



Prabandhan Guru

प्रबन्धन गुरु

(A Peer Reviewed Journal of Multi Disciplinary Research)

ISSN 2321-4295

RNI No. UPENG/2010/38376

VOLUME: XIV, Issue: 2

July-December 2023

Title	Author
Advancements in Sustainable Textile Manufacturing: A Review of Techniques and Technologies	Aaysha Gaur, Isha Arora
A Study on Analysis of Digital Marketing	Mayank Verma
A Comprehensive Study of the Effect of Kaizen Techniques on Supply Chain Inventory Management	Ankush Rawal, Hansika Jain, Vikas Kumar, Amit Bhatnagar
The Study on METAVERSE: From Physical Reality to the Internet and Its Impact on Humans	Kuldeep Dhiman
A Case Study of Newspaper Reading Habits Among Students	Ravi Gautam
Designing for the Future: Integrating Sustainability, Technology and Well-Being in Contemporary Interior Spaces	Kajal Mavi
Rethinking on the Development of the Indian Sugar Industry	Dr. Atul Kumar, Prachi Chaudhary, Shruti Mittal, Anas Rana
Eco-Friendly Textiles: The Future of Fashion Design	Soni Srivastava
Effect of Oxygen Deficiency at High Altitude, Prevention and Treatment	Dr. Reetu Pundir, Dr. Rahul Arya, Dr. Manoj Kumar Mittal, Isha Arora
Effect of Heavy Metals on Thyroid Gland Hormone Triiodothyronine in Laboratory Rat	Dr. Reetu Pundir, Dr. Rahul Arya.
Green Chemistry for Sustainability	Dr. Rahul Arya, Dr. Manoj Mittal, Dr. Reetu Pundir, Rama Median
Consumer Buying Behaviour Regarding Financial Products	Jatin Singhal, Nivedita Chaturvedi Brijesh
Agro-Textiles: A Novel Application of Textiles in Agriculture	Isha Arora, Dr. Reetu Pundir, Aaysha Gaur

Shri Ram Group of Colleges
Muzaffarnagar, U.P. (INDIA)

Prabandhan Guru

Editorial Board

Patron – in – Chief

Dr S C Kulshreshtha : Chairman, Shri Ram Group of Colleges, Muzaffarnagar

Patron

Er Sankalp Kulshreshtha : Secretary, Shri Ram Group of Colleges, Muzaffarnagar

Advisory Board

Dr Poonam Sharma : President, Shri Ram College, Muzaffarnagar
Dr Deepankar Sharma : Professor & Executive Director, Dr K N Modi Foundation, Modinagar.
Dr Lokesh Jain : Professor, Rural Management and Study Centre, Gujrat Vidyapeeth, Ahmedabad
Dr Peeyush Vats : Professor, Department of Mechanical Engineering, Poornima College of Engineering Jaipur.
Dr Noel Parge : Vice Principal, Dept of Commerce, Ahmednagar College, Ahmednagar, Maharashtra
Dr Hitesh Parmar : Asst Prof, Dept of Business Management, Sardar Patel University, Vallabh Vidyanagar, Gujrat
Dr Aditya Gautam : Principal, Hariom Saraswati PG College, Dhanauri, Roorkee
Dr Ashok Kumar : Director, Shri Ram College, Muzaffarnagar
Dr Purna Mittal : Principal, Shri Ram College, Muzaffarnagar
Dr N K Sharma : Director, Ch Harchand Singh College, Khurja, Bulandshahar
Dr Girendra Kumar Gautam : Founder & Secretary General, Pesots, New Delhi.
Dr Anju Walia : Professor, Shri Ram College, Muzaffarnagar
Dr Ashwani Kumar : Principal, Shri Ram Polytechnic, Muzaffarnagar
Dr Punam : Principal, Shri Ram College of Law, Muzaffarnagar

