for personalized learning that integrates Knowledge Graphs (KGs) with Cognitive Modeling (CM).

In the proposed framework, knowledge graphs are used to represent domain knowledge in a structured manner, capturing concept hierarchies, prerequisite relationships, and semantic dependencies among learning units. Cognitive modeling is employed to track learners' knowledge states, misconceptions, learning progress, and cognitive factors such as mastery level and forgetting. By combining these two components, the framework enables adaptive content sequencing, targeted feedback, and dynamic learning path generation.

The integration of knowledge graphs with cognitive models allows learning systems to make informed instructional decisions based on both the structure of the subject matter and the learner's cognitive profile. This framework provides a conceptual foundation for developing intelligent tutoring systems and adaptive digital learning platforms, particularly for school and higher education contexts. The proposed approach highlights the potential of graph-based and cognitive techniques to enhance learning effectiveness, engagement, and long-term knowledge retention.

**Keywords:** Personalized Learning, Knowledge Graphs, Cognitive Modelling, Knowledge Tracing, Adaptive Learning Systems.

# Impact of Sustainable Financial Practices on Long-Term Corporate Performance

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Sustainable financial practices have emerged as a critical determinant of long-term corporate performance in an increasingly complex and risk-sensitive global economy. By integrating environmental, social, and governance (ESG) considerations into financial decision-making, organizations enhance operational efficiency, strengthen risk management, and improve access to capital. Frameworks developed by institutions such as the Global Reporting Initiative and the Task Force on Climate- related Financial Disclosures have improved transparency and standardized ESG reporting, enabling investors to better assess corporate sustainability performance.

Empirical evidence indicates that companies adopting sustainable financial strategies often experience reduced cost of capital, improved market valuation, and greater resilience during economic downturns. Moreover, sustainable practices contribute to long-term value creation by fostering innovation, enhancing brand reputation, and aligning corporate governance with stakeholder expectations. While challenges such as inconsistent ESG metrics and the risk of greenwashing persist, the strategic integration of sustainability into financial frameworks positions firms for sustainable growth and competitive advantage. Overall, sustainable financial practices represent not only an ethical imperative but also a strategic pathway to enduring corporate success.

**Keywords:** Sustainable finance; ESG integration; Corporate performance; Long-term value creation; Risk management.

# A Study on Corporate Social Responsibility (CSR) and ESG (Environmental, Social, Governance) Practices

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Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) have emerged as guiding frameworks for businesses to integrate sustainability and ethical practices into their core operations. CSR focuses on voluntary initiatives undertaken by companies to contribute to societal development, community welfare, and ethical business conduct, while ESG provides measurable criteria used by investors and stakeholders to evaluate corporate sustainability performance and governance standards. It examines the legal context for the implementation of CSR and ESG, focusing on relevant legal provisions, regulatory initiatives, and court precedents. The integration of CSR and ESG frameworks enhances corporate transparency, strengthens stakeholder trust, mitigates operational risks, and supports long-term value creation. With growing regulatory expectations, investor activism, and consumer awareness, companies across industries are adopting structured ESG reporting, sustainability programs, and responsible governance mechanisms. This study examines the evolving role of CSR and ESG practices in improving corporate reputation, financial resilience, stakeholder engagement, and sustainable development outcomes, highlighting the strategic importance of aligning social responsibility initiatives with measurable ESG performance indicators.

# A Study on the Factors Affecting Customer Satisfaction in the Four-Wheeler Automobile Segment in Chhattisgarh

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The automobile industry in India has grown rapidly over the past decade, and the four-wheeler segment has seen significant expansion even in tier-2 and tier-3 markets like Chhattisgarh. With increasing competition among automobile brands, understanding what makes customers satisfied has become critical for manufacturers and dealers alike. This study explores the key factors that influence customer satisfaction among four-wheeler buyers in Chhattisgarh. The research focuses on variables such as product quality, after-sales service, pricing, brand image, fuel efficiency, dealership experience, and availability of spare parts. Both primary and secondary data are used in the study. Primary data is collected through structured questionnaires from four-wheeler owners across urban and semi-urban areas of Chhattisgarh, while secondary data is gathered from published reports, journals, and industry data. The findings of this study aim to help automobile companies and dealers better understand the expectations of customers in this region, identify gaps in their current service offerings, and develop strategies to improve overall customer experience. The study also highlights how regional factors such as road conditions, income levels, and brand awareness, uniquely shape buying behaviour and satisfaction levels in Chhattisgarh compared to metro cities.

**Personal Faith or Social Influence? Exploring the Construction of Spiritual Tourism Experiences in Ayodhya and Varanasi**

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The increasing visibility of pilgrimage destinations such as Ayodhya and Varanasi in contemporary public discourse has raised questions about the evolving nature of spiritual tourism. While previous research has examined religious motivation and the role of social media in influencing travel decisions, limited studies explore how personal faith and social influence jointly shape spiritual experiences. This study aims to investigate whether spiritual tourism experiences are primarily driven by individual belief systems or constructed through social and digital influences. Adopting a descriptive and analytical research design, the study is based on primary data collected through a structured questionnaire administered to visitors of Ayodhya and Varanasi. The instrument measured indicators of personal faith, social and digital influence, and perceived spiritual experience using a five-point Likert scale. Responses were analysed using descriptive statistics and interpreted thematically to identify dominant experiential patterns. The findings suggest that while personal faith remains a central motivation for pilgrimage, social narratives and digital exposure significantly influence expectations and experiential interpretation. The study concludes that contemporary spiritual tourism experiences emerge from the interaction between belief and mediated influence. The research offers insights for tourism management and contributes to understanding experience construction in modern spiritual contexts. Keywords: Spiritual Tourism, Personal Faith, Social Influence, Experience Construction.

**Administrative challenges in implementing NEP 2020 at the school level**

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The National Education Policy (NEP) 2020 envisions a transformative shift in India's education system by integrating technology, holistic learning, and value-based education to achieve sustainable development. At the school level, the convergence of technology and humanity plays a critical role in fostering inclusive, equitable, and future-ready education. Technology enhances access, digital literacy, personalized learning, and efficient school administration, while humanistic values ensure ethical decision-making, emotional well-being, cultural sensitivity, and social responsibility. Together, they form the foundation for sustainable educational development.

However, the implementation of NEP 2020 presents significant administrative challenges. These include inadequate digital infrastructure, disparities between urban and rural schools, limited teacher preparedness for technology integration, resistance to pedagogical change, financial constraints, and the need for competency-based assessment reforms. Additionally, school leaders must balance rapid digital transformation with the preservation of human interaction, mental health, and moral education. Ensuring equity, data privacy, and inclusive access further complicates policy execution at the grassroots level.

This paper examines the intersection of technology and human values in advancing sustainable development within schools and critically analyzes the administrative barriers faced during NEP 2020 implementation. It highlights the necessity of visionary leadership, structured capacity-building programs, collaborative governance, and context-sensitive planning to translate policy into practice effectively. The study concludes that sustainable educational reform requires not only technological advancement but also empathetic, value-driven administration that aligns innovation with human development goals.

**Keywords:** NEP 2022, Sustainable Development, Educational Technology, School Administration, Humanistic Education, Policy Implementation.

**Impact of Teacher Behaviour on Students' Self-Concept and Motivation: An Educational Perspective for Sustainable Development**

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In the era of global convergence, where business, technology, and humanities intersect to promote sustainable development, education plays a transformative role in shaping human capital. Among the various factors influencing student development, teacher behaviour remains one of the most powerful determinants of learners' self-concept and motivation. This study investigates the impact of teacher behaviour—such as encouragement, empathy, fairness, communication style, and classroom management—on students' academic self-concept and intrinsic motivation at the senior secondary level.

Grounded in humanistic and social cognitive theories, the research adopts a mixed-method approach involving survey tools, standardized self-concept and motivation scales, and classroom observations. Data will be collected from senior secondary students across diverse school settings to examine how positive and negative teacher behaviours influence students' perception of self-worth, academic confidence, engagement, and long-term goal orientation.

The study aligns with the conference theme by highlighting how emotionally supportive and ethically responsible teaching practices contribute to sustainable human development. In a technology-driven educational landscape, the human element—teacher behaviour—remains central to fostering resilient, self-motivated learners who are capable of contributing meaningfully to business innovation, technological advancement, and social well-being.

The findings are expected to provide evidence-based recommendations for teacher training programs, policy frameworks, and institutional practices that promote holistic development. By strengthening students' self-concept and intrinsic motivation, education systems can cultivate adaptive, responsible, and future-ready individuals essential for sustainable global progress.

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**Digital Transformation in Higher Education and the Future of Work: An HRM Perspective**

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Digital transformation is rapidly redefining the structure and functioning of higher education institutions, influencing both organizational processes and employee work patterns. In private universities of Chhattisgarh, the integration of digital technologies in academic and administrative functions has created significant shifts in how work is performed and managed. This study empirically examines the impact of digital transformation on the future of work, with particular attention to the role of human resource management (HRM) practices. The objectives of the study are to (i) analyze the impact of digital transformation on the future of work in higher education institutions, (ii) examine the effect of digital transformation on HRM practices, and (iii) assess the influence of HRM practices on future-of-work outcomes.

A quantitative research design was adopted. Primary data were collected using a structured questionnaire based on a five-point Likert scale. The study targeted academic and administrative staff working in selected private universities of Chhattisgarh. Using purposive sampling, 200 respondents who are actively engaged with digital technologies in their work roles were surveyed. The instrument measured three constructs: digital transformation, human resource management practices, and future-of-work outcomes. Data analysis included descriptive statistics to summarize respondent characteristics, reliability analysis using Cronbach's alpha to ensure internal consistency, and linear regression analysis to test the proposed hypotheses.

The results reveal that digital transformation has a significant positive impact on both HRM practices and the future of work. Furthermore, HRM practices significantly influence future-of-work outcomes, highlighting their strategic importance in technology-enabled institutional environments. The study contributes empirical evidence from the context of private universities in Chhattisgarh and offers practical implications for institutional leaders seeking to align digital initiatives with workforce management strategies to achieve sustainable organizational transformation.

# Psychological Factors Influencing Acceptance of Artificial Intelligence and Robotics for Sustainable Development: A Review

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Artificial intelligence (AI) and robotics are increasingly employed to address global sustainability challenges in areas such as smart energy management, environmental conservation, healthcare, and automated workplaces. However, the successful implementation of these technologies depends not only on technical efficiency but also on human acceptance, adaptation, and behavioural change. Psychological factors play a critical role in determining whether individuals and communities adopt or resist AI-driven solutions. The present paper provides a narrative review of existing literature to examine the key psychological determinants influencing the acceptance and effective use of AI and robotic technologies for sustainable development. Relevant studies from psychology, human–computer interaction, and organizational behaviour were analyzed to identify recurring themes. Findings highlight the importance of attitudes toward technology, perceived usefulness, trust, technology readiness, technostress, ethical concerns, and fear of job displacement in shaping adoption behaviors. The review further discusses how AI-based systems can promote pro-environmental and sustainable behaviours through behavioural nudges and decision-support tools. An integrative conceptual framework is proposed linking psychological readiness, technology acceptance, and sustainable outcomes. The paper underscores the need to incorporate psychological insights in the design and implementation of AI interventions to ensure responsible, inclusive, and sustainable technological progress.

**Keywords:** Artificial Intelligence; Robotics; Sustainable Development; Technology Acceptance; Psychological Factors; Trust in AI; Technostress; Behavioural Change.

**A Study on Human Resource Management in the Age of Artificial Intelligence**

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Human Resource Management (HRM) in the age of Artificial Intelligence (AI) is experiencing a paradigm shift as organizations increasingly adopt intelligent technologies to enhance workforce management and strategic decision-making. AI-powered systems—such as machine learning algorithms, predictive analytics, chatbots, and automated recruitment platforms—are transforming traditional HR functions including talent acquisition, training and development, performance appraisal, and employee engagement. These technologies enable data-driven insights, improve operational efficiency, reduce administrative burdens, and support more objective decision-making processes. In AI-enabled workplaces, HR professionals are evolving into strategic partners who focus on workforce planning, digital skill development, diversity and inclusion, and organizational agility. AI also facilitates personalized learning experiences, real-time performance monitoring, and predictive workforce analytics. However, the integration of AI into HRM presents challenges related to data privacy, ethical concerns, algorithmic bias, transparency, and workforce displacement.

**Science Education and Indigenous Knowledge Systems as Catalysts for Sustainable Community Development**

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Through the development of scientific literacy, critical thinking, and problem-solving abilities, science education is essential to the promotion of sustainable community development. Indigenous and local knowledge systems provide tried-and-true methods for social organization, agriculture, health, and environmental preservation in addition to formal scientific knowledge. This essay investigates the ways in which incorporating indigenous knowledge systems into science education can spur long-term community growth.

Communities can create contextually aware and culturally appropriate answers to today's problems, like resource management, public health, and climate change, by fusing modern scientific methods with traditional knowledge. The study emphasizes the value of community-based learning, inclusive curricula, and policy frameworks that value local knowledge as a resource for sustainable development.

# A Comprehensive Review of the Physicochemical Characteristics of Groundwater in Rajnandgaon District, Chhattisgarh, India

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Groundwater is a critical natural resource that supports domestic water supply, agriculture, livestock rearing, and industrial activities in both rural and urban regions of India. In Rajnandgaon District of Chhattisgarh State, groundwater is extensively utilized due to limited availability of surface water resources and pronounced seasonal variability in rainfall. Therefore, assessment of the physicochemical properties of groundwater is essential for evaluating water quality, understanding hydrogeochemical processes, and determining its suitability for drinking, irrigation, and other uses.

Numerous studies have reported that several physicochemical parameters—including pH, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), fluoride ($F^-$), arsenic (As), nitrate ($NO_3^-$), chloride ($Cl^-$), sulfate ($SO_4^{2-}$), iron (Fe), and other dissolved ions—frequently exceed the permissible limits prescribed by the Bureau of Indian Standards (BIS: IS 10500–2012) and the World Health Organization. The deterioration of groundwater quality is influenced by geological mineral dissolution, anthropogenic activities, seasonal variations, and complex hydrogeochemical processes. This review underscores the necessity of continuous monitoring and the adoption of effective groundwater management strategies to ensure water quality and protect public health.

The hydrogeological setting of Rajnandgaon District is complex and is governed by diverse geological formations, including granitic and metavolcanic rocks, along with structural features associated with the Dongargarh–Kotri rift zone. Groundwater occurrence and quality exhibit notable spatial variability across the district's nine tehsils, such as Chhuriya, Dongargaon, Dongargarh, and Rajnandgaon, each characterized by distinct hydrochemical conditions. Groundwater recharge predominantly occurs through monsoonal rainfall and contributions from tributaries of the Seonath River traversing the region. Overall, the physicochemical quality of groundwater in the district reflects the combined effects of natural geological controls and localized anthropogenic influences.

**Drug Development and Characterization Bioactive Gummies Using *Colocasia esculenta* for Hair Growth Promoting Activity**

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Taro mucilage has promising functions as a natural additive in the food industry, acting mainly as a thickener, stabilizer, and emulsifier. However, these properties can be altered by the extraction technique, which consequently can change its chemical composition. The extraction of taro mucilage can be done in a simple way, such as grinding the rhizome and filtering, or using more sophisticated techniques, using cold temperature and chemical reagents and enzymes to eliminate impurities. In summary, the extraction technique strongly interferes with the chemical composition of the mucilage, in which cold extraction. The prepared chewable gummies was formulated using mould process with hair growth promotion. The hair growth promotion characteristics is due to the presence of active ingredients like Taro, Amla, Hibiscus, Fenugreek, In the present study, an attempt was made to formulate a herbal gummy using different natural ingredients like Taro, Amla, Hibiscus, Fenugreek, Orange peel and Beet root Three formulations (F1, F2, F3) of the gummies were Prepared by varying the proportions of additives and evaluated for their physiochemical properties Like color, odour, pH, thickness, dissolution and Anti-bacterial test. Based on these tests, F2 gummies Formulation code was selected as the best formulation among the others. The designed formulation F2 consisting 1gm of *Colocasia esculenta*, 0.5gm of *Trigonella foenum* Extract, 0.5gm *Emlica officinalis* Extract, 0.4 gm of *Hibiscus sabdariffa*, 1.730 gm of Gelatin, 8 gm of sucrose found to be promising chewable gummies with hair growth promotion.

**Keywords:** Bioactive Gummies, Sustainable processing of tarogum, Amla, Hibiscus, Fenugreek.

**Diagnostic Analysis of Mid-Day Meal Scheme in Government Schools of Raipur City**

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India's Mid-Day Meal (MDM) Scheme, a key government initiative, aims to boost school enrolment, curb dropouts, enhance child nutrition, and advance socio-economic progress. This study examines its implementation, challenges, outcomes, and effects in Raipur city's government schools, Chhattisgarh. Drawing on primary data from stakeholder surveys and interviews (students, teachers, cooks, parents) plus secondary sources from education and nutrition departments, it assesses program efficacy, pinpoints operational hurdles, and offers targeted policy and practical recommendations.

**Keywords:** Mid-Day Meal Scheme, Diagnostic Analysis, Government Schools, Raipur City, School Nutrition, Student Attendance, Implementation Challenges, Educational Outcomes.

# A Study on the Purchase Intention of Electric Two-Wheelers Among Young Consumers with Reference to Arang City

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The growing environmental concerns and rising fuel prices have accelerated the demand for sustainable transportation solutions worldwide. Electric vehicles (EVs) have emerged as a promising alternative to conventional fuel-based vehicles. Despite government initiatives and increasing awareness, EV adoption in India remains relatively low. Young consumers represent a key market segment due to their openness to innovation and environmental consciousness. This study aims to examine the factors influencing the purchase intention of electric vehicles among young consumers in India. A quantitative research design was adopted using a structured questionnaire. Key factors such as environmental concern, price perception, charging infrastructure, government incentives, and social influence were analysed. The findings indicate that environmental concern, government incentives, and charging infrastructure significantly influence purchase intention, while high price perception negatively affects it. The study provides valuable insights for policymakers and marketers to enhance EV adoption strategies.

**Keywords:** Electric vehicles, Purchase intention, young consumers, Environmental concern, Government incentives.

**Artificial Intelligence and Robotics Technologies for Sustainable Development**

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Sustainable development in the twenty-first century can no longer rely solely on policy reform or conventional industrial transitions; it increasingly depends on intelligent technological integration. As environmental instability, demographic pressure, and economic inequalities intensify, Artificial Intelligence (AI) and robotics emerge not merely as tools of automation but as strategic instruments capable of redefining sustainable futures. This study investigates how AI-driven analytics and robotic systems are reshaping development paradigms in alignment with the United Nations Sustainable Development Goals (SDGs).

Moving beyond a purely technical interpretation, the research situates AI and robotics within a broader sustainability discourse that connects innovation with ecological responsibility and social equity. In agriculture, intelligent robotic systems facilitate precision-based interventions by analyzing soil data, forecasting crop health, and optimizing irrigation patterns, thereby reducing chemical dependency and conserving water resources. In energy and urban infrastructure, AI-enabled predictive models enhance grid efficiency, monitor consumption patterns, and support smart city frameworks that reduce environmental stress. Similarly, automated systems in manufacturing contribute to circular economy practices through optimized recycling, waste segregation, and reduced material loss.

However, technological advancement is not inherently sustainable. The research critically addresses emerging concerns such as workforce displacement, widening digital divides, surveillance risks, and algorithmic bias. These challenges highlight that sustainability must be understood as a socio-technical construct rather than a purely environmental objective. Through qualitative inquiry and interdisciplinary analysis, the study proposes a governance-oriented model that emphasizes ethical design, inclusive policymaking, and long-term accountability in technological deployment.

The study concludes that AI and robotics hold transformative potential only when embedded within frameworks that prioritize human dignity, environmental balance, and intergenerational responsibility. intelligent machines but also ethical imagination, institutional collaboration, and value-driven innovation.

**Machine Minds and human stories: A scholarly exploration of AI's role in literature**

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Artificial intelligence (AI) has not only refined technologies but it also gives its Effect on many areas of life, including literature. Machine Minds and Human Stories examine how AI is connected to reading, writing, and understanding literary texts. This study looks at AI in two main ways: as a subject in stories and as a tool that helps create and analyse literature. It explains how AI can help writers generate ideas, assist in translation, and support literary research. At the same time, the paper discusses important questions about creativity, authorship, and whether machines can truly be creative like humans. Using simple ideas from literature and technology, the study shows that AI does not replace human imagination but works alongside it. The paper concludes that the correlation between machine intelligence and human storytelling is opening new paths for creative expression and encouraging scholars to rethink traditional ideas about literature in the modern digital world.

**Keywords:** Artificial Intelligence, Human Stories, Literary Analysis, Digital Humanities.

# मिथिलेश्वर के कथा साहित्य में संवेदना का अनुशीलन

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मिथिलेश्वर समकालीन हिंदी कथा –साहित्य में सामाजिक यथार्थवाद और मानवीय संवेदनशीलता के प्रति गहराई से प्रतिबद्ध लेखक के रूप में एक महत्तवपूर्ण स्थान रखते हैं। उनका कथा–साहित्य ग्रामीण भारत के जीवनानुभवों से उद्भूत है, विशेषकर समाज के हाशिये पर स्थित वर्गों जैसे भूमिहीन मजदूर, दलित, महिलाएँ, प्रवासी और शहरी गरीबों की वास्तविकताओं से। अपने समकालीन लेखकों से उन्हें जो विशेष रुप से अलग करता है, वह है संवेदनशीलता की उनकी निरंतर साधना जो मात्र भावनात्मक सहानुभूति तक सीमित नहीं लेकिन पीड़ा, अन्याय और मानवीय गरिमा के प्रति एक आलोचनात्मक तथा नैतिक प्रतिबद्धता है। उनकीसंवेदनशीलता किसी अमूर्त विचारधारा से नहीं बल्कि जीवन के प्रत्यक्ष अनुभवों से उपजी है,जिससे उनकी रचनाएँ प्रामाणिक और सामाजिक रुप से अर्थपूर्ण बनती है।

मिथिलेश्वर का यथार्थवाद गरीबी और पीड़ा का सनसनीखेज चित्रण नहीं करता लेकिन दैनिक संघषों को शांत किन्तु तीव्र प्रभाव के साथ सामने लाता है। उनके पात्र असाधारण मनुष्य हैं जिनके जीवन में व्यवस्थगत असमानताएँस्पष्ट रूप से झलकती हैं। इस दृष्टिकोण के माध्यम से मिथिलेश्वर एक ऐसा संवेदनशील यथार्थ रचते हैं, जो पाठकों को उनके पात्रों की भावनात्मक और नैतिक दुनिया में प्रवेश करने का अवसर देता है। इस प्रकार उनका कथा–साहित्य सामाजिक चेतना और भावनात्मक गहराई का संगम बन जाता है जहाँ सत्ता,शोषण और प्रतिरोध मानवीय संबंधों को सूक्ष्म रूप से आकार देते हैं।

**शब्द सार**– संवेदनशीलता, यथार्थवाद, आलोचनात्मक, अर्थपूर्ण।

**Phytochemical analysis and antioxidant activity of *Ipomoea aquatica* from Chhattisgarh, India**

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*Ipomoea aquatica* is a green leafy vegetable; rich source of secondary metabolites, vitamins and amino acids with many health benefits. The present study was accomplished to analyse phytochemical constituents and antioxidant activity methanol extracts of *I. aquatica* from Chhattisgarh, India. For this purpose, first the powdered plant was extracted successively with methanol. The obtained concentrated extract was subjected to preliminary phytochemical screening following standard protocols. The antioxidant activities of extracts were evaluated by Fenton reaction. Ascorbic acid was used as standard antioxidant. Phytochemical screening of methanol extract of *I. aquatica* showed presence of wide array of natural bioactive chemical constituents such as alkaloids, carbohydrates, glycosides, flavonoids, phenolics, tannins, terpenoids, proteins etc. The total phenolic content of seed as determined by Fenton reaction and was found to be good antioxidant activity as dose depended manner. The antioxidant activity of plant extract was carried out with ascorbic acid as a standard reducing agent. The *I. aquatica* extract exhibited concentration dependent free radical scavenging activity. In conclusion the present study indicates that *I. aquatica* extract may be a potential source of natural antioxidant.

**Keywords:** Antioxidant activity, Fenton reaction, *Ipomoea aquatica*, phytochemical screening

**Tourism, Hospitality and Sustainable Development**

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Tourism and hospitality play a vital role in economic growth and community development, but their expansion also raises concerns about environmental protection and social responsibility. Social development in tourism and hospitality focuses on balancing economic benefits with environmental conservation and the well-being of local communities. This approach encourages responsible resource utilization, cultural preservation, and long term planning to minimize negative impacts while maximizing positive outcomes. By adopting sustainable practices, the tourism and hospitality industry can contribute to inclusive growth, environmental sustainability and improve quality of life for present and future generations. This paper examines the role of sustainable practices in the tourism and hospitality industry, highlighting strategies such as responsible resource management, community participation, and policy implementation. It emphasizes that adopting sustainable development principles can enhance destination competitiveness, ensure long term environmental conservation and promote inclusive socio economic growth.

**Keywords:** Hospitality Industry, Resource Management, Environmental Conservation

**Impact of Climate Change on Medicinal Plant Diversity in Western Odisha**

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Climate change is increasingly affecting plant biodiversity, especially medicinal plant species that are highly sensitive to changes in the environment. Western Odisha has tropical dry deciduous forests, shifting rainfall patterns, and local communities that rely heavily on forest resources, making it an important area to study climate-related ecological changes. This study assesses the impact of climate change on medicinal plant diversity in Western Odisha through field observations, discussions with local communities, and analysis of long-term climate data. The results show clear changes in where species are found, a decline in the population of some important medicinal plants, and shifts in flowering and fruiting times, which are linked to rising temperatures and irregular rainfall. Environmental stress also affects the availability and potential healing properties of plant resources. This study highlights the increasing vulnerability of medicinal plants and the risks to traditional healthcare practices and the livelihoods of communities that depend on forests. It stresses the urgent need for conservation strategies, such as sustainable harvesting, community involvement, climate-resilient farming, and both in-situ and ex-situ conservation methods. The findings help clarify the ecological effects of climate change on medicinal plant diversity and offer a scientific foundation for future conservation and sustainable use efforts in the area.

**Keywords:** Climate change, Medicinal plants, Biodiversity, Western Odisha, Conservation, Traditional knowledge

**A Review on Development of Antimicrobial Based Hydrogel from Flaxseeds**

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Hydrogels are three-dimensional, hydrophilic polymeric networks capable of absorbing substantial amounts of water while maintaining structural integrity, making them highly suitable for biomedical and antimicrobial applications. In recent years, increasing concerns regarding environmental sustainability and antimicrobial resistance have driven research toward biodegradable and plant-based alternatives to synthetic hydrogels. Flaxseed (*Linum usitatissimum*), a rich source of mucilage polysaccharides and bioactive compounds such as lignans, presents significant yet underexplored potential in hydrogel development. The present study aims to develop and characterize a flaxseed-derived antimicrobial hydrogel using aqueous extraction of mucilage followed by formulation optimization based on pH, temperature, and polymer concentration. The developed hydrogel will be evaluated for physicochemical properties including swelling index, water retention capacity, mechanical strength, and rheological behavior. Antimicrobial efficacy will be assessed through Minimum Inhibitory Concentration (MIC) and microbial inhibition assays against selected pathogenic microorganisms including *Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans*. The research seeks to address the existing gap in the application of flaxseed-based biopolymers in antimicrobial hydrogel systems. The anticipated outcome is the development of a sustainable, biodegradable, and effective antimicrobial hydrogel with potential applications in wound healing, biomedical materials, and eco-friendly packaging. The study contributes to advancing plant-based biomaterials as viable alternatives in combating microbial contamination and antibiotic resistance.

**Keywords**: Flaxseed mucilage; Antimicrobial hydrogel; Biopolymer; Rheological characterization; MIC assay.

**Design and Evaluation of a Functional Herbal Tea Granules**

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The objective of the present investigation was to design, formulate, and evaluate herbal tea granule formulation intended to exhibit antidiabetic potential. The formulation comprised *Hibiscus rosa-sinensis* (Java), *Zingiber officinale* (Ginger), *Elettaria cardamomum* (Cardamom), and *Stevia rebaudiana* (Stevia), selected based on their traditional use and reported antidiabetic and antioxidant properties. It was hypothesized that combining these botanicals would result in a synergistic enhancement of biological activity. Nine different formulations were developed by varying the composition and physicochemical characteristics of the herbal ingredients. *Hibiscus rosa-sinensis*, a commonly used component in herbal beverages, has been extensively studied for its antidiabetic and antioxidant effects, particularly using flower petals and leaves in experimental models. The optimized formulation was subjected to systematic evaluation, including phytochemical analysis, in vitro antioxidant assessment, antidiabetic activity screening, and sensory evaluation encompassing taste, color, aroma, and overall acceptability. Physical quality attributes such as moisture content, bulk density, and particle size distribution were also determined to assess formulation stability and handling characteristics. The findings indicated that the optimized herbal tea granules demonstrated acceptable physicochemical properties, favorable organoleptic attributes, and promising antioxidant and antidiabetic potential. The developed formulation may therefore be considered a functional herbal beverage with potential application in supportive dietary management of diabetes.

**Keyword:** Herbal tea granule, Hibiscus, Antioxidant, Antidiabetic.

**Study on Development of Eco-Friendly Hydrogel from Lotus Stem**

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The present study focuses on the development of an eco-friendly hydrogel derived from lotus stem as a sustainable alternative to conventional synthetic polymer-based hydrogels. The increasing environmental concerns associated with non-biodegradable polymers have necessitated the exploration of renewable, biodegradable, and biocompatible materials. Lotus stem (*Nelumbo nucifera*), a naturally abundant aquatic plant rich in polysaccharides, cellulose, and bioactive compounds, was selected as the primary raw material due to its inherent biodegradability and eco compatibility. The hydrogel synthesized through an optimized extraction and green cross-linking approach, minimizing the use of toxic reagents and hazardous solvents. Physico-chemical characterization, swelling behavior analysis, mechanical strength evaluation, and biodegradability assessment needs to be carried out using standard analytical techniques. The developed hydrogel has to demonstrated high water absorption capacity, structural stability, and favorable biodegradation properties under controlled conditions in further work. Previous works on this, suggested that lotus stem-based hydrogel holds significant potential for applications in agriculture (soil moisture retention), biomedical fields (wound dressing and drug delivery systems), and environmental remediation (wastewater treatment) needs to be explored. This research contributes to the advancement of sustainable biomaterials and supports the principles of green biotechnology by promoting renewable resources and environmentally responsible manufacturing practices.

**Keywords**: Eco-friendly hydrogel, Lotus stem, Biodegradable polymer, green biotechnology, Sustainable materials.

**Investigation on Cancer preventive effects of selected millets found in Kanker & Kabirdham district of Chhattisgarh State**

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Cancer therapy, particularly radiotherapy, is often limited by radiation-induced damage to surrounding normal tissues. The search for natural agents with both anticancer and radioprotective potential has gained increasing attention. Millets such as Pearl (Bajra) and Finger (Ragi) are nutrient-dense cereals rich in polyphenols, flavonoids, tannins, phytic acid, and dietary fiber, which possess strong antioxidant and anti-inflammatory properties. Bioactive constituents of bajra and ragi exhibit anticancer effects by scavenging reactive oxygen species (ROS), inhibiting tumor cell proliferation, inducing apoptosis, and modulating molecular pathways associated with inflammation and carcinogenesis. Their high antioxidant capacity helps reduce oxidative DNA damage, lipid peroxidation, and genomic instability, thereby contributing to cancer prevention and control. Importantly, these millets demonstrate potential in protecting normal tissues from radiation-induced oxidative stress. By enhancing endogenous antioxidant defense systems such as superoxide dismutase, catalase, and glutathione peroxidase, they may mitigate DNA strand breaks and cellular injury in healthy tissues without compromising tumor radiosensitivity. This selective protective action highlights their promise in the development of plant-based radioprotective drugs. Overall, bajra and ragi represent affordable functional foods with significant therapeutic potential in oncology and radiation biology. Further experimental and clinical studies are required to isolate active compounds and validate their role in radioprotective drug development.

**Keywords:** Bajra; Ragi; Anticancer activity; Radioprotection; Polyphenols; Oxidative stress; Normal tissue protection.