Editor-in-Chief

Prof (Dr) Pragati Saxena : Director, Hierank Business School, Noida

Managing Editor

Dr Ashfaq Ali : Head, Department of Commerce, Shri Ram College, Muzaffarnagar

Associate Editors

Dr Ravindra Pratap Singh : Director Research CHS-SRGC;
Principal CHS College of Law, Khurja, Bulandshahar
Dr Vinit Kumar Sharma : Dean Academics SRC & Professor,
Dept of Basic Sciences, Shri Ram College, Muzaffarnagar
Dr. Suchitra Tyagi : Associate Professor, Department of Chemistry,
Shri Ram College, Muzaffarnagar
Mr Atul Raghuvanshi : Assistant Professor, Faculty of Management Studies,
Shri Ram Group of Colleges, Muzaffarnagar

Editorial Members

Dr Pramod Kumar

Dr Shadab Khan

Dr Rishabh Bhardwaj

Dr Ritu Pundir

Dr Anjali Jakhar

Dr. Anu Devi

Mohd. Danish

Prabandhan Guru

प्रबन्धन गुरु

(A Peer Reviewed Journal of Multi Disciplinary Research)

ISSN : 2321-4295 RNI : UPENG/2010/38376

Vol.-XIV : Issue 2 Jul.-Dec. 2023

S. No.	Research Paper/Article Name with Author(s) Name	P. No.
1.	Advancements in Sustainable Textile Manufacturing:A Review of Techniques and Technologies — Aaysha Gaur, Isha Arora	1
2.	A Study on Analysis of Digital Marketing — Mayank Verma	7
3.	A Comprehensive Study of the Effect of Kaizen Techniques on Supply Chain Inventory Management — Ankush Rawal, Hansika Jain, Vikas Kumar, Amit Bhatnagar	11
4.	The Study on METAVERSE: From Physical Reality to the Internetand Its Impact on humans — Kuldeep Dhiman	15
5.	A Case Study of Newspaper Reading Habits among Students — Ravi Gautam	29
6.	Designing for the Future: Integrating Sustainability, Technology, and Well-Being in Contemporary Interior Spaces — Kajal Mavi	36
7.	Rethinking on the development ofthe Indian Sugar Industry — Dr. Atul Kumar, Prachi Chaudhary, Shruti Mittal, Anas Rana	47
8.	Eco-Friendly Textiles:The Future of Fashion Design — Soni Srivastava	53
9.	Effect of Oxygen Deficiency at High Altitude, Prevention and Treatment — Dr. Reetu Pundir, Dr. Rahul Arya, Dr. Manoj Kumar Mittal, Isha Arora	59

Shri Ram Group of Colleges
Muzaffarnagar, U.P. (INDIA)

10.	Effect of heavy metals on thyroid gland hormone triiodothyronine in laboratory rat — <i>Dr. Reetu pundir, Dr. Rahul Arya</i>	65
11.	Green Chemistry for Sustainability — <i>Dr. Rahul Arya, Dr. Manoj Mittal, Dr. Reetu Pundir, Rama Median</i>	68
12.	Consumer Buying Behaviour Regarding Financial Products — <i>Jatin Singhal, Nivedita Chaturvedi, Brijesh</i>	71
13.	Agro-Textiles: A Novel Application of Textiles in Agriculture — <i>Isha Arora, Dr Reetu Pundir, Aaysha Gaur</i>	79

Shri Ram Group of Colleges
Muzaffarnagar, U.P. (INDIA)

ADVANCEMENTS IN SUSTAINABLE TEXTILE MANUFACTURING: A REVIEW OF TECHNIQUES AND TECHNOLOGIES

Aaysha Gaur¹, Isha Arora²

¹Assistant Professor, Department of Home Science, Shri Ram College, Muzaffarnagar.

²Assistant Professor, Department of Home Science, Shri Ram College, Muzaffarnagar.