# Introduction of Auto Ignition System for LPG & BFG Firing in Hot Gas Generator

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Blast furnace HGG (Hot Gas Generator) ignition systems are specialized, automated, and high-energy systems designed to combust low-calorific blast furnace gas (BFG) efficiently, Because BFG has low calorific value (approx. 700-850 kcal/cum) and a high auto-ignition point (630–650°C), these systems ensure safe and stable combustion.

**Key Components of an Automatic BFG Ignition System:**

- High-Energy Ignition Rod/Arc Generator: Uses high-voltage (10-15kV) to generate a strong, durable spark, frequently utilizing a plasma igniter to directly ignite the BFG.
- Flame Monitoring/Detection System: Detects whether the ignition was successful, allowing the system to proceed to full combustion or trigger safety shutdown procedures (flameout protection).
- Combustion/Burner Assembly: Often designed to first ignite a high-calorific value fuel (like natural gas or coke oven gas or LPG) to stabilize the flame before switching to the main, lower-grade BFG.
- Automatic Control System (PLC): Manages the entire ignition sequence, including purging, valve opening, high-voltage discharge, and flame monitoring.
- Catalytic Reaction Chamber: Used in advanced systems to enhance the combustion of BFG by improving the mixing and breaking down of gas components before ignition.

**Operational Principles:**

1. Safety Purging: The burner automatically purges the combustion chamber with air before startup to ensure no gas accumulation.
2. Ignition Sequence: The Ignition controller produced high voltage sparks and triggers the high-energy igniter which creates a 30mm x 8mm area of active species (O, O2+, N2+) to quickly raise the Pilot in starting and after reaching temperature around 300, LPG firing stopped and BFG started.
3. Stability Monitoring: Once ignited, the flame monitor verifies the fire. If no signal is detected, the burner shuts down and triggers an alarm.

**Plant Based Antimicrobials Against Superbugs: A Green Strategy**

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Antimicrobial resistance (AMR) has emerged as a major global health threat due to the rapid rise of superbugs that no longer respond to commonly used antibiotics. The misuse and overuse of antimicrobial drugs in human healthcare, veterinary practice, and agriculture have accelerated resistance development. Global health estimates indicate that more than one million deaths per year are directly linked to drug-resistant infections, with several million additional severe cases worldwide. Major affected conditions include drug-resistant tuberculosis, hospital-acquired infections, respiratory and gastrointestinal infections, wound and skin infections, and resistant urinary tract infections. Kidney health is also impacted, as resistant UTIs and bloodstream infections can progress to kidney infections and renal injury, while prolonged high-dose antibiotic therapy increases the risk of drug-induced kidney damage. Plant-based antimicrobials provide a sustainable green alternative. Medicinal plants contain bioactive phytochemicals such as alkaloids, flavonoids, terpenoids, phenolics, tannins, and essential oils with broad antimicrobial properties. These compounds act through multiple mechanisms including microbial cell wall disruption, enzyme inhibition, quorum sensing interference, and biofilm prevention, thereby lowering resistance risk. Plant extracts have shown supportive value against skin, oral, digestive, and resistant urinary infections. A new and effective idea in this field is the development of plant-derived nano-formulations and smart antimicrobial coatings. Herbal phytochemicals can be loaded into biodegradable nanoparticles, hydrogels, or wound dressings to improve stability, targeted delivery, and antimicrobial potency at low doses. Another promising approach is AI-guided screening of medicinal plants combined with ethnobotanical databases to rapidly identify high-activity compounds and synergistic plant combinations. Community-level use of plant antimicrobial feed additives in poultry and livestock can also reduce routine antibiotic use and slow resistance spread. Thus, integrating plant antimicrobials with nanotechnology, data-driven screening, and sustainable agriculture practices offers an innovative and eco-friendly pathway to combat superbugs and AMR-related diseases.

# Integrating Deep Learning with Cryptographic Techniques for Privacy-Preserving Data Analytics

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The convergence of deep learning and cryptography has emerged as a promising solution to the growing demand for secure and privacy-aware intelligent systems. Deep learning models typically require direct access to sensitive data, which poses significant risks when deployed in untrusted or cloud-based environments. This research presents a secure deep learning framework that enables model computation on encrypted data by incorporating cryptographic mechanisms such as homomorphic encryption and secure computation protocols. The proposed approach modifies conventional neural network architectures by employing polynomial-based activation approximations and encryption-friendly arithmetic operations, allowing learning and inference to be performed without revealing plaintext information. Throughout the computational process, data confidentiality is preserved, and only authorized entities are permitted to decrypt the final outcomes. Experimental analysis conducted on standard benchmark datasets demonstrates that the proposed method maintains high predictive accuracy while ensuring strong data protection with acceptable computational overhead. The findings confirm the practicality of deploying deep learning solutions in privacy-sensitive applications and contribute toward the development of trustworthy artificial intelligence systems that effectively balance security, efficiency, and performance.

**Keywords:** Deep Learning, Cryptography, Privacy-Preserving Machine Learning, Homomorphic Encryption, Secure Computation, Encrypted Inference, Data Security, Artificial Intelligence

# Green HRM in India: An Empirical Analysis of Sustainable Workplace Practices in Corporates

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There is an increasing need to integrate environmental management with Human Resource Management (HRM) practices, commonly referred to as Green HRM initiatives. Green HRM involves utilizing various employee-related processes and HR functions to promote sustainable business practices while fostering environmental awareness among employees. By embedding environmental considerations into HR policies and practices, organizations can operate in a more environmentally responsible and sustainable manner. Broadly, Green HRM encompasses two key dimensions: the adoption of environmentally friendly HR practices and the preservation and enhancement of organizational knowledge capital in support of sustainability goals.

The purpose of this study is to examine the current status, awareness, implementation, and challenges of Green Human Resource Management practices in India—an area that remains relatively underexplored in academic research. The paper analyzes the extent to which Indian organizations have adopted Green HRM practices, evaluates their growth trajectory, and assesses the effectiveness of their implementation. By focusing on an emerging economy like India, this study contributes to the growing body of literature on sustainable HRM and provides insights into the opportunities and constraints associated with Green HRM adoption in the Indian corporate context.

**Keywords**: Green HRM, Green HRM Practices, Environmental Sustainability, Sustainable HRM, Indian Corporates.

**Consumer Buying Behaviour Towards Gold Jewellery**

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The Indian gold jewellery market has experienced significant transformation in recent years due to rising income levels, urbanization, and increased awareness about quality standards. Consumers no longer rely solely on traditional buying practices; instead, they demand certified purity, transparent pricing, innovative designs, and reliable service. Purchase motives range from investment security to adornment, social status, and emotional satisfaction. In this context, the present study aims to identify the major factors influencing consumer buying behaviour towards gold jewellery. Gold jewellery occupies a vital position in Indian culture as both an ornament and a form of financial security. However, dynamic market conditions and the emergence of branded retailers have altered consumer expectations. The respondents selected for the study were 30 male and females, divided into three age groups - 25 to 40, 40 to 55, 55 to 70.

**Keywords**: Gold, Jewellery, Consumer Behaviour, Jewellery Industry, Consumer Preference, Indian Jewellery Market, Jewellery Investment, Consumer Preferences.

**Public Health, Community Pharmacy and Sustainable Development Goals (SGDS)**

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The role of community pharmacy in public health has been increasingly recognized as essential for achieving broader health outcomes and contributing to the united nation sustainable development goles, especially SDG 3 (Good health and wellbeing) and SDG 17 (Partnerships for the Goals). Community pharmacists are uniquely positioned as highly accessible health professionals who provide services beyond traditional medication dispensing, including health promotion, disease prevention, chronic disease support, vaccination delivery, and patient counseling, thereby enhancing community-level care and reducing pressure on secondary healthcare systems. Evidence suggests that community pharmacy services, when integrated with broader public health strategies, can improve clinical, economic, and humanistic health outcomes, increase access to self-care interventions, and support population health initiatives such as smoking cessation, disease screening, and immunization campaigns. However, sustainable implementation of these expanded roles requires policy support, adequate funding, workforce training, and integration within primary health-care frameworks to ensure quality, equity, and long-term viability of services. Strengthening community pharmacy contributions through strategic reforms, interdisciplinary collaboration, and recognition in health policy can significantly advance public health agendas, foster resilient health systems, and contribute meaningfully to achieving the SDGs by improving access to essential health services at the community level.

**Keywords:** Public Health, SDG 3, SDG 17, Primary Health Care, Community Pharmacy.

# Anchoring Bias and Herding Behaviour in the New Issue Market: A Review of Retail Investor Decision-Making

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The new issue market, especially the phenomenon of Initial Public Offerings (IPOs), has witnessed considerable participation from retail investors, though their decision-making processes tend to be inconsistent with the principles of rationality as assumed under conventional finance theories. This review paper attempts to synthesize the existing literature on the implications of Anchoring Bias and Herding Behaviour on retail investors in the context of the new issue market, using the behavioral finance theory as a framework for analysis. Anchoring bias, as developed by Tversky & Kahneman (1974), highlights the tendency of individuals to be heavily influenced by initial reference points while making decisions under conditions of uncertainty. In the context of IPOs, this phenomenon has implications for investors' valuation expectations. Herding Behaviour, which has received considerable attention in the context of financial markets (Banerjee, 1992; Bikhchandani et al., 1992), pertains to the phenomenon of investors being influenced by the decisions of other investors, especially under conditions of information asymmetry and high levels of uncertainty.

Through a systematic review of existing literature on both theoretical and empirical research articles, this paper aims to find consistent evidence that retail investors are affected by subscription, market sentiments, media, and pricing in IPO issues. According to existing literature, oversubscription patterns and listing performance can be seen as a tendency of collective behavior of investors rather than rational investment decisions. In addition, it also examines the methodologies that have been used in existing literature to measure the behavior of investors in new issues.

By synthesizing scattered research findings, this paper makes a contribution to the behavioral finance body of literature by providing a conceptual framework on how anchoring effects and herding effects influence retail investor participation in initial public offerings. It also highlights areas for further research, especially with regard to emerging markets.

**Optimization of Fermentation for Bioethanol Production from Custard Apple Using Yeast**

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The growing demand for sustainable and environmentally friendly energy sources has accelerated the search for alternative biofuel feedstocks derived from agro-industrial residues. Brazil and USA are the two major ethanol producers accounting for 62% of the world production. Custard apple (*Annona squamosa* L.) is a member of the family Annonaceae and is a significant tropical fruit grown in the West Indies, South and Central America, Ecuador, Peru, Brazil, India, Mexico, the Bahamas, Bermuda, and Egypt. Custard apple is one of the important fruit crop growing wild on Deccan Plateau and some parts of Central India. The fruits are soft granular, juicy with mild flavour. It is one of the delicious and nutritionally valuable fruit. This study aims to explore the fermentation strategy for bioethanol production from custard apple pulp as a low cost, nutrient- rich substrate using the yeast, Saccharomyces cerevisiae. The process includes pulp extraction, enzymatic pretreatment, fermentation, and ethanol recovery. Key parameters such as pH, temperature and fermentation duration are needs to be optimized to maximize ethanol yield. The study highlights the potential of custard apple as an alternative and renewable feedstock for bioethanol production. The future study aims to provide new experimental data on ethanol production from *Annona squamosa*, a fruit that has not been extensively studied for waste valorization and biofuel purposes. This contribution will enhance the existing knowledge base and may encourage further research on other underutilized tropical fruits as potential bioresources.

**Keywords**: Bioethanol, Custard Apple (*Annona squamosa*), *Saccharomyces cerevisiae*, enzymatic pretreatment, fermentation, waste valorization.

**Sustainable Drug Delivery System and Advance Formulation**

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Advances in molecular pharmacology and an improved understanding of the mechanism of most diseases have created the need to specifically target the cells involved in the initiation and progression of diseases. This is especially true for most life-threatening diseases requiring therapeutic agents which have numerous side effects, thus requiring accurate tissue targeting to minimize systemic exposure. Recent drug delivery systems (DDS) are formulated using advanced technology to accelerate systemic drug delivery to the specific target site, maximizing off-target accumulation in the body. As a result, they play an important role in disease management and treatment. Recent DDS offer greater advantages when compared to conventional drug delivery systems due to their enhanced performance, automation, precision, and efficacy. They are made of nanomaterials or miniaturized devices with multifunctional components that are biocompatible, biodegradable, and have high viscoelasticity with an extended drug delivery to the specific target site, maximizing therapeutic efficacy and minimizing therapeutic efficacy and minimizing off-target accumulation in the body. As a result, they play an important role in disease management and treatment. Recent DDS offer greater advantages when compared to conventional drug delivery systems due to their enhanced performance, automation, precision, and efficacy. They are made of nanomaterials or miniaturized devices with multifunctional components that are biocompatible, biodegradable, and have high viscoelasticity with an extended circulating half-life. This review, therefore, provides a comprehensive insight into the history and technological advancement of drug delivery systems. It updates the most recent drug delivery system, their therapeutic application, challenges associated with their use, and future directions for improved performance and use.

**Keywords**: Drug delivery system, Nanoparticles, Nanocarriers, Tumour, Pharmacokinetics, Chemotherapy.

**Green Packaging in the Circular Economy: Contemporary Developments and Challenges**

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The increasing global focus on environmental sustainability has accelerated innovation in green packaging, positioning it as a vital component of sustainable development. This study examines the emerging trends, key challenges, and potential opportunities associated with green packaging, particularly its contribution to environmental sustainability. Green packaging involves the use of biodegradable, recyclable, and reusable materials, along with innovative design approaches that reduce environmental impact throughout the product life cycle.

Although green packaging offers significant benefits—such as waste reduction, resource conservation, and improved brand image—its adoption is accompanied by several challenges. Organizations often encounter obstacles including higher production costs, inadequate consumer awareness, regulatory constraints, and supply chain complexities.

This research provides a critical analysis of recent innovations, market drivers, and policy initiatives influencing the green packaging ecosystem. Furthermore, it identifies strategic pathways through which businesses and other stakeholders can address existing barriers, embed sustainability into operations, and contribute to the development of a circular economy. By presenting practical and research-driven insights, the study aims to assist industry practitioners, policymakers, and scholars in advancing sustainable packaging solutions and fostering a more environmentally responsible future.

**Keywords:** Green packaging; Sustainable packaging; Eco-friendly materials; Waste management; Circular economy.

**To Study Customer Satisfaction with Respect to Digital Banking in India**

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This study examines customer satisfaction with digital banking by analyzing key factors such as ease of use, security, reliability, service quality and customer support. With the raid growth of technology and digital transformation in the banking sector, digital banking has become an important channel for delivering financial services. The objective of the study is to analyze customer satisfaction and identify the key factors influencing satisfaction with digital banking platforms such as mobile banking, internet banking, and online payment system

The research is based entirely on secondary data collected from published journals, research articles, bank reports, government publications, and reliable online sources. The study reviews the existing literature to understand customer perceptions regarding convenience, security, accessibility, transaction speed, and service quality.

The findings from the review indicate that customers are generally satisfied with digital banking due to its convenience and efficiency. The study concludes that banks must focus on strengthening security measures and improving service quality to enhance overall customer experience.

**Keywords**: Customer satisfaction, Banking services, Service Quality, Mobile Banking, Internet Banking

# शिक्षकों की संज्ञानात्मक प्रवृत्ति, अभिक्षमता एवं शिक्षण रणनीतियों का उच्च माध्यमिक विद्यार्थियों के गणितीय अधिगम और शैक्षिक उपलब्धि पर प्रभाव: एक अनुभवजन्य अध्ययन"

प्रियंका बिरनवार, मोनिका चौबे
शिक्षा विभाग, आंजनेय विश्वविद्यालय, रायपुर, छत्तीसगढ़

वर्तमान शिक्षा व्यवस्था में गणितीय अधिगम विद्यार्थियों की तार्किक क्षमता, समस्या-समाधान कौशल तथा विश्लेषणात्मक सोच के विकास का प्रमुख आधार है। तथापि, उच्च माध्यमिक स्तर पर गणित विषय को विद्यार्थियों द्वारा कठिन एवं जटिल समझा जाना एक सामान्य समस्या है, जिसके परिणामस्वरूप उनकी शैक्षिक उपलब्धि अपेक्षित स्तर तक नहीं पहुँच पाती। इस संदर्भ में यह आवश्यक हो जाता है कि गणितीय अधिगम को प्रभावित करने वाले कारकों का गहन अध्ययन किया जाए। प्रस्तुत शोध का मुख्य उद्देश्य शिक्षकों की संज्ञानात्मक प्रवृत्ति, अभिक्षमता एवं शिक्षण रणनीतियों का विद्यार्थियों के गणितीय अधिगम तथा शैक्षिक उपलब्धि पर पड़ने वाले प्रभाव का अनुभवजन्य विश्लेषण करना है।

शिक्षक की संज्ञानात्मक प्रवृत्ति में उसकी सोच शैली, निर्णय क्षमता, समस्या-समाधान दृष्टिकोण, तर्कशक्ति एवं ज्ञान-संरचना प्रमुख घटक होते हैं, जो कक्षा में शिक्षण की गुणवत्ता को प्रत्यक्ष रूप से प्रभावित करते हैं। इसी प्रकार शिक्षक की अभिक्षमता जैसे विषय ज्ञान, शिक्षण कौशल, संप्रेषण क्षमता एवं नवाचारपूर्ण पद्धतियों का प्रयोग विद्यार्थियों के अधिगम अनुभव को प्रभावी बनाती

प्रस्तुत अध्ययन वर्णनात्मक सर्वेक्षण एवं सहसंबंधात्मक शोध पद्धति पर आधारित है। अध्ययन हेतु उच्च माध्यमिक विद्यालयों के शिक्षकों एवं विद्यार्थियों का चयन स्तरीकृत यादृच्छिक नमूना पद्धति द्वारा किया गया। आंकड़ों के संकलन हेतु शिक्षक संज्ञानात्मक प्रवृत्ति मापनी, अभिक्षमता परीक्षण, शिक्षण रणनीति सूची तथा विद्यार्थियों की गणितीय उपलब्धि परीक्षण का उपयोग किया गया। प्राप्त आंकड़ों का विश्लेषण माध्य, मानक विचलन, सहसंबंध एवं t-परीक्षण जैसे सांख्यिकीय उपकरणों द्वारा किया गया। अध्ययन के निष्कर्षों से यह स्पष्ट हुआ कि शिक्षकों की संज्ञानात्मक प्रवृत्ति एवं अभिक्षमता का विद्यार्थियों के गणितीय अधिगम एवं उपलब्धि से सकारात्मक एवं महत्वपूर्ण संबंध है। जिन कक्षाओं में शिक्षक नवाचारी एवं विद्यार्थी-केंद्रित शिक्षण रणनीतियों का प्रयोग करते हैं, वहाँ विद्यार्थियों की उपलब्धि स्तर अपेक्षाकृत अधिक पाया गया। इसके अतिरिक्त यह भी पाया गया कि शिक्षक की समस्या-समाधान क्षमता एवं तार्किक दृष्टिकोण विद्यार्थियों में आत्मविश्वास तथा गणित के प्रति सकारात्मक अभिवृत्ति का विकास करता है।

अतः यह निष्कर्ष निकाला जा सकता है कि गुणवत्तापूर्ण गणितीय अधिगम के लिए केवल पाठ्यवस्तु पर्याप्त नहीं है, अपितु शिक्षक की संज्ञानात्मक दक्षता एवं प्रभावी शिक्षण रणनीतियाँ भी समान रूप से आवश्यक हैं। अध्ययन के आधार पर सुझाव दिया गया है कि शिक्षकों के लिए संज्ञानात्मक कौशल विकास प्रशिक्षण, नवाचारपूर्ण शिक्षण पद्धतियों का समावेश तथा सतत व्यावसायिक विकास कार्यक्रमों को प्रोत्साहित किया जाना चाहिए, जिससे विद्यार्थियों की गणितीय उपलब्धि में समग्र सुधार संभव हो सके।

**Screening of Indigenous Soil Microbes for Sustainable PHB Production Using Agro-Industrial Substrates**

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The extensive use of synthetic plastics has become integral to modern society; however, their non-biodegradable nature has resulted in severe environmental pollution and ecological imbalance. Biodegradable bioplastics such as polyhydroxybutyrate (PHB) have emerged as promising sustainable alternatives due to their biodegradability, biocompatibility, and thermoplastic properties comparable to petroleum-derived plastics.

The present study aimed to isolate and screen efficient PHB-producing bacteria from agricultural soil samples collected from the Bilaspur region, Chhattisgarh, India. Soil samples were processed using serial dilution and plating techniques, and bacterial isolates were subjected to primary screening for PHB production using the Sudan Black B staining method. Among the total isolates obtained, ten exhibited significant intracellular lipid inclusions indicating PHB accumulation. Secondary quantitative screening identified two potent strains, designated SSST5 and SSST7, which showed maximum PHB yields when cultivated with fructose and glucose as carbon sources, respectively.

The effect of nitrogen limitation on bacterial growth and polymer biosynthesis was evaluated, revealing enhanced PHB accumulation under nutrient stress conditions. To assess economic feasibility, agro-industrial substrates such as molasses and sugarcane juice were supplemented in synthetic media. Molasses supplementation resulted in the highest PHB yield (53.21% of cell dry weight), whereas sugarcane juice yielded 14.13%. Morphological and biochemical characterization identified strain SSST5 as *Bacillus* sp. and strain SSST7 as *Pseudomonas* sp. The extracted polymer was confirmed by Fourier Transform Infrared Spectroscopy (FTIR), and Nuclear Magnetic Resonance (NMR). These findings highlight the potential of indigenous soil bacteria for sustainable and cost-effective PHB production, supporting circular bioeconomy and eco-friendly plastic development.

**Integrating Indian Knowledge System with Modern Climate Change Migration Strategies Insights into Carbon Sequestration and Sustainability**

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Climate change is one of the biggest environmental challenges today. Indian Knowledge Systems (IKS) include traditional practices such as agroforestry, sacred groves, organic farming, and traditional water management that have helped protect nature for centuries. These practices can store carbon in soil and plants, which helps reduce global warming. When combined with modern scientific methods, IKS can improve carbon sequestration and promote sustainable development. This seminar discusses how traditional Indian knowledge and modern climate strategies can work together to protect the environment and ensure a sustainable future.

**Pharmaceutical Innovation, Entrepreneurships, and Global business**

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Pharmaceutical innovation, entrepreneurship, and global business models are central to the advancement of modern healthcare systems. Continuous scientific progress in biotechnology, genomics, and digital health technologies has accelerated the discovery and development of new therapies aimed at addressing complex and emerging diseases. Innovation in the pharmaceutical sector is characterized by high research and development (R&D) costs, long development timelines, and significant regulatory requirements, making strategic management and collaboration essential for success.

Entrepreneurship plays a critical role in translating scientific discoveries into marketable treatments. Small biotechnology startups often lead early-stage research by focusing on specialized or high-risk therapeutic areas. These ventures are typically supported by venture capital funding, academic partnerships, and strategic alliances with larger pharmaceutical firms. Through mergers, acquisitions, and licensing agreements, large multinational companies scale promising innovations for global commercialization.

Global business models in the pharmaceutical industry have evolved from fully integrated structures to more collaborative and network-based approaches. Outsourcing research, manufacturing, and distribution to specialized organizations allows firms to reduce costs and improve efficiency. Additionally, expanding into emerging markets and adopting tiered pricing strategies enable companies to balance profitability with broader access to medicines. Digital transformation, including artificial intelligence and data analytics, further enhances drug discovery, clinical trials, and patient engagement.

Overall, the integration of innovation, entrepreneurial initiative, and adaptive global business strategies ensures the continued growth and sustainability of the pharmaceutical industry while striving to improve global health outcomes.

**Keywords**: Pharmaceutical innovation, Entrepreneurship, Biotechnology, ESR, VCF, Operational efficiency.

**Carbonomics and Supply Chain Resilience: A Stakeholder Ecosystem Approach to Green Logistics**

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Decarbonization of logistics has become one of the key aspects of global climate commitments development, considering the important contribution of the sector to greenhouse gas emissions and the essential role of this area in supplying and trading operations. In this paper, the authors create a stakeholder ecosystem model, which incorporates firms, governments, technology providers, financiers, and consumers in order to show how the concept of decarbonization can be realized through a coordinated effort. The framework is based on and builds upon existing research on green logistics, supply chain sustainability, resilience, and the triple bottom line, and draws on them to present logistics decarbonization as both a strategic opportunity and a sustainability necessity. The model is designed to have four stakeholder blueprints: firms/industry, policymakers/regulators, enablers/investors, and consumers/ end-users, each of which is mapped to key performance indicators (KPIs), which can be quantified to represent emissions reductions, circularity practices, resilience, and adoption of innovations. Boundary conditions and assumptions, such as grid decarbonization, risks associated with the supply of rare-earth, and policy continuity, clearly explain the model applicability and constrainability. The framework is both prescriptive and offers practical guidance on how to design multi-actor strategies, but also a diagnostic instrument that may identify gaps in decarbonization courses of action. The paper adds value in theory by linking logistics decarbonization to the wider discussion of supply chain resilience, the circular economy, and climate transition governance, and provides practical implications to industry and policy. It suggests further research opportunities in the future, such as empirical validation of KPIs, scenario testing with simulations, and cross-country comparative research. The stakeholder ecosystem model provides an optimistic roadmap to speeding up the decarbonization of logistics and highlights the need to urgently align sustainability with resilience in global supply chains.

**Financial Inclusion as a Tool for Global Economic Convergence: Integrating Microfinance, Digital Banking, and Insurance for Sustainable Rural Development**

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Financial inclusion has emerged as a critical instrument for promoting global economic convergence and reducing disparities between developed and developing economies. By ensuring access to affordable financial services—such as savings, credit, insurance, and digital payment systems—financial inclusion empowers marginalized populations, particularly in rural areas, to participate actively in economic activities. This study examines financial inclusion as a strategic tool for achieving global economic convergence through the integration of microfinance, digital banking, and insurance services for sustainable rural development.The paper highlights how microfinance institutions facilitate entrepreneurship and income generation among low-income households, while digital banking platforms enhance financial accessibility, transparency, and efficiency. Additionally, inclusive insurance mechanisms mitigate risks associated with agriculture, health, and climate-related vulnerabilities, thereby strengthening economic resilience in rural communities. The integration of these three pillars creates a comprehensive financial ecosystem that promotes productivity, reduces poverty, and supports long-term sustainable growth. The study adopts a conceptual and analytical approach by reviewing global financial inclusion models and examining their implications for developing economies. It argues that coordinated policy frameworks, technological innovation, and public–private partnerships are essential to maximize the developmental impact of financial inclusion initiatives. Ultimately, financial inclusion not only fosters rural empowerment but also contributes to narrowing global income gaps and promoting equitable economic convergence.

**Key Words:** Financial Inclusion, Global Economic Convergence, Microfinance, Digital Banking, Sustainable Rural Development.

**Human Resource Management in the Age of Artificial Intelligence**

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The emergence of Artificial Intelligence (AI) is reshaping Human Resource Management (HRM) from a traditional administrative function to a strategic, data-driven partner in organizational growth. In today's competitive business environment, organizations are increasingly adopting AI-based tools in recruitment, employee engagement, performance management, learning and development, and workforce analytics. This paper examines the role of AI in transforming core HR functions and enhancing decision-making efficiency. The study highlights how technologies such as machine learning, predictive analytics, AI powered chatbots, and automation streamline hiring processes, reduce operational costs, and improve employee experience. At the same time, it addresses key challenges including data privacy concerns, ethical issues, algorithmic bias, and the potential impact of automation on employment patterns. The paper also discusses the changing role of HR professionals, emphasizing the need for digital competencies, analytical skills, and strategic leadership. The findings suggest that AI should be used as a supportive tool to augment human judgment rather than replace it. A balanced integration of technology and human values can help organizations achieve sustainable growth, improved productivity, and enhanced employee satisfaction. This study provides practical insights for managers and HR professionals adapting to the evolving digital workplace.

**Keywords:** Artificial Intelligence, Human Resource Management, Digital Transformation, HR Analytics, Talent Acquisition, Workforce Management

# The Green Mile: Adoption of Sustainable Last-Mile Delivery Practices in the Indian E-commerce Industry

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The rapid growth of Indian e-commerce has intensified environmental concerns related to last-mile delivery, including carbon emissions and packaging waste. Despite industry initiatives toward green logistics, the adoption of sustainable last-mile delivery practices remains inconsistent. This doctoral research investigates the factors influencing the adoption of sustainable last-mile delivery practices in the Indian e-commerce industry from an organizational perspective.

**Objective:** The study aims to: (i) identify key drivers and barriers to adopting green delivery practices; (ii) examine the influence of stakeholder pressures on adoption decisions; and (iii) develop a strategic framework for implementing sustainable last-mile solutions.

**Theoretical Framework:** The research integrates the Technology-Organization-Environment (TOE) framework with Stakeholder Theory to comprehensively capture technological, organizational, and external factors shaping adoption behavior.

**Methodology:** A sequential mixed-methods design is employed. Phase one involves semi-structured interviews with logistics and sustainability managers from e-commerce firms and third-party logistics providers. Phase two comprises a survey administered to a broader sample of industry stakeholders, with data analyzed using Structural Equation Modeling.

**Expected Outcomes:** The study anticipates that regulatory pressure, consumer awareness, and competitive intensity will emerge as primary external drivers, while infrastructure costs and technological compatibility will pose significant barriers. Internally, top management commitment and organizational readiness are expected to be critical enablers. The findings will yield a strategic adoption framework offering practical guidance for e-commerce firms, logistics providers, and policymakers striving to advance sustainable last-mile delivery in India.

**Integrating Emerging Technologies with Scientific Research for Regional Sustainability**

**Emerging Technology: 3D Printing in Housing**

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New emerging technology of 3D printing is positioning itself as a transformative tech in the housing sector by enabling faster, cost-efficient, and resource-optimized construction processes. Through automated, layer-by-layer fabrication, it reduces material waste and construction time while allowing innovative architectural designs. As the technology evolves, 3D printing has the potential to address housing shortages, improve construction efficiency and add to the housing sector's overall sustainability.

The housing sector in Raipur, Chhattisgarh has been expanding steadily due to urbanization, infrastructure development, and rising demand for residential projects. It plays a crucial role in the local labour market by generating large-scale employment for construction workers, contractors, engineers, architects, and allied service providers. As one of the city's key economic drivers, the sector significantly contributes to income generation, skill development, overall local economic growth and due to which new technology adaptation in housing sector is generally viewed as a threat to sustainability to the local labour market.

This research paper examines the effects of 3D printing technology in the housing sector and its implications for the local labour market and labour economics in Raipur, Chhattisgarh. As 3D printing begins to influence construction practices globally, its potential application in affordable housing, rapid construction, and cost-efficient building methods raises important questions about employment structures and wage dynamics at the local level. The study adopts a descriptive research design and is qualitative in nature, aiming to explore emerging trends rather than test causal relationships.

Data were collected through semi-structured interviews with local builders, colonizers, contractors, construction workers, architects, policymakers, labour union representatives and technical experts, along with descriptive review of secondary sources related to housing development in Raipur. The findings suggest that while large-scale adoption of 3D printed

housing in Raipur is still at an exploratory stage, its introduction could significantly alter labour demand in the construction sector. Traditional roles involving manual masonry, carpentry, and on-site fabrication may experience reduced demand or task transformation, while new roles related to digital design, machine operation, material engineering, and technical supervision may emerge.

The study further indicates potential economic effects such as changes in wage structures, skill premiums for technologically trained workers, and shifts in labour productivity. However, limited technical awareness, capital investment constraints, and skill gaps pose challenges to immediate implementation. The research concludes that 3D printing in the housing sector may gradually reshape local labour economics in Raipur, acting as a skill-biased technological change that emphasizes the need for targeted vocational training, institutional readiness, and policy support to ensure inclusive employment outcomes and a sustainable local housing and labour market.

**Digital Banking Experience and Customer Loyalty in India: An Integrated Study Using SERVQUAL and TAM**

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**Objective:** How SERVQUAL dimensions (reliability, responsiveness, assurance, empathy, tangibles) drive customer loyalty in Indian digital banking; and to rank the most impactful drivers by bank type and customer segment.

**Framework:** SERVQUAL-only model adapted to mobile and internet banking. Reliability, responsiveness, assurance, empathy, and tangibles influence customer satisfaction and trust, which mediate effects on attitudinal and behavioral loyalty (preference, recommendation, increased usage). Direct paths from SERVQUAL dimensions to loyalty will also be tested. Multi-group comparisons assess differences across public, private, and fintech banks and across age, digital literacy, and urban–rural segments.