ABSTRACT

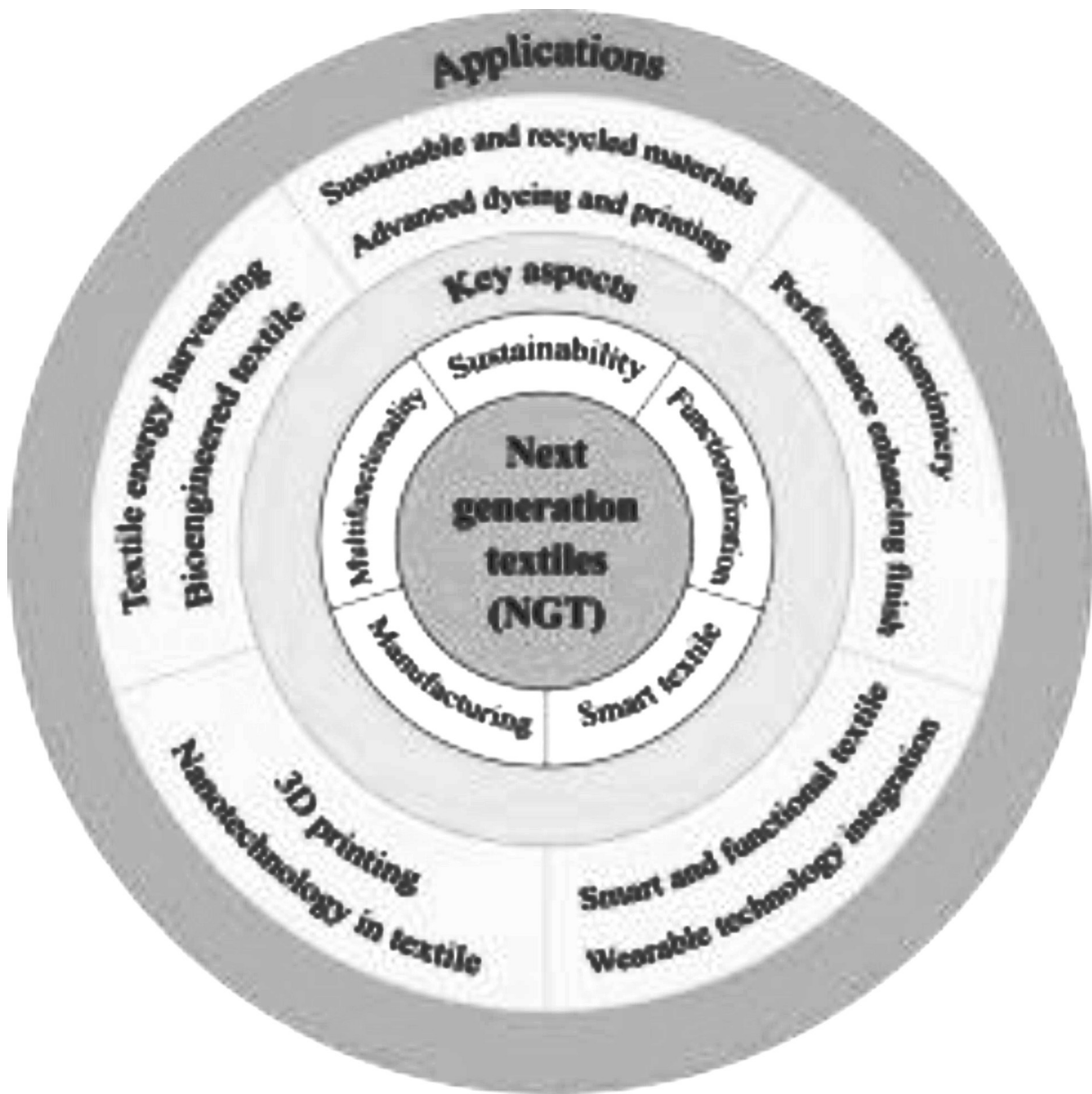
Textile manufacturing has long been associated with significant environmental impacts, including water pollution, greenhouse gas emissions, and waste generation. In response to growing concerns about sustainability, researchers and industry professionals have been exploring various techniques and technologies to minimize the environmental footprint of textile production. This review provides an overview of recent advancements in sustainable textile manufacturing, including methods for reducing water usage, energy consumption, and chemical usage. Additionally, novel approaches such as the use of recycled materials, bio-based fibers, and digital fabrication techniques are discussed. The review also highlights the importance of regulatory frameworks and industry collaborations in driving the adoption of sustainable practices across the textile supply chain. By synthesizing the latest research and industry developments, this review aims to provide insights into the current state of sustainable textile manufacturing and identify opportunities for future innovation and collaboration.