**Methodology:** Cross-sectional, stratified survey of adult digital banking users across Indian regions and bank types (target n=500–800). Instruments use validated SERVQUAL items localized via translation/back-translation and piloted. Data will be analyzed with CFA and SEM to establish reliability and validity, estimate direct and mediated effects, and test multi-group differences with measurement invariance. Procedural and statistical checks will address common method bias.

**Expected outcomes:** Rank-ordered impacts of SERVQUAL dimensions on satisfaction, trust, and loyalty overall and by segment/bank type; identification of high-leverage drivers (e.g., reliability, responsiveness); actionable guidance to enhance service reliability, support, and assurance cues in digital channels; theoretical evidence on SERVQUAL's explanatory power for loyalty in India's digital banking context.

**The Changing Lives of Women in The Namesake: Choosing Their Own Path**

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While literary criticism of Jhumpa Lahiri's *The Namesake* often centers on Gogol's hardship with his patronymic identity, this paper shifts the emphasis toward the women who serve as the novel's emotional and structural backbone. By probing the lives of Ashima, Moushumi, and Sonia, this study explores how female agency is reclaimed within the restrictive "double bind" of cultural tradition and Western expectation. The paper claims that Lahiri does not offer a single blueprint for liberation; instead, she presents a spectrum of survival. Through a close reading of Ashima's "quiet" expansion, Moushumi's "loud" but ultimately self-destructive rebellion, and Sonia's fluid integration, we see a broader definition of feminism, one that is not about abandoning one's roots, but about the hard-won right to author one's own story. Ultimately, this research suggests that for the woman in the diaspora, independence is found not in a physical location, but in the psychological "home" built through the power of personal choice.

**Keywords**: Diasporic feminism; female agency; cultural hybridity; post-colonial domesticity; second-generation identity.

**Endophytic Fungi as Fountain Heads of Novel Bioactive Compounds**

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The serendipitous discovery of penicillin from *Penicillium chrysogenum* marked the beginning of the golden era of antibiotics and highlighted the immense pharmaceutical potential of fungi. Since then, fungal metabolites have played a pivotal role in human health, serving as antibacterial, anticancer, antioxidant, and immunomodulatory agents. In recent years, attention has increasingly shifted toward plant-associated microorganisms, particularly endophytic fungi, as prolific reservoirs of novel bioactive compounds with significant therapeutic promise.

Endophytes constitute a diverse and ubiquitous group of microorganisms that inhabit the internal tissues of living plants without causing apparent harm. Through intricate metabolic interactions with their host plants, endophytes synthesize a wide array of secondary metabolites and signaling molecules exhibiting remarkable biological activities. Notably, genetic exchange and metabolic adaptation enable certain endophytes to produce bioactive compounds analogous to those of their host plants, even when cultured independently. This unique capability enhances their value as sustainable and alternative sources of pharmaceutically important phytochemicals.

Given the growing demand for novel and effective therapeutic agents, endophytic fungi have emerged as compelling candidates in contemporary drug discovery research. The present paper highlights recent advances, explores current research trends, and underscores the immense biotechnological potential of these promising microorganisms.

# Role of Water Chemistry in Assessing and Managing Aquatic Pollution for Sustainable Development

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Water chemistry is a crucial branch of environmental chemistry that deals with the chemical characteristics of natural and contaminated water systems. Increasing industrialization, agricultural runoff, and urban activities have significantly altered the physicochemical properties of surface and groundwater resources. This study emphasizes the importance of water chemistry in evaluating water quality and understanding the behavior of pollutants in aquatic environments. Key parameters such as pH, dissolved oxygen, hardness, alkalinity, nutrients, heavy metals, and organic contaminants are essential indicators of water health. The interaction of these chemical constituents influences water suitability for drinking, irrigation, and industrial use. The role of analytical techniques in monitoring water pollution and identifying contamination sources is highlighted. Special attention is given to the impact of heavy metals and nutrients on aquatic ecosystems and human health. The application of green chemistry and sustainable treatment methods is discussed as an effective approach to improving water quality. This work highlights the need for continuous monitoring and scientifically informed management strategies to ensure the sustainable use and conservation of water resources.

**Keywords:** Water Chemistry, Water Quality, Aquatic Pollution, Sustainable Management, Environmental Monitoring

**Role of Education and Social work in Sustainable Development**

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Sustainable development addresses pressing global challenges such as climate change, poverty, inequality, and environmental degradation, as outlined in the UN's 2030 Agenda and 17 Sustainable Development Goals (SDGs). Education (SDG 4) equips individuals with knowledge, skills, values, and attitudes essential for sustainability, while social work advances social justice, empowers marginalized communities, and promotes environmental equity.

This paper explores the synergy between education and social work in achieving sustainable development. Education for Sustainable Development (ESD) fosters environmental awareness and ethical values, while social workers implement "green social work" practices—advocating for environmental justice, supporting climate-vulnerable groups, and enabling community-led sustainable initiatives.

In the Indian context, where rural-urban divides, gender disparities, and resource overexploitation persist, integrating education and social work can drive inclusive, localized change. The paper argues that mainstreaming both fields is crucial for building a just, resilient, and ecologically balanced society aligned with the SDGs.

**From Persia to Postcolonial Peril: Hybridity and Paranoia in Firozsha Baag Parsi Imaginary**

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The paper discusses *Tales from Firozsha Baag* by *Rohinton Mistry* as an intricate example of the Parsi imaginary that has developed over time to attain a precarious place in the postcolonial Bombay starting with its mythical Persian roots. The analysis of the chosen stories suggests that the study makes the argument that Mistry presents the Parsi identity as being inherently hybrid but highly anxious, caught between the purity of past histories and the realities of the lived minority marginalization. As symbolic areas, the domestic spaces of the Baag are examined in way that they intersect with the forces of urban decay, political instability and demographic recession. Based on rituals, the language of everyday life and the clash between generations, the analysis shows how characters overcome their hybridity in the strategies that often become paranoia and exceptionalist defense. Endogamy and ritual purity is explained as a way to stabilize a feeling of self that is threatened but Mistry uses irony and humor to defy these claims and show how such cultural armor may do little to protect the community of internal tension or external violence. This paper highlights that hybridity in the work of Mistry is not a glorified union but an area of conflict where the nostalgia of a romanticized past is mixed with an inordinate mistrust of the majoritarian present. Moreover, the article examines how the narrative point of view and global migration play out as re-positioning the Parsi subject between the local enclave and the broader diaspora. The paper takes a methodological approach that blends a close analysis of the texts with historical context and explores the motives of cleanliness and the fear of extinction in the collection of Parsi anxieties as a fictional archive. In the end the paper will argue that Mistry redefines the Parsi imaginary as an imaginary of constant motion and exposure and provide a crucial reflection on the negotiation of survival, memory and difference among small minorities in the unresolved legacies of empire.

**Keywords:** Parsi imaginary, Rohinton Mistry, hybridity, postcolonial paranoia, minority identity, Firozsha Baag, urban domesticity, cultural memory, diaspora.

# The Brainn Incubator as an Arts-Based Education Model for Sustainable Youth Empowerment: A Case Study of the Brainn Foundation for Arts, India

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In India's evolving cultural and creative sectors, access to structured arts education and professional mentorship remains disproportionately concentrated within metropolitan centres. Emerging artists from non-metro and semi-urban regions frequently operate within informal ecosystems characterised by limited institutional support, inadequate skill-development pathways, and the absence of sustainable livelihood models. These structural constraints restrict both cultural inclusion and long-term community development.

This paper presents a case study of The Brainn Incubator, a flagship arts-education and talent development programme operated by the Brainn Foundation for Arts (BFA), a Section 8 not-for-profit organisation incorporated under the Companies Act, 2013. The study examines the design, implementation, and outcomes of The Brainn Incubator (Cycle 1), a pilot initiative conducted in Central India with the objective of enabling youth through structured mentorship, skill development, and ethical creative practice.

The incubation framework integrates arts education with established principles of social work, emphasising experiential learning, psychosocial safety, peer collaboration, and professional literacy. Participants underwent guided training in creative communication, performance discipline, collaborative production processes, and foundational understanding of intellectual property and creative rights. The programme adopted a practice-based pedagogy wherein learning outcomes were assessed through continuous engagement and the development of documented creative outputs rather than conventional evaluation mechanisms. Findings from the pilot indicate measurable improvement in participants' technical competencies, communication confidence, creative discipline, and awareness of sustainable career pathways within the cultural sector. The initiative further indicates that locally rooted mentorship models can reduce migration pressures, preserve regional cultural identity, and expand inclusive access to creative infrastructure.

From a sustainability perspective, the programme aligns with Environmental, Social,

and Governance (ESG) principles through low-resource digital workflows, emphasis on social inclusion and youth employability, and nonprofit governance structures ensuring reinvestment into subsequent incubation cycles. While limited in scale, the pilot establishes a replicable framework for arts-based education as a tool for community empowerment.

The paper concludes that creative incubation, when structured as an educational and social-development intervention rather than a purely commercial enterprise, can serve as a viable model for sustainable community development in emerging economies. Such frameworks hold relevance for policymakers, educational institutions, and nonprofit organizations seeking scalable approaches to community-rooted creative development.

# सतत आर्थिक विकास हेतु कर नागरिकों के वैश्विक अभिसरण को प्राप्त करने में वस्तु एवं सेवा कर (जीएसटी) की भूमिका

दिलेश्वर प्रसाद साहू, चिंतामणि पांडा

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आज की वैश्वीकृत दुनिया में, 'सतत आर्थिक विकास' का अर्थ केवल पैसा कमाना नहीं, बल्कि एक ऐसी अनियमित और स्थिर अर्थव्यवस्था बनाना है जो लंबे समय तक टिक सके। इसमें GST (वस्तु एवं सेवा कर) एक सेतु (ब्रिज) की तरह कार्य करता है। पारंपरिक कर प्रणालियाँ अक्सर जटिल और टूटी हुई होती थीं, जिससे व्यापार करना कठिन हो जाता था। GST ने "एक देश, एक कर" के सिद्धांत के साथ करों के जाल को खत्म कर दिया है। यह न केवल व्यापार करने की लागत को कम करता है, बल्कि पूरे देश को एक एकल बाजार में बदल देता है। जब कर प्रणाली सरल और अंतरराष्ट्रीय मानकों के अनुरूप होती है, तो विदेशी निवेश बढ़ता है और आधारभूत ढांचे का सही उपयोग होता है। संक्षेप में, GST एक ऐसी अनियमित नींव रखता है जहाँ विकास और जवाबदेही साथ-साथ चलते हैं। वर्तमान वैश्विक आर्थिक परिदृश्य में सतत आर्थिक विकास के लिए कर समेकन में विस्थापन, सरलता तथा वैश्विक समन्वय अत्यंत आवश्यक हो गया है। वस्तु एवं सेवा कर (GST) को एक व्यापक अप्रत्यक्ष कर सुधार के रूप में देखा जाता है, जिसने कर संरचना को एकीकृत, अनियमित एवं आधारभूत ढांचे बनाया है। जीएसटी बहु-स्तरीय कर प्रणाली को समाप्त कर “एक राष्ट्र, एक कर” की अवधारणा को खोलता है, जिससे करों के दोहराव (कैस्केडिंग प्रभाव) को कम किया जा सके और उत्पादन तथा वितरण प्रणाली में दक्षता बढ़ाई जा सके। वैश्विक स्तर पर, कई देशों ने वैट या जीएसटी जैसे मूल्य बढ़ाकर मॉडल को अपनाया है, जिससे कर नागरिकों में समानता और सामंजस्य स्थापित हुआ है। यह अभिसरण (कन्वर्जेंस) अंतरराष्ट्रीय व्यापार को सरल बनाता है, निवेश को प्रोत्साहित करता है तथा बहुराष्ट्रीय कंपनियों के लिए कर अनुपालन को सुलभ बनाता है। जीएसटी डिजिटल अनुपालन प्रणाली के माध्यम से कर प्रशासन को अधिक समावेशी बनाता है और कर चोरी की संभावनाओं को कम करता है, जिससे राजस्व संग्रह में वृद्धि होती है। यह न केवल आंतरिक बाजार को मजबूत करता है, बल्कि वैश्विक आर्थिक मानकों के अनुरूप कर संरचना विकसित करने में भी महत्वपूर्ण भूमिका निभाता है। अतः जीएसटी को सतत आर्थिक विकास तथा वैश्विक कर अभिसरण के बीच एक सेतु के रूप में देखा जा सकता है।

# सतत विकास और मानव कल्याण

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यह शोध सतत विकास (सतत विकास) और मानव कल्याण (मानव कल्याण) के परस्पर संबंध का विश्लेषण प्रस्तुत करता है। सतत विकास का सार ऐसे विकास से है जो वर्तमान पीढ़ी की आवश्यकताओं की पूर्ति करते हुए भविष्य की जरूरतों की परियोजनाओं से समझौता न करे। मानव कल्याण में स्वास्थ्य, शिक्षा, आय, सामाजिक सुरक्षा, पर्यावरणीय गुणवत्ता तथा जीवन स्तर जैसे तत्व सम्मिलित हैं।

अध्ययन में पाया गया कि आर्थिक विकास तभी सार्थक है जब वह सामाजिक समानता और पर्यावरण संरक्षण के साथ संतुलित हो। प्राकृतिक संसाधनों का अंधाधुंध दोहन, प्रदूषण और जलवायु परिवर्तन मानव कल्याण को प्रतिकूल रूप से प्रभावित करते हैं। इसके विपरीत, स्वच्छ ऊर्जा का उपयोग, हरित तकनीक, पेयजल शिक्षा, स्वास्थ्य सेवाओं की प्राप्ति तथा सामाजिक न्याय की नीतियां मानव जीवन की गुणवत्ता को विनियमित करती हैं।

शोध के परिणाम बताते हैं कि सतत विकास लक्ष्यों (एसडीजी) को अपनाकर गरीबी उन्मूलन, लैंगिक समानता, स्वच्छ जल एवं स्वच्छता, तथा जलवायु कार्रवाई जैसे क्षेत्रों में सकारात्मक परिवर्तन लाया जा सकता है। इसके लिए सरकार, निजी क्षेत्र और समाज के सभी निकायों की संयुक्त भागीदारी आवश्यक है।

अंततः निष्कर्ष निकाला गया कि सतत विकास और मानव कल्याण एक-दूसरे के पूरक हैं। संतुलित आर्थिक, सामाजिक और आर्थिक नीतियां अपनाकर ही सतत समृद्धि और सुखद जीवन सुनिश्चित किया जा सकता है।

**Colonialism and the Making of Modern India**

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The present paper presents a comprehensive and critical analysis of the role of colonialism in the making of modern India. From the late seventeenth century to the mid-twentieth century, the influence of the ruling class in India profoundly influenced Indian society, economy, and politics. This study attempts to explain how the colonial policies, land-revenue systems, industrial and commercial structures, and labor reforms produced structural changes in Indian society. The modern legal system and the literary structure established by Mitra Sasan gave birth to a new middle age, which strengthened the status of Rashtriya Tida. The Satamatika and Dhatimamak reform movements—such as the Brahma Samataj, Aaya Samataj and Amrudh movements—gave rise to the Satamatika revival and modern consciousness. Along with this, challenges like fragmentation of progressive policies, decline of traditional industries, problems of agriculture and exploitation of resources also emerged. This research argues that colonial rule was not only a period of exploitation and repression, but also one that laid the foundations of modern political institutions, democratic values, and national identity. The freedom movement organized these changes and gave Indian identity a national character.

# जिला–गौरेला पेंड्रा मरवाही (छत्तीसगढ़) के ग्रामीण एवं शहरी क्षेत्र के विद्यार्थियों के तनाव स्तर का तुलनात्मक अध्ययन

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वर्तमान वैश्विक प्रतिस्पर्धात्मक परिवेश में विद्यार्थियों के मध्य मनोवैज्ञानिक तनाव एक गंभीर शैक्षिक एवं सामाजिक चुनौती के रूप में उभर कर सामने आया है। जिला गौरेला पेंड्रा मरवाही (छत्तीसगढ़) के संदर्भ में यह समस्या विशेष रूप से महत्वपूर्ण है, जहाँ ग्रामीण एवं शहरी क्षेत्रों की सामाजिक, आर्थिक एवं शैक्षिक परिस्थितियों में उल्लेखनीय विविधताएँ पाई जाती हैं। यद्यपि पूर्ववर्ती क्षेत्रों में तनाव के विभिन्न आयामों का विश्लेषण किया गया है, तथापि ग्रामीण एवं शहरी विद्यार्थियों के तनाव स्तर के तुलनात्मक अध्ययन पर सीमित शोध उपलब्ध है।प्रस्तुत अध्ययन का मुख्य उद्देश्य जिला गौरेला पेंड्रा मरवाही के ग्रामीण एवं शहरी क्षेत्र के विद्यार्थियों के तनाव स्तर का तुलनात्मक विश्लेषण करना तथा उससे संबंधित शैक्षिक, सामाजिक एवं आर्थिक परिस्थितियों की पहचान करना है।

अध्ययन हेतु कुल 250 विद्यार्थियों (125 ग्रामीण एवं 125 शहरी) का चयन स्तरीकृत यादृच्छिक मॉडल (Stratified Random Sampling) विधि द्वारा किया गया। डेटा संकलन के लिए मानकीकृत उपकरण Perceived Stress Scale (PSS) का उपयोग किया गया, जिसके अनुसार विश्वसनीयता एवं वैधता पूर्व-स्थापित है। संकलन आंकड़ों का विश्लेषण स्वतंत्र मॉडल t-परीक्षण (Independent Sample t-test), सहसंबंध विश्लेषण (Correlation Analysis) तथा एनोवा (ANOVA) के माध्यम से किया गया। परिणामों से स्पष्ट हुआ कि शहरी क्षेत्र के विद्यार्थियों में औसत तनाव स्तर ग्रामीण विद्यार्थियों की अपेक्षा सांख्यिकीय रूप से अधिक पाया गया ($p < 0.05$)। इसके अतिरिक्त पारिवारिक आय, शैक्षिक अपेक्षाएँ एवं प्रतिस्पर्धात्मक दबाव तनाव स्तर के महत्वपूर्ण पूर्वानुमानक (Predictors) के रूप में उभरे। अध्ययन के निष्कर्ष शैक्षिक नीति- निर्माताओं, शिक्षकों एवं परामर्शदाताओं के लिए महत्वपूर्ण संकेत प्रदान करते हैं। विशेषतः क्षेत्रीय असमानताओं को ध्यान में रखते हुए लक्षित तनाव-प्रबंधन कार्यक्रम एवं मनोसामाजिक परामर्श सेवाओं के विकास की आवश्यकता पर बल दिया गया है।

# Sustainable Finance and Environmental Investment: A Paradigm Shift Towards Climate-Aligned Capital Allocation

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This research examines the evolving landscape of green finance and its critical role in facilitating the global transition to a sustainable, low-carbon economy. As climate change poses unprecedented challenges, green finance has emerged as a vital mechanism for channelling capital towards environmentally beneficial projects through instruments including green bonds, climate funds, and ESG-integrated investment strategies.

Through comprehensive analysis of global markets, regulatory frameworks, and case studies, this paper identifies key drivers and barriers to scaling sustainable investment. While green finance has experienced exponential growth exceeding $500 billion globally, significant challenges remain in standardization, transparency, and equitable access to capital, particularly for developing nations.

Key findings reveal that successful implementation requires robust taxonomies, credible verification systems, and alignment between public policy and private sector incentives. This paper provides actionable insights for policymakers, financial institutions, and investors, demonstrating that green finance represents both an ethical imperative and a strategic opportunity to build climate resilience, drive sustainable growth, and create long-term value in an increasingly carbon-constrained world.

**Keywords:** Green Finance, Sustainable Investment, Climate Finance, ESG, Green Bonds, Environmental Economics, Carbon Markets, Regulatory Frameworks

# Physico-Chemical Parameter of Ground Water for Drinking in Dhamtari Block: A Review

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Chhattisgarh's Dhamtari district is largely dependent on the Mahanadi River system, which includes significant projects like the ancient Rudri Barrage, which makes the area suitable for paddy farming, and the Ravishankar Sagar (Gangrel Dam), a vital irrigation and drinking water source. The district is excellent at managing water resources; it has been recognized nationally for its GIS-based plans that revitalize water bodies (Amrit Sarovars) and encourage rainwater harvesting, greatly enhancing agricultural potential and groundwater recharge. By comparing results to BIS/WHO standards for parameters like pH, TDS, hardness, fluoride, chloride, and iron, the physico-chemical parameters of groundwater in Dhamtari are analyzed to determine its suitability for drinking, domestic, and agricultural use, identify health risks (such as from high fluoride/nitrate), guide aquifer management, and ensure public health. The typical approach entails gathering representative water samples and evaluating them in a lab using standard operating methods, frequently in accordance with the guidelines set forth by the American Public Health Association (APHA). The groundwater in the Dhamtari district exhibits notable physico-chemical problems for drinking purposes, with elevated concentrations of Fluoride, Total Dissolved Solids (TDS), and Total Hardness frequently surpassing the limits set by WHO/BIS, suggesting that many areas are unsuitable for consumption. High concentrations of fluoride (which causes fluorosis), chloride, nitrate, and TDS require treatment like defluoridation and reverse osmosis, indicating contamination from natural sources or agricultural/sewage runoff and necessitating quick corrective actions for public health, even though pH and some other parameters are frequently acceptable.

**Keywords:** Ground water resources, Contamination, Health, Water quality index (WQI), Permeability index (PI), Sodium absorption ratio (SAR).

**Current Freshwater Trends: The impact of various pearl nuclei implantation and rearing techniques on freshwater mussel survival, growth, and pearl creation; pearl farming in India**

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The goal of this research is to analyze the comparative effects of various pearl nuclei implantation techniques and rearing methods on the survival and growth of the freshwater mussel, *Lamellidens marginalis*. Pearl nuclei were implanted in the mussels through three different methods (mantle cavity, mantle tissue, and gonadal implantation), after which the mussels were tagged and kept in a post-operative care unit for one week days. The live implanted mussels were subsequently reared for 6 months using two distinct methods. Cultured pearls are of great significance in international trade. India has established foundational technology for the cultivation of pearls in freshwater environments, recognizing the potential and value of freshwater pearl production. The Indian pond mussel, *Lamellidens marginalis*, is the predominant species employed in freshwater pearl aquaculture. The technology for freshwater pearl culture is disseminated to the country's fish farming communities, entrepreneurs, researchers, and students to foster a sustainable model for socio-economic development. This encompasses their types, historical significance, the distribution of freshwater pearl mussels in various countries, pearl bio mineralization, pearl farming techniques, and factors affecting pearl quality, among other aspects. A major drawback of seawater pearl production is the high costs, the risk of significant business failures, and the prolonged coating time. In contrast, freshwater pearls appear to offer promising prospects as an alternative to seawater pearls. This study aims to evaluate the effects of loads (the number and diameter of nuclei) on the freshwater pearl coating process, as well as the suitable nucleus diameter, to achieve the optimal coating thickness of half-round pearls. The research consists of the experimental implantation of 4, 8, and 4 nuclei per individual mussel, maintained using the hapa method in bottom waters. An observational method and factorial randomized block design were utilized to examine the influence of the load on the success of pearl coating and the thickness of the pearl layer, in comparison to the layer thickness of seawater pearls.

# कोरबा जिला में औद्योगीकरण और आदिवासी का कौशल विकास: एक समीक्षात्मक अध्ययन

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आइ के समय में कोरबा जिला छत्तीसगढ़ का एक बड़ा औद्योगक क्षेत्र बन गया है। यहाँ बहुत सारे पावर प्लांट और कोयला खियांन है जिसके कारण यहाँ के स्थानीय आदिवासी लोगों का िवन बहुत बिल गया है। पहले वो अंगल और खेती पर दानर्षर थे, लेडकन अब इमीन अजधग्रहण होने से उनके पास रोइगार का समस्या हो गया है। इस शोध पत्र का उद्देश्य यह है डाक हम सरकार द्वारा संचालित िया रहा 'स्किल डेवलपमेंट' (कौशल विकास) योनाओआं का समीक्षात्मक अध्ययन करें और िखें डाक क्या सच में फायि हो रहा है।

इस अध्ययन में हमने रारत सरकार का 'प्रधानमांत्री कौशल दावकास योनिया' (PMKVY) और छत्तीसगढ़ सरकार का 'मुख्यमांत्री कौशल दावकास योनिया' (MMKVY) और 'लाइवलीहुड कॉलेइ' के काम की समीक्षा की है। सरकार कोजशश कर रहा है दक आदिवासी युवाओं को तकनीकी तौर पर तरेदनांग करके उन्हें इंडस्ट्री में काम करने लायक बनाया गया है।

शोध से यह मालूम पड़ता है दक कौशल दावकास योनिया से कुछ आदिवासी बच्चों को वेस्कडांग, दफ्तर और जसलाई इससे काम दमला है और उनकी कमाई बढ़ाई है। लेडकन समीक्षा करने पर पता चलता है दक अरी र्रीं बहुत से लोगों को सही इआनकारी नहींयां है और तरेदनांग के बाई र्रीं सबको नौकरी नहींयां दमल पाता है। इसजलए केवल योनिया बनाना काफी नहींयां है, उसका सही से पालन होना र्रीं रिरुरी है।

**मुख्य-शब्द**: कोरबा, समीक्षात्मक अध्ययन, कौशल विकास, प्रधानमांत्री कौशल डावकाास योइना, लाइवलीहुड कॉलेइ, आदिवासी रोइगार।

# डिजिटल अर्थव्यवस्था के माध्यम से वित्तीय समावेशन: सतत विकास की ओर एक आर्थिक मार्ग

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वित्तीय समावेशन (वित्तीय समावेशन) सतत आर्थिक विकास का एक महत्वपूर्ण आधार है, विशेष रूप से विकासशील देशों के लिए। डिजिटल अर्थव्यवस्था के तीव्र विस्तार ने पारंपरिक वित्तीय प्रणाली को बदल दिया है और डिजिटल प्लेटफॉर्म, मोबाइल बैंकिंग, फिनटेक नवाचार तथा डिजिटल सार्वजनिक अवसंरचना के माध्यम से व्यापक जनसंख्या तक वित्तीय सेवाओं की पहुंच संभव बनाई है। यह शोध पत्र डिजिटल अर्थव्यवस्था के माध्यम से वित्तीय समावेशन की भूमिका तथा उसके सतत विकास में योगदान का आर्थिक दृष्टिकोण से विश्लेषण करता है। अध्ययन में यह बताया गया है कि मोबाइल भुगतान प्रणाली, डिजिटल वॉलेट, यूनिफाइड पेमेंट्स इंटरफेस (UPI), डायरेक्ट बेनिफिट ट्रांसफर (DBT) तथा फिनटेक आधारित ऋण लाभार्थियों ने किस प्रकार बैंकिंग, बचत, ऋण और बीमा सेवाओं तक पहले से वंचित वर्गों की पहुंच को बढ़ाया है। डिजिटल वित्तीय सेवाओं ने लेन-देन लागत को कम किया है, भौगोलिक बाधाओं को दूर किया है तथा विस्थापन बढ़ाया है, जिससे ग्रामीण क्षेत्रों, महिलाओं और सूक्ष्म एवं लघु उद्यमों की आर्थिक भागीदारी में वृद्धि हुई है। सतत विकास के संदर्भ में, डिजिटल माध्यमों से वित्तीय समावेशन समावेशी विकास, गरीबी उन्मूलन और आय सृजन में सहायक सिद्ध हुआ है, जिससे सतत विकास लक्ष्य (SDGs) जैसे SDG-1 (गरीबी उन्मूलन), SDG-8 (सम्मानजनक कार्य और आर्थिक वृद्धि) तथा SDG-10 (असमानताओं में कमी) की प्राप्ति में योगदान मिलता है। इसके साथ-साथ डिजिटल साक्षरता की कमी, साइबर सुरक्षा जोखिम और डिजिटल अवसंरचना की शर्तें जैसी चुनौतियाँ भी सामने आती हैं। यह अध्ययन द्वितीयक आँकड़ों पर आधारित है, जिसमें सरकारी विचार, अंतरराष्ट्रीय साक्षरता के प्रकाशनों और पूर्व शोध साहित्य का उपयोग किया गया है। यह कहा जा सकता है कि डिजिटल अवसंरचना, डिजिटल साक्षरता और समावेशी नीतियां डिजिटल अर्थव्यवस्था के माध्यम से वित्तीय समावेशन को खोलकर निरंतर आर्थिक विकास का मार्ग प्रशस्त कर सकती हैं।

**मुख्य शब्द:** वित्तीय समावेशन, डिजिटल अर्थव्यवस्था, सतत विकास, आर्थिक विकास, फिनटेक, एसडीजी

**Role of Education and Social Working Building Sustainable Communities**

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Sustainable communities are vital for ensuring long-term social, economic, and environmental well-being. Education and social work play a crucial role in promoting sustainability by empowering individuals, strengthening community participation, and fostering inclusive development. This paper examines the objectives, significance, and interdependent roles of education and social work in the process of building sustainable communities.

Education supports sustainable communities by raising awareness, developing critical thinking, and promoting responsible citizenship aligned with the Sustainable Development Goals. It equips individuals with the knowledge, values, and skills required to address challenges such as poverty, inequality, environmental degradation, and social exclusion.

Social work complements educational efforts by translating knowledge into action through community engagement, advocacy, and targeted social interventions. Social workers function as change agents who support marginalized populations, promote social justice, and facilitate community-based solutions to local and global challenges. The combined efforts of education and social work enhance social cohesion, resilience, and shared responsibility within communities.

The paper further highlights key challenges and proposes strategies for integrating educational initiatives with social work practices to promote sustainable, participatory, and inclusive community development.

**Keywords:** Sustainable communities, Education, Social work, Community development, Social sustainability.

# Adaptive Federated Deep Learning for Multi-Operator EV Charging Control in Urban Smart Grids

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The rapid growth of electric vehicles (EVs) in urban environments has imposed significant operational challenges on smart grid infrastructure, particularly in scenarios involving multiple charging operators with diverse objectives and constraints. Traditional centralized EV charging management approaches often suffer from limitations related to data privacy, scalability, and communication overhead. To overcome these challenges, this paper proposes an Adaptive Federated Optimization framework for Multi-Operator EV Charging Management using Iterative Deep Learning in urban smart grids.

The proposed framework enables decentralized model training across multiple EV charging operators through federated learning, where local deep learning models are trained using operator-specific data and aggregated via adaptive optimization techniques without sharing raw data. An iterative learning strategy continuously updates model parameters by considering real-time grid conditions, EV charging demand, and dynamic pricing signals. This approach improves load balancing, reduces peak demand, and enhances overall grid reliability while ensuring data privacy and reduced communication costs.

Simulation results under realistic urban smart grid scenarios demonstrate that the proposed method achieves superior performance compared to conventional centralized and non-adaptive charging strategies in terms of convergence speed, operational cost reduction, and grid stability. The results confirm the effectiveness of adaptive federated deep learning for scalable and intelligent EV charging management in future urban power systems.

**Keywords:** Electric Vehicles (EVs), Federated Learning, Adaptive Optimization, Iterative Deep Learning, Smart Grids, Multi-Operator Charging Management, Load Balancing, Urban Energy Systems.

**Digital Banking and its Implication on Customer Satisfaction**

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Digital banking has significantly transformed the banking sector by offering customers convenient, fast, and technology-driven financial services. Services such as mobile banking, internet banking, digital wallets, and automated customer support systems have enhancedaccessibility and efficiency in banking operations. Digital banking improves customer satisfaction by reducing transaction time, providing 24/7 services, improving service accuracy, and offering personalized banking experiences. Thispaper examines the impact of digital banking services on customer satisfaction with special reference to service quality, ease of use, security, and reliability. The study also highlights challenges faced by customers, including cybersecurity risks, technical issues, and digital literacy gaps. The paper concludes that effective implementation of digital banking solutions plays a crucial role in enhancing customer satisfaction and strengthening long-term customer relationships in the banking sector.