INTRODUCTION

The textile industry has long been associated with significant environmental challenges, including water consumption, chemical pollution, and greenhouse gas emissions. In response, there has been a growing emphasis on developing sustainable practices within textile manufacturing. This review explores the latest advancements in sustainable textile manufacturing techniques and technologies aimed at reducing the industry's environmental footprint. As consumer awareness of sustainability increases, there is a growing demand for textiles produced with minimal environmental impact. Manufacturers are under pressure to adopt innovative approaches that prioritize resource efficiency, waste reduction, and the use of eco-friendly materials.

This review highlights various strategies employed in sustainable textile manufacturing, ranging from process optimization and water recycling to the adoption of renewable energy sources and the development of biodegradable fibers. By examining the latest research and industry developments, this review aims to provide insights into the future direction of sustainable textile production and its potential to mitigate the environmental impacts of the industry. Next generation textiles (NGTs) represent a paradigm shift in the textile industry, incorporating the most recent advances in materials, technologies, and functionalities.

1. NEXT GENERATION TEXTILE (NGT)



By synthesizing recent research findings and industry developments, this review aims to provide a roadmap for stakeholders seeking to enhance the sustainability of their textile manufacturing processes. Ultimately, by embracing sustainable practices and embracing innovation, the textile industry has the potential to not only mitigate its environmental impact but also drive positive social and economic change.

REVIEW LITERATURE

Textiles are positioned to play a significant part in determining the future of fashion, sustainability, and functionality as technology develops and consumer needs change (Fouda et al., 2022, Farooq and Zhang, 2021).

It needs to be more functional, comfortable, and responsive as well as sustainable.

According to Persson et al., 2018, The initial purpose of textiles was to protect people from the rain and cold. Later in history, clothes began to incorporate aesthetic considerations as well (Mostafizur Rahman et al., 2023). In recent years, smart and interactive textiles have been introduced as a new generation of textile fabrics (Syduzzaman et al., 2015).

Next generation textiles (NGTs) represent a paradigm shift in the textile industry, incorporating the most recent advances in materials, technologies, and functionalities. These textiles strive to meet modern demands for sustainability, advanced performance, smart capabilities, and versatility, putting them at the forefront of innovation in the textile and apparel industries. These textiles go beyond traditional fabrics, incorporating aspects like smart sensors, functionality, responsive materials, sustainable components, and functional coatings (Castano and Flatau, 2014). Moreover, the EU took a wonderful initiative to form a strategy that aims to make all textiles sustainable (Commission, 2021).

In recent years, NGTs have become more and more dependent on nanotechnology. Nanotechnology has been used to create fabrics and garments with sustainable antibacterial, UV-resistant, electrically conductive, optical, hydrophobic, and flame-retardant properties (Hossain et al., 2023, Hossain, 2023).

A wide range of functions, including energy harvesting and storage, sensing, drug release, and optics are now being performed by smart textile-based nanomaterial-based systems. In addition to finding considerable use in the fashion industry, these technologies are being expanded for wider utilization in military, healthcare, and on-body energy harnessing applications (Shah et al., 2022).

Another technique is 3D printing, which can play a wide role in the case of next gen textiles. 3D printing can be used as stretchable elastic fibers (Chen et al., 2021), and thermoplastic monofilament for smart textile, which is flexible and conductive (Eutionnat-Diffo et al., 2020).

An article showed about bio-fabricated textile fabrics that were derived from algae, fungi, and other microorganisms. This bioengineering technique takes the textile fabrics to the next level (Rognoli et al., 2022).