**Keywords:** Digital Banking, Customer Satisfaction E-Banking Services, Service Quality, Financial Technology (FinTech)

# Role of Digital Technology in Transforming Banking, Insurance and Financial Services in India

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Digital Transformation in Banking, Insurance and Financial Services: An Indian Perspective highlights how rapid technological advancement is reshaping the structure and functioning of the Indian financial system, influencing service delivery, customer interaction, and financial inclusion across sectors. The rapid changes in digital technology have transformed the Banking, Insurance and Financial Services (BIFS) sector in India by improving service delivery and customer experience. Globalisation, the Digital India initiative, the growing use of smartphones, and changing customer needs have driven organisations to adopt technologies such as mobile banking, digital payments, artificial intelligence, and FinTech platforms. These developments have expanded financial access and improved efficiency across sectors. However, existing studies examine banking, insurance, and financial services separately, so there is limited understanding of how digital technology is changing the sector as a whole. This study aims to analyze the role of digital technology in reshaping the Indian BIFS sector and to examine its effects on efficiency, customer satisfaction, and financial inclusion. The study uses an analytical and conceptual approach based on secondary data from RBI reports, industry publications, academic journals, and reliable online sources, with descriptive analysis to understand current trends. Digitalization has made financial services faster, cheaper, and more transparent and has reduced operational and transaction costs. FinTech innovations have supported cashless payments and wider outreach. At the same time, cybersecurity risks and low digital awareness in some areas still remain a challenge. The study provides useful insights for banks, insurance companies, and policymakers to develop secure and customer-friendly digital strategies and adds value to existing literature by offering a combined view of banking, insurance, and financial services transformation in India rather than treating them individually.

**Keywords:** Digital Technology, Banking, Insurance and Financial Services, Financial Inclusion, Indian Financial Sector, Digital Transformation.

# Deep Learning–Driven Iterative Multi-Objective Optimization for Sustainable and Waste-Free Additive Manufacturing

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The rapid adoption of additive manufacturing (AM) has highlighted critical challenges related to material waste, energy consumption, and process sustainability. To address these issues, this paper proposes an iterative deep learning–driven multi-objective optimization framework aimed at enabling sustainable zero-waste additive manufacturing. The proposed framework integrates real-time process data with deep learning models to predict key manufacturing outcomes, including material utilization, mechanical performance, surface quality, and energy efficiency. A multi-objective optimization strategy is employed to iteratively refine process parameters, balancing conflicting objectives such as waste minimization, production time, and part quality. Feedback from each manufacturing cycle is used to continuously update the learning model, enhancing prediction accuracy and adaptability to varying materials and geometries. Simulation and experimental results demonstrate that the proposed framework significantly reduces material waste and energy usage while maintaining or improving product performance compared to conventional parameter-selection approaches. The study establishes a scalable and intelligent decision-support system for next-generation additive manufacturing, contributing to the realization of environmentally sustainable and zero-waste industrial production.

**Keywords:** Additive Manufacturing, Deep Learning, Multi-Objective Optimization, Zero-Waste Manufacturing, Sustainable Production

**From Traditional to Disruptive: A Study of Innovative Business Models Driving sustainable growth**

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Digital gold is an emerging and an innovative investment tool that enables an individual to purchase and hold gold in electronic form through digital applications. It offers aneasy and cost effective option to physical gold which can be purchased in very small quantities. In today's current time of digitalisation and globalisation where inflation is very high, digital gold provides investors a chance to grow their savings in this financial system which is globally connected. Earlier, physical gold was used as source of storing value. Digital gold being a recent invention lacks popularity, uniform rules and regulations, physical ownership, reliability and long term performance which indicates a significant research gap. This paper aims to analyse and evaluate more pathways to make it trustworthy, easily accessible and acceptable for all income groups and age groups. The aim is to make it more popular among youngsters and make them aware about it. The research is conceptual and comparative. It is based on secondary data collected from research journals, articles, books and government platforms. The study reveals that digital gold is seen asaffordable and highly liquid asset. It supports shared ownership and easy transactions. Digital gold creates new ways of earning income, reduces financial risk arising from price fluctuations. It redefines asset ownership theories, add new dimensions in the field of gold investment, and contributes to digital economy theories. The originality of this paper lies in its focused study of digital gold as an emerging and under-researched investment term. This research paper contributes to deeper understanding of digital investment methods, offering insights that may facilitates decision making and policy formation in the field of commerce and finance.

**Keywords:** Digital Gold, Gold Investment, Digitalization, SharedOwnership, Asset Ownership.

# The Impact of Sustainable Marketing on Gen Z Purchase

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The Impact of Sustainable Marketing on Generation Z's Purchase Intention. This research investigates the relationship between sustainable marketing strategies and the purchase intentions of Generation Z (Gen Z) consumers, a demographic increasingly defined by its commitment to social and environmental activism. As the first generation of true digital natives, Gen Z possesses a unique ability to scrutinize corporate transparency, making them more sensitive to "green washing" than their predecessors. This study explores how key dimensions of sustainable marketing—specifically environmental responsibility, social equity, and economic transparency—influence the psychological drivers behind consumer behavior.

Utilizing a quantitative approach through structural equation modeling, the research analyzes the mediating roles of brand trust and perceived value. The findings suggest that Gen Z's purchase intention is not merely driven by the functional attributes of a product, but by the alignment of a brand's values with their personal identity. While traditional marketing emphasizes price and quality, this study highlights that for Gen Z, sustainability acts as a primary differentiator. Brands that demonstrate a genuine, long-term commitment to ESG (Environmental, Social, and Governance) criteria see a significant increase in brand loyalty and word-of-mouth advocacy.

However, the research also reveals a critical "intention-behavior gap"; while Gen Z expresses a strong preference for sustainable options, factors such as price sensitivity and product accessibility remain significant barriers. The study concludes that for sustainable marketing to effectively convert intention into action, brands must bridge the gap between ethical aspiration and practical affordability. These insights provide a strategic roadmap for marketers looking to engage the $360 billion+ purchasing power of Generation Z by moving beyond superficial "green" claims toward authentic, value-driven brand narratives.

# डॉ. सत्यभामा आदिल की कहानियों में पर्यावरण चेतना का स्वरूप और संवेदनात्मक अभिव्यक्ति

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समकालीन हिन्दी कथा-साहित्य में पर्यावरणीय चेतना एक महत्वपूर्ण विचारणीय प्रवृत्ति के रूप में सामने आया है। डॉ. सत्यभामा आदिल की कहानियाँ इस संदर्भ में विशेष रूप से उल्लेखनीय हैं, क्योंकि उनमें प्रकृति और मानव जीवन के गहरे अंतर्संबंध को संवेदनात्मक स्तर पर अभिव्यक्त करने का प्रयास किया गया है। उनकी कहानियों में पर्यावरण केवल भौतिक परिवेश के रूप में उजागर नहीं होता, बल्कि अस्तित्व, सांस्कृतिक मूल्यों और सामाजिक संतुलन का आधार बनकर मानव जीवन में उजागर होता है। डॉ. आदिल की कहानियाँ अधिकतर आधुनिक विकास की अंधी दौड़, उपभोक्तावाद तथा प्राकृतिक संसाधनों के अति-दोहन से उत्पन्न पर्यावरणीय संकटों की ओर इंगित करती हैं। वे ग्रामीण जीवन, लोक-संस्कृति और प्रकृति के सहजीवी संबंध को निर्देशांक करते हुए यह स्पष्ट करती हैं कि प्रकृति से विमुखता मनुष्य को सामाजिक और नैतिक विघटन की ओर ले जाती है। उनकी रचनाओं में पेड़, जल, भूमि, ऋतु और प्राकृतिक परिवेश जीवंत धाराओं के रूप में उपस्थित होकर पाठक में संवेदना, आत्मीयता और संरक्षण-बोधात्मक प्रवृत्ति का विकास करते हैं।

इन कहानियों की मूलभावना यह है कि पर्यावरण संरक्षण का संदेश प्रत्यक्ष उपदेश के रूप में नहीं, बल्कि मानवीय अनुभव, स्मृति और संवेदनात्मक गतिविधि के माध्यम से व्यक्ति होता है।
इस प्रकार डॉ. सत्यभामा आदिल का कथा-साहित्य बहुआयामी प्रकृति को जीवन-मूल्यों से जुड़ते हुए पाठक को प्रकृति के प्रति जिम्मेदार और सजग बनने की प्रेरणा देता है। उनकी लेखनी पर्यावरण चेतना को साहित्यिक संवेदना और सामाजिक दायित्व के रूप में स्थापित करता है।

**मुख्य शब्द:** पर्यावरण चेतना, प्रकृति-मानव संबंध, हरियाली, समकालीन हिन्दी कहानी, लोकजीवन, सांस्कृतिक संवेदना, प्रकृति-सतर्क दृष्टि।

**Blockchain-Enabled Green Finance: Examining the Role of Distributed Ledger Technology in Sustainable Investment Strategies and ESG Compliance**

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The integration of financial innovation and sustainability needs has led to radical change in the world of investments. The paper explores the key crossroads between blockchain technology and green finance and will explore how a distributed ledger can contribute to transparency, accountability, and efficiency in sustainable investment strategies as well as improve the compliance framework of Environmental, Social, and Governance (ESG).

Based on empirical data on the new and developed economies, this paper will use a mixed approach based on quantitative investigation utilizing blockchain-linked green bond markets and qualitative research examining instances of institutional adoption. The study answers three basic questions: (1) How does the blockchain technology reduce the risks of greenwashing in sustainable finance? (2) How can distributed ledgers minimize the cost of transactions and information asymmetries in investments that meet ESG requirements? (3) What are the ways to change regulatory frameworks and take the potential of blockchains to advantage?

We find that blockchain-based solutions exhibit great capabilities in real time ESG information validation and that smart contracts would lead to lower costs of compliance, estimated by about 30-40 percent relative to non-blockchain systems. The paper establishes that the tokenization of green assets is a key process of democratizing sustainable access to investment, especially amongst retail investors and institutional players in developing economies. Moreover, we record the effect of the immutable audit trails which are characteristic of distributed ledger technology to increase the credibility of stakeholders and enable the cross-border flow of green capital.

The study also helps in the clearance of literature since it introduces an integrated conceptual scheme, synthesizing the distributed ledger technology capabilities with sustainable finance goals. We create a taxonomy of blockchain applications in greener bonds, climate finance instruments, and impact investment vehicles, which is offering empirical standards to

which financial institutions that operate in the context of digital transformation of sustainability can orient themselves.

There are implications to policymakers that seek to create regulatory sandboxes to support fintech innovation, financial institutions that look to adopt blockchain solutions to support the energy consumption spectrum, and other international development organizations that must find scalable mechanisms to mobilize climate finance. The paper ends by giving practical recommendations on standardization of blockchain protocols in green finance, interoperability issues and setting up governance models that preclude incentivizing innovations at the cost of systemic risks management.

The paper contributes to the development of the academic discussion at the intersection of financial sustainability and technological disruption with economic resilience-directly consistent with the sustainable development, digital transformation, and responsible business operation aspects that the conference has focused on.

**Keywords:** Environmental Financing, Cryptocurrencies, GHG Reporting, Investment sustainability, DLA, Blockchain, Financial Technology, Regulatory Technology, DX.

**_Andrographis paniculata_ for Potential Immunomodulator Activity in COVID-19**

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The aimed of current review to COVID-19 pandemic has intensively disrupted global health, economics, and well-being. *Andrographis paniculata* (Burm. f.) Nees has been used as a complementary treatment for COVID-19 in several Asian countries. aimed to summarize the information available regarding *A. paniculata* and its constituents, to provide critical points relating to its pharmacological properties, safety, and efficacy, revealing its potential to serve as a source of lead compounds for COVID-19. A. paniculata and its active compounds possess favorable antiviral, anti-inflammatory, immunomodulatory, and antipyretic activities that could be beneficial for COVID-19 treatment. *A. Paniculata* specially target the white blood cell and inhibit the production of T-Cell result in improvement of Immune system. A. paniculata alone or in combination was superior to the placebo in reducing the severity of upper respiratory tract infection. the safety of *A. paniculata*, as discussed in this review, support the argument that A. paniculata is a promising natural source for drug discovery regarding COVID-19 post-infectious treatment, rather than prophylaxis.

**An Empirical Study on Technology Adoption in Tourism and Travel**

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This empirical study examines the adoption of technology in the tourism and travel industry and its impact on operational efficiency and customer experience. The rapid growth of digital tools such as mobile applications, online booking platforms, artificial intelligence, and digital payment systems has transformed the way tourism services are delivered and consumed. The study aims to identify the factors influencing technology adoption among tourism service providers and travellers. Primary data is collected through structured questionnaires from travel agencies, tourism businesses, and tourists. The study analyses the level of awareness, usage, and perceived benefits of technology in tourism operations. It also evaluates how technology improves service quality, accessibility, and customer satisfaction. The findings reveal that technology adoption enhances efficiency, reduces operational costs, and improves communication between service providers and customers. However, challenges such as lack of technical skills, high implementation costs, and resistance to change are also observed. The study highlights the importance of digital literacy and infrastructure in promoting technology adoption. It also examines the role of government initiatives and digital platforms in supporting tourism development. Statistical tools such as percentage analysis and graphical representation are used for interpretation. The results show a positive relationship between technology adoption and business performance in tourism. Technology also contributes to better decision-making through data analysis and customer feedback. The study concludes that technology adoption is essential for competitiveness and sustainability in the tourism sector. It recommends that tourism businesses invest in modern technologies and training programs. Overall, technology plays a crucial role in transforming and modernizing the tourism and travel industry.

# The Impact of Green Marketing on Consumer Buying Behaviour: A Conceptual Framework

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In recent decades, environmental concerns such as climate change, pollution, resource depletion, and global warming have significantly influenced consumer behaviour across the world. As awareness regarding sustainability increases, businesses are shifting from traditional marketing practices to environmentally responsible strategies known as green marketing. The present study aims to examine the concept, evolution, importance, and major determinants of green marketing, along with its influence on consumer buying behaviour. The paper is conceptual in nature and based on secondary data collected from research articles, journals, and scholarly sources. It further proposes a conceptual framework identifying environmental, economic, psychological, demographic, and social factors affecting green purchase intentions. The findings suggest that green marketing positively influences consumer decisions when supported by awareness, affordability, trust, and effective communication strategies.

**Keywords**: Green Marketing, Consumer Behaviour, Sustainable Development, Green Products, Purchase Intention

**Comprehensive Assessment of Harmful Heavy Metals in Contaminated Soil and Groundwater in the Industrial Area of Raigarh Chhattisgarh, India**

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This paper primarily focuses on a comprehensive study of the industrial area of Rai-garh, Chhattisgarh. The aim of the report is to analyze the spatiotemporal variation in groundwater and soil quality around selected industrial areas of Raigarh, Chhattisgarh State.The study focuses on parameters such as pH, conductivity, hardness, alkalinity, temperature, and heavy metals. Various analytical techniques, including atomic ab-sorption spectroscopy, instrumental methods, and titration, were employed for the analysis of these parameters. Samples were collected from five different locations within the Raigarh industrial area. The primary aim of the research is to analyze the pollutants present in water and soil. The study is expected to be useful in maintaining the quality of water and soil in the industrial area and will also benefit farmers and other stakeholders in the region. This study will support industrial units in reducing the release of polluted solid and liquid waste. The environmental landscape of Rai-garh is burdened by significant pollution attributed to coal-related activities, resulting in elevated concentrations of substances such as fluoride (F), arsenic (As), lead (Pb), mercury (Hg), selenium (Se), and cadmium (Cd). Recent investigations have high-lighted contamination of groundwater resources and soil samples in Raigarh, adversely impacting the safety of the water supply in Raigarh city.

# Technological Challenges and Problems of Small and Marginal Farmers in Raipur City Nearest Villages

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**ABSTRACT**

India's agricultural backbone—small and marginal farmers managing over 86% of the nation's farmland—paradoxically struggles with technological advancement while shouldering the responsibility of national food security.

**OBJECTIVE**

To identify and analyze the technological problems and challenges encountered by small and marginal farmers in the study area.

**METHODOLOGY**

This study uses a mixed-method approach, combining literature review and primary field research. Data was collected from small and marginal farmers in villages near Raipur through structured questionnaires and personal interviews. The data was analyzed using thematic and statistical methods to identify key technological challenges.

**MAJOR FINDINGS**

Small and marginal farmers near Raipur have low adoption of modern agricultural technologies due to high costs, limited credit access, and small landholdings. Traditional irrigation methods and low digital usage continue because of poor technical knowledge and internet access. Although farmers are aware of schemes like PM-KISAN, Kisan Credit Card, and Pradhan Mantri Krishi Sinchayee Yojana, complex procedures limit their full benefits.