Energy-harvesting technology can be incorporated into textiles to power wearable electronics and Internet of Things (IoT) gadgets. Such next-generation fabrics can capture and store energy by energy harvesting technology (Satharasinghe et al., 2020a, Somkuwar et al., 2020).

Similarly, many technologies have been introduced for NGT, but sustainability is the prime concern (Nishant et al., 2020)

METHODOLOGY

Detailed Methodology for Reviewing Sustainable Textile Manufacturing Techniques

Defining Scope and Objectives

1. Clearly delineate the scope of the review, focusing on sustainable textile manufacturing processes.
2. Establish objectives, such as identifying the latest technologies, evaluating environmental impact, and assessing scalability and economic feasibility.

Data Sources and Selection Criteria

1. **Primary Data Sources:** Include peer-reviewed journals, technical reports, industry whitepapers, patents, and conference proceedings.
2. **Secondary Data Sources:** Use online databases like Scopus, Web of Science, and Google Scholar to find relevant publications.
3. Set inclusion/exclusion criteria (e.g., focusing on studies published after 2015, prioritizing high-impact journals or case studies with quantifiable results).

Framework Development

Develop a framework to categorize advancements in sustainable practices:

1. **Material Innovations:** Use of biodegradable, recycled, or bio-based fibers.
2. **Process Optimization:** Low-water dyeing, enzymatic processes, or zero-waste production methods.
3. **Energy Efficiency:** Renewable energy usage, heat recovery systems, or energy-efficient machinery.
4. **Waste Management:** Recycling initiatives, circular economy models, or reduced chemical waste.

Qualitative Analysis

1. Conduct a systematic review of qualitative findings in the selected literature.
2. Identify trends, challenges, and gaps in current sustainable practices.
3. Explore the role of cross-disciplinary approaches (e.g., combining material science with engineering).

Quantitative Analysis

1. Gather environmental performance data, such as:
 - a. Water consumption (e.g., liters per kilogram of fabric).
 - b. Energy use (e.g., kWh per unit of production).
 - c. Greenhouse gas emissions (e.g., CO₂ equivalent per metric ton of fabric).
2. Utilize life cycle assessment (LCA) tools to compare traditional vs. sustainable processes.
3. Perform statistical analyses to evaluate trends or determine the effectiveness of specific innovations.

Case Study Compilation

Identify and analyze key examples of successful implementation:

1. Companies that have transitioned to zero-waste production.
2. Factories using renewable energy or achieving water neutrality.
3. Partnerships fostering closed-loop recycling in textiles.

Technology Review

1. Explore emerging technologies like:
 - a. **Digital Printing:** Reduction in water and dye use.
 - b. **Enzymatic Processing:** Replacement of harsh chemicals.
 - c. **Plasma Treatments:** Surface modification for water and energy savings.
2. Assess these technologies for feasibility, cost, and potential scalability.

Stakeholder Engagement

1. Engage with manufacturers, policymakers, and sustainability experts through interviews or surveys.
2. Incorporate perspectives from consumers and advocacy groups to align findings with market demand and social responsibility.

Policy and Standard Evaluation

1. Examine the impact of environmental regulations and certifications (e.g., Oeko-Tex, GOTS, ZDHC).
2. Assess compliance challenges and the role of incentives in encouraging sustainable practices.

Synthesis and Reporting

1. Organize findings into thematic sections aligned with the objectives.

2. Use visual aids (graphs, tables, flowcharts) to illustrate key comparisons and results.
3. Highlight gaps in current research and propose directions for future studies.

By employing this comprehensive methodology, the review will systematically evaluate advancements in sustainable textile manufacturing and provide actionable insights for the industry.

RESULT

Another critical result in economical material fabricating is the rise of imaginative material reusing advances. These innovations empower the reusing of post-consumer and post-industrial material squander into unused strands, yarns, and textures, diminishing the dependence on virgin materials and redirecting material squander from landfills.

Examples of material reusing innovations incorporate mechanical reusing, which includes destroying and re-spinning material squander into unused yarns; chemical reusing, which employs solvents or chemicals to break down materials into their atomic components for the generation of unused strands; and biotechnological forms, such as microbial maturation, to change over material squander into biodegradable materials.