**CONCLUSIONS**

The study concludes that stronger government support, easy loan availability, simplified subsidy procedures, affordable equipment, and better training programs are necessary to help small and marginal farmers adopt modern agricultural technologies in villages near Raipur.

**Ethno Medicinal Plant**

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Ethnobotanical plants play a crucial role in traditional healthcare systems, livelihoods, and cultural practices of indigenous and local communities. These plants have been used for centuries to treat various diseases, provide nutrition, and support daily life. Ethnobotanical knowledge is usually transmitted orally across generations and reflects the deep relationship between humans and nature. In recent years, scientific research has validated many traditional plant uses, leading to the discovery of bioactive compounds and new pharmaceuticals. However, rapid urbanization, habitat destruction, and loss of traditional knowledge threaten the conservation of ethnobotanical resources. Therefore, documentation and sustainable utilization of ethnobotanical plants are essential for biodiversity conservation, drug discovery, and cultural preservation. Integrating traditional knowledge with modern scientific approaches can contribute significantly to sustainable development and healthcare advancement.

**Nutritional Management Strategies for Lactose Intolerance of Chhatisgarh**

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Lactose intolerance is a common gastrointestinal condition characterized by the inability to digest lactose due to lactase enzyme deficiency, leading to symptoms such as bloating, diarrhea, abdominal pain, and flatulence. With increasing awareness of digestive health and changing dietary patterns, lactose intolerance has emerged as a significant nutritional concern affecting quality of life across different age groups. Effective nutritional management plays a crucial role in minimizing symptoms while ensuring optimal nutrient intake, particularly calcium, vitamin D, and protein.

This dissertation explores comprehensive nutritional management strategies for lactose intolerance, emphasizing individualized dietary modifications rather than complete dairy exclusion. Key approaches discussed include the use of lactose-free and low-lactose dairy products, incorporation of fermented dairy foods, enzyme supplementation, and the strategic selection of non-dairy calcium-rich alternatives. The role of food processing techniques, meal planning, and gradual lactose tolerance development is also examined. Additionally, the study highlights the importance of nutrition education and label reading in empowering individuals to make informed food choices.

By integrating scientific evidence with practical dietary interventions, this work underscores that lactose intolerance can be effectively managed through balanced nutrition without compromising nutritional adequacy. The findings aim to contribute to improved dietary guidelines and promote a sustainable, symptom-free lifestyle for individuals with lactose intolerance.

# A Mathematical Framework Using Ordinary Differential Equations and Generative Artificial Intelligence for Healthcare Data Analysis

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The use of Ordinary Differential Equations (ODEs) combined with Generative Artificial Intelligence (AI) offers significant potential for transforming the analysis of medical and hospital data. ODEs are particularly effective for modeling dynamic systems that change over time, including disease progression, patient treatment responses, and infection spread. By integrating ODEs with generative AI models, it becomes possible to simulate realistic patient health patterns, predict disease trajectories, create synthetic datasets, and enhance clinical decision-making. This paper examines the synergy between ODEs and generative AI in medical data analysis, outlining their applications, challenges, and advantages. It also emphasizes their contributions to personalized medicine, early detection of diseases, and efficient allocation of healthcare resources.

**Keywords:** Healthcare data analysis, Differential equation modelling, Ordinary Differential Equations, Generative Artificial Intelligence, Mathematical modeling.

# पर्यटन उद्योग को बढ़ावा देने में छत्तीसगढ़ की उद्योग नीति 2024 की भूमिका

बॉबी राजपूत
पत्रकारिता और जनसंचार विभाग, अंजनेया विश्वविद्यालय, रायपुर, छत्तीसगढ़
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छत्तीसगढ़, भारतीय उपमहाद्वीप के मध्य स्थित एक राज्य है, जिसे 1 नवंबर 2000 को मध्यप्रदेश से विभाजित कर एक नया राज्य बनाया गया। यह राज्य प्राकृतिक संसाधनों, ऐतिहासिक स्थल, और सांस्कृतिक धरोहर से भरपूर है। छत्तीसगढ़ का पर्यटन क्षेत्र हाल के वर्षों में तेजी से विकसित हो रहा है, और राज्य के विकास में इसका महत्वपूर्ण योगदान देखा जा रहा है। पर्यटन न केवल आर्थिक दृष्टि से महत्वपूर्ण है, बल्कि इस राज्य की सांस्कृतिक और ऐतिहासिक पहचान को भी बढ़ावा देता है।

छत्तीसगढ़ की उद्योग विकास नीति 2024–30 राज्य की अर्थव्यवस्था में संरचनात्मक परिवर्तन लाने की दिशा में एक महत्वपूर्ण पहल है, जिसमें पर्यटन उद्योग को विकास के प्रमुख स्तंभों के रूप में मान्यता दी गई है। इस नीति के तहत पर्यटन गतिविधियां—जैसे होटल, रिसॉर्ट, इको-टूरिज्म, वेलनेस सेंटर, एडवेंचर टूरिज्म, होम-स्टे तथा सांस्कृतिक पर्यटन—को औद्योगिक स्तर प्रदान कर उन्हें वित्तीय एवं पर्यावरणीय प्रोत्साहन के दायरे में शामिल किया गया है। परिणामस्वरूप, पर्यटन परियोजनाओं को पूंजी अनुदान, ब्याज सब्सिडी, कर-रियायतें, स्टाम्प शुल्क में छूट तथा आधारभूत संरचना सहयोग जैसे लाभ उपलब्ध कराए जा रहे हैं।

नीति का एक प्रमुख उद्देश्य राज्य के प्राकृतिक एवं सांस्कृतिक प्रावधानों— पर्यावरणीय बस्तर और सरगुजा जैसे आदिवासी एवं पिछड़े क्षेत्रों—का सतत एवं समावेशी विकास सुनिश्चित करना है। इसके माध्यम से निजी निवेश को आकर्षित करने, सार्वजनिक-निजी भागीदारी (PPP) मॉडल को प्रोत्साहित करने तथा सिंगल विंडो सिस्टम द्वारा स्वयंसेवकों को सरल बनाने पर बल दिया गया है। यह नीति पर्यटन अवसंरचना के विस्तार, प्रयागराज आतिथ्य सेवाओं के विकास और ग्रामीण एवं सामुदायिक पर्यटन को बढ़ावा देने की दिशा में भी महत्वपूर्ण भूमिका निर्धारित करती है। साथ ही, यह नीति रोजगार सृजन, कौशल विकास और महिला एवं युवा सशक्तिकरण पर विशेष ध्यान केंद्रित करती है, क्योंकि पर्यटन क्षेत्र श्रम-प्रधान होने के कारण प्रत्यक्ष एवं अप्रत्यक्ष दोनों प्रकार के रोजगार उत्पन्न करता है। पर्यावरण संरक्षण, हरित ऊर्जा के उपयोग और जिम्मेदार पर्यटन के सिद्धांतों को अपनी नीति सतत विकास की अवधारणा को भी खोलती है। अत: उद्योग नीति 2024–30 पर्यटन क्षेत्र को औद्योगिक परिवेश में समाहित कर राज्य की अर्थव्यवस्था में विविधीकरण, क्षेत्रीय संतुलन और सामाजिक-आर्थिक प्रगति को सुनिश्चित करने का प्रभावी माध्यम सिद्ध हो रही है।

# ऑनलाइन शिक्षण के दौरान शिक्षक-विद्यार्थी अंतः क्रिया का अधिगम गुणवत्ता पर प्रभाव

संगीता साहू, निधि शुक्ला

शिक्षा विभाग, अंजनेया विश्वविद्यालय, रायपुर, छत्तीसगढ़

वर्तमान डिजिटल युग में ऑनलाइन शिक्षण शिक्षा व्यवस्था का एक महत्वपूर्ण अंग बन चुका है। इस परिवर्तित शैक्षिक परिदृश्य में शिक्षक-विद्यार्थी अंतः क्रिया अधिगम गुणवत्ता के निर्धारण में केंद्रीय भूमिका निभाती है। प्रस्तुत अध्ययन का उद्देश्य ऑनलाइन शिक्षण के दौरान शिक्षक-विद्यार्थी अंतः क्रिया के अधिगम गुणवत्ता पर प्रभाव का विश्लेषण करना है।

अध्ययन में वर्णनात्मक सर्वेक्षण पद्धति का उपयोग किया गया। नमूना चयन हेतु उच्चतर माध्यमिक स्तर के वि द्याथियों को यादृच्छिक नमूना तकनीक के माध्यम से चुना गया। डेटा संकलन के लिए अधिगम गुणवत्ता मापन स्केल तथा शिक्षक-विद्यार्थी अंतः क्रिया प्रश्नावली का प्रयोग किया गया। प्राप्त आंकड़ों का विश्लेषण माध्य, मानक विचलन, सहसंबंध गुणांक तथा । परीक्षण जैसी सांख्यिकीय तकनीकों द्वारा किया गया। अध्ययन के निष्कर्षों से यह स्पष्ट हआ कि ऑनलाइन शिक्षण के दौरान प्रभावी एवं नियमित

शिक्षक-विद्यार्थी अंतःक्रिया विद्यार्थियों की अधिगम गुणवत्ता को सकारात्मक रूप से प्रभावित करती है। जिन कक्षाओं में शिक्षक दवारा समय पर प्रतिक्रिया शंकाओं का समाधान, प्रोत्साहन एवं सक्रिय सहभागिता सुनिश्चित की गई, वहाँ विद्यार्थियों की शैक्षणिक उपलब्धि, समझ का स्तर तथा विषय के प्रति रुचि में उल्लेखनीय वृद्धि देखी गई। इसके विपरीत, सीमित या एकतरफा संचार से अधिगम की गुणवत्ता प्रभावित पाई गई।

अतः यह निष्कर्ष निकाला जा सकता है कि ऑनलाइन शिक्षण की सफलता केवल तकनीकी साधनों पर निर्भर नहीं है, बल्कि शिक्षक-विद्यार्थी के बीच सार्थक, दविपक्षीय एवं सहयोगात्मक अंतः क्रिया अधिगम गुणवत्ता के विकास में महत्वपूर्ण भूमिका निभाती है। इसलिए ऑनलाइन शिक्षण में संवादात्मक रणनीतियों, नियमित प्रतिपुष्टि तथा सहभागितापूर्ण गतिविधियों को प्राथमिकता दी जानी चाहिए।

मुख्य शब्दः ऑनलाइन शिक्षण, शिक्षक-विद्यार्थी अंतः, क्रियाकलाप गुणवत्ता, प्रतिपुष्टि, माध्यमिक शिक्षा।

# A Study of a Hybrid Cryptography Digital Signature Schemes for Post Quantum Secure Communication

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The rapid advancement of quantum computing poses a significant threat to classical public key cryptographic systems such as RSA and ECC, which rely on the hardness of integer factorization and discrete logarithm problems. With the development of large-scale quantum computers, algorithms like Shor's algorithm can efficiently break these traditional schemes, compromising digital security. To address this emerging challenge, post-quantum cryptography (PQC) has been introduced to design cryptographic algorithms resistant to quantum attacks. However, transitioning directly from classical to post-quantum systems presents compatibility, performance, and security concerns.

This study focuses on hybrid cryptography digital signature schemes that combine classical digital signatures with post-quantum signature algorithms to achieve enhanced security and backward compatibility. The hybrid approach ensures that even if one cryptographic component is compromised; the overall system remains secure. The research analyzes various post-quantum digital signature candidates such as lattice-based, hash-based, and multivariate-based schemes, and evaluates their integration with conventional algorithms. Performance metrics including key size, signature size, computational efficiency, and implementation feasibility are examined to determine their suitability for secure communication systems.

The proposed study highlights the importance of hybrid digital signature mechanisms in securing sensitive communications in sectors such as e-governance, banking, defense, and IoT networks. It concludes that hybrid cryptographic frameworks provide a practical and secure transitional solution toward quantum-resistant communication infrastructures.

**Standardization of Drug Regulatory Practices in the Global Era**

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In the modern globalized world, the pharmaceutical industry has expanded beyond national boundaries, making the standardization of drug regulatory practices increasingly important. Differences in regulatory requirements among countries often lead to delays in drug approval, increased development costs, and unequal access to safe and effective medicines. Standardization aims to harmonize regulatory frameworks so that pharmaceutical products can be evaluated, approved, and monitored using consistent scientific and ethical principles across regions. The global era has witnessed the emergence of international organizations such as the World Health Organization (WHO), International Council for Harmonisation (ICH), and regional regulatory authorities that promote uniform guidelines for drug development, clinical trials, quality control, and post-marketing surveillance. Harmonized standards help ensure drug safety, efficacy, and quality while reducing duplication of testing and regulatory efforts. This not only accelerates the availability of new medicines but also strengthens public health protection worldwide.

Standardization of regulatory practices also supports global trade and collaboration by building mutual trust among regulatory agencies. It enables developing countries to strengthen their regulatory systems by adopting internationally accepted norms, thereby improving patient safety and regulatory efficiency. Moreover, uniform regulations enhance transparency, encourage innovation, and facilitate faster responses to global health emergencies such as pandemics. Despite its benefits, achieving complete standardization remains challenging due to differences in legal systems, economic conditions, and public health priorities among nations. However, continuous international cooperation, capacity building, and regulatory convergence efforts are paving the way toward a more unified global drug regulatory system. In conclusion, the standardization of drug regulatory practices is a vital step in the global era to ensure equitable access to quality medicines, promote innovation, and protect public health on a global scale.

**Detection of Silicosis and Pulmonary Tuberculosis Among Silica Dust Exposed Glass Industry Workers in Firozabad District**

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The glass and bangle industry in Firozabad employs a vast population exposed to hazardous silica dust. This prolonged exposure significantly increases the risk of silicosis and secondary pulmonary tuberculosis (silicotuberculosis). This study aimed to detect the prevalence of these conditions among workers in the Firozabad district. A cross-sectional study was conducted involving 70 workers. Clinical histories were recorded, and sputum and blood samples were collected. Diagnostic assessments included Gene-Xpert for Mycobacterium tuberculosis detection and ELISA for immunological profiling. Age, gender, smoking habits, and duration of silica exposure were analysed. The majority of the subjects were male (81%) and fell within the 41–50 age group (35.7%). While 41.4% were smokers, 58.6% were non-smokers. The overall positivity for silicosis was 55.7% (n=39), with the highest prevalence seen in those exposed for 2 to 5 years (72.7%). Gene-Xpert results revealed a high tuberculosis burden, with 70% (n=49) of the cases testing positive. Notably, workers with 2 to 5 years of exposure showed the highest TB positivity rate at 81.8%. Economic analysis indicated that 54% of the affected individuals were lower-class daily wage labourers, highlighting the socio-economic impact of these occupational diseases. The study underscores a high prevalence of silicotuberculosis among glass industry workers. Gene-Xpert and ELISA proved to be effective diagnostic tools for early detection. The findings suggest that the duration of exposure is a critical factor in disease progression, necessitating stricter occupational safety measures and regular health screenings for factory workers in Firozabad.

**Keywords:** Silicosis, Pulmonary Tuberculosis, Glass Industry, Gene-Xpert, Firozabad, Occupational Health

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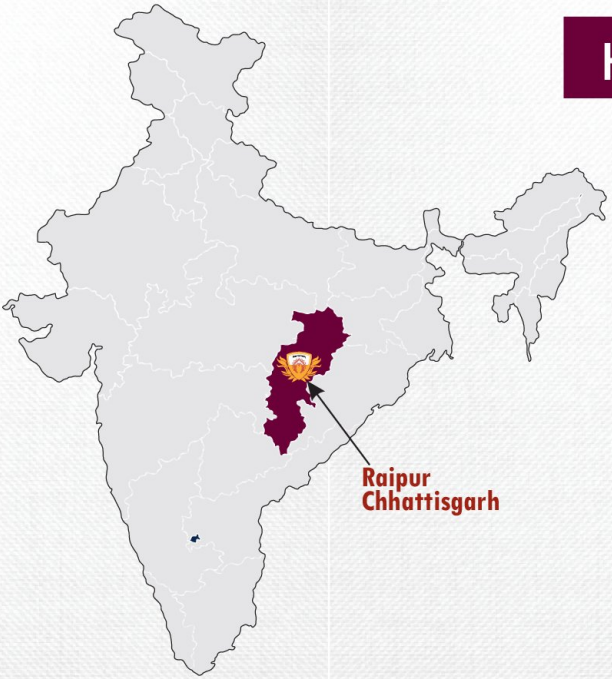


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