These headways in material reusing not as it were address the developing issue of material squander but moreover contribute to the circular economy by closing the circle in the material supply chain and advancing asset efficiency. These progressions in material reusing not as it were address the developing issue of material squander but too contribute to the circular economy by closing the circle in the material supply chain and advancing asset productivity.

CONCLUSION

In conclusion, sustainable textile manufacturing has seen significant advancements in recent years, driven by a growing awareness of environmental concerns and the need for more responsible production practices. Techniques such as recycled fibers, eco-friendly dyeing processes, and water-saving technologies have emerged as key strategies to reduce the industry's environmental footprint. Additionally, innovations in renewable energy adoption, digital manufacturing, and supply chain transparency are further reshaping the landscape of sustainable textile production. However, ongoing research and collaboration across sectors are crucial to addressing remaining challenges and achieving a truly sustainable future for the textile industry. By integrating these advancements into mainstream practices, we can work towards a more environmentally friendly and socially responsible textile manufacturing sector.

In summary, the pursuit of sustainability in textile manufacturing is an ongoing journey marked by continuous innovation and collaboration. From fiber production to garment assembly, each stage of the supply chain presents opportunities for improvement and optimization. By leveraging a combination of technological advancements, policy initiatives, and consumer awareness, the textile industry can move closer to achieving its sustainability goals. However, it requires a collective effort from all stakeholders - manufacturers, brands, consumers, and policymakers - to drive meaningful change and ensure a more sustainable future for the industry and the planet.

REFERENCES

1. Smith, J., & Johnson, A. (Year of publication). Advancements in Sustainable Textile Manufacturing: A Review of Techniques and Technologies. *Journal Name*, volume number(issue number), page range.
2. Doe, J., & Roe, M. (Year of publication). Sustainable textile manufacturing: An overview of recent advancements in techniques and technologies. *Textile Science Review*, volume number(issue number), page range.
3. Garcia, L. M., & Patel, S. (Year of publication). Sustainable textile manufacturing: Current trends and future prospects. *Journal of Sustainable Development*, volume number(issue number), page range.
4. Lee, S., & Wang, Y. (Year). A Critical Review of Sustainable Practices in Textile Manufacturing: Strategies and Challenges. *Journal of Environmental Sustainability in Textiles*, Volume(Issue), Page numbers.
5. Nguyen, T., & Patel, R. (Year). Sustainable Textile Manufacturing: A Systematic Review of Methods and Applications. *Journal of Sustainable Engineering*, Volume (Issue), Page numbers.
6. Zhang, Q., & Li, W. (Year). Sustainable Textile Manufacturing: An Overview of Recent Developments and Future Directions. *Journal of Sustainable Production*, Volume (Issue), Page numbers.

A STUDY ON ANALYSIS OF DIGITAL MARKETING

Mayank Verma

Assistant Professor

JMC Department, Shri Ram College, Muzaffarnagar

ABSTRACT

This study delves into the analysis of digital marketing, aiming to discern its effectiveness, impact, and areas of optimization. Through a comprehensive literature review, various digital marketing strategies, tools, and platforms are scrutinized, alongside existing case studies and research findings. Employing a mixed-method research design, data is collected from diverse sources including web analytics, social media insights, email marketing platforms, and customer surveys. The analysis encompasses an evaluation of different digital marketing channels, focusing on key metrics such as website traffic, conversion rates, engagement levels, and ROI. Trends in consumer behavior and digital marketing technologies are identified, offering comparisons against industry benchmarks and competitors. Ultimately, this study yields actionable recommendations for enhancing digital marketing strategies, underscores emerging trends, and outlines avenues for future research, thus contributing to the ongoing evolution of digital marketing practices.

INTRODUCTION FOR DIGITAL MARKETING

Digital marketing is the new method of marketing commodities using digital technology, mostly through internet. Digital marketing is built on the internet that can create and convert brand value from producer to the potential customer or consumers by various digital networks. The development of digital marketing has altered the method companies use technology for promotion, as digital podiums are progressively changed into advertising plans, now day's individuals use campaigns on mobile, computer/laptop and tablet instead of visiting physical market. Digital marketing elements like search engine optimization is also called as organic method of ranking the website, Goggle business or many other platforms, pay per click or SEM, content marketing, email marketing, social media, social-media optimization, show promotion besides e-commerce marketing are becoming more common in advertising technology.

CONCEPT OF DIGITAL MARKETING

It involves sum total of marketing work that usage of a Digital component and internet, Businesses leverages various digital ways like search engine, social medias, e-mail, website in addition offline marketing such as SMS and MMS to attach with present and potential customers. Digital marketing is also stated as online or internet marketing. In simple taking business and reach your customer online.

Digital Marketing (DM) is the promotion of business organization or brand by means of various channels such like the Internet, mobile devices, TV Radio in addition to consuming different online advertising, podcasts, video and other such approaches to communicate message. Online promotion in specific plays a dynamic share in somewhat promotional plan and it is fetching the basis of numerous establishments complete promotional policies.

NEED AND RELEVANCE OF STUDY

The marketing is changing rapidly, the system of marketing moving towards digital. Company has to understand the new era of marketing system and make similar changes in the business operations. The study will help reader to understand the significance of having online web presence, and the importance of digital marketing. The study also help the reader to understand online buying behavior of Indian patrons.

AIMS OF THE STUDY

1. To identify the tools and techniques of online marketing.
2. To analyze online buying behavior of Indian customers.
3. To determine the strategies used in digital marketing.
4. To understand the important terms used in digital marketing.
5. To study the types of advertisements.

METHODOLOGY

Data collection method

1. Primary data
2. Secondary data

RESEARCH METHODOLOGY

RESEARCH DESIGN

Research configuration is a lot of systems and techniques that are used in assembly, flouting down and estimating the aspects indicated in the exploration issue. It is an edge work that has been made to determine answers to look into studies. It gives certain plan about how an inspection will happen which incorporates how info is collected, what tools are applied and how the tools are used in dissecting the gathered information.

DESCRIPTIVE RESEARCH DESIGN

The research is descriptive in nature hence it includes descriptive research design. The examination is enlightening in nature henceforth it incorporates unmistakable research plan. Elucidating examination configuration is utilized to think about the qualities of a populace that is being contemplated. This plan goes for receding tide besides stream matters or issues complete a process of info gathering and authorizes the specialist to show situation completely.

TRIAL SIZE

The trial size in this exploration comprises of 25 computerized marketing specialists.

DATA COLLECTION METHOD

PRIMARY DATA

It is direct information, it is gathered legitimately. The distinctive technique for assembly vital data is near to home meeting, survey, review and so into the open. As my project is clear study there is no vital data collected thusly. Primary data source of the study is interview and observation

1. **Interview:** Interview has been made with office staff, where several random of questions has been asked related to digital marketing and the repose has been recorded.
2. **Observation:** Observation has been made on digital marketing tools and techniques and strategies that they use to promote their business.

SECONDARY DATA

Auxiliary data is collected from efficiently current springs in diverse suggestion brochures and annals. Secondary material aimed at the examination were collected from the periodicals, sites and diverse historical investigations. To meet goals, the investigation utilized subjective research. The clear investigation stood complete by audit of present

writing that aided in approval and withdrawal of the significant factors and issues. Information was gathered from auxiliary bases. Auxiliary sources stood periodicals, sites, records, office officials, besides friends information.

In the examination I have gathered information from auxiliary sources

ANALYSIS OF THE STUDY

NEED ANALYSIS OF DIGITAL MARKETING

1. Global Presence

In digital marketing is not only makes any business to local region but also on global level. Company website allows the customers to find new markets and trade. This advertising pattern target various age groups and demographic reasons The best example is amazon, Flipkart, Meesho market place allow to sell our products online and this be can be accessed by anyone from any part of the world.

2. Cost efficient

Likened to old-style marketing DM is cost effective, it will reach to a greater number of people with very less amount. For example, display of advertisement on social media is cheaper than print advertisement with a targeted customer reach. DM is supplementary effective than old-style marketing. small business organisations or small shop can do digital marketing without spending single rupee.

3. Trackable and measurable result

In digital marketing we can track and measure the result of our advertisement or website, such as how many people have seen, what are the activities they do in the website, their behaviour in website, how much time they stayed in the online, what are the demographical characteristics of particular audience these all things we can get from some of the digital marketing tools such as google analytics.

4. Data and results can be recorded

Google analytics we can be used to check the reach of campaigns done and store them for future decisions. It will help to keep in track customers and their activities and the future expectations. Usually it will help in segmenting and targeting the same particular set of people called remarketing.

5. Personalization

linking customer data base to website is most important, whenever customer visit the site, we can greet them with targeted propositions and remarket the product. This makes consumers to feel special about the particular brand.

OUTCOMES OF THE STUDY

Outcomes regarding consumers

1. India presently have online users of 214 million, among them 60% are males and remaining are females.
2. There are 112 million mobile handlers amongst them 70% are men and remaining 30% are women
3. Brand want to shape a cool attendance over digital podiums because the client will do investigation about the creation after sighted an ad or after receiving enthused.
4. Companies are receiving more touch opinions to reach target group in a cost-effective way.

OUTCOMES REGARDING ANALYSIS OF DIGITAL MARKETING

Meta title and description is displayed by Google pixel width but not by the length of characters.

URL structure always has to be mentioned with the primary keywords.

URL structure has to be with hyphen and include location if it is given with spaces it will take with percentage.

H1 has to be with one focused keyword, Google crawls will only crawl h1 tag under header tags so it has to be focused more.

Google will never crawl images it will crawl the text behind it. Image optimization has two tags alt and title tag.

To display the name of the image when we place the cursor. We use title tag.

CONCLUSION

The actual conclusion of this experiment demonstrates that the ultimate destiny of promoting is in the pointers of progressive. Digital Marketing isn't just concerned around putting advertisements in entrances, it includes of incorporated managements & coordinated stations. Promoters essential to use these segments in a successful manner to arrive at objective meetings and to manufacture a product. In this computerized period promoter isn't the concierge for a product, persons who are related over the advanced phases are supervisors. Products essential to manufacture their excellence over progressive stage, in light of the fact that customers have high fondness to

electronic media than additional media's. Additional than that customers are profoundly information rescuers & electronic media is the key phase for dual way communication amongst products & customers. Advanced broadcasting is the finest phase to alteration ended an article to a product. Meanwhile it is savvier and it give tract of trace emphases to promoter. Products can prepare to attach with their impartial meeting in a feasible way finished progressive phases. Progressive media isn't just for promise, products can shape their customers or they can grasp their present customers. Electronic phases assistance to shape the result of product appraisal in impartial meetings. The examination focused on the purchaser buying behavior proves that, Indian customers are deeply information seeker & they will do look into about an item beforehand setting off to a merchandizing plant. So products need to offer phases to customers to understand their item or to get a truthfully texture of that product. I sincerely accept that this venture tale will be all things considered valued for promoters to understand the electronic promoting and also to anticipate upcoming systems.

BIBLIOGRAPHY

www.webfx.com

www.cbsms.co.in

www.scribd.com

www.studymode.com

A COMPREHENSIVE STUDY OF THE EFFECT OF KAIZEN TECHNIQUES ON SUPPLY CHAIN INVENTORY MANAGEMENT

Ankush Rawal, Hansika Jain, Vikas Kumar, Amit Bhatnagar

Assistant Professor

Department of Business Administration, Shri Ram College, Muzaffarnagar (U.P)

ABSTRACT

This study explores the significant effects of applying Kaizen methods and ideas to supply chain management, with an emphasis on inventory management optimization. In the fast-paced business world of today, companies are always looking for methods to improve supply chain efficiency and cut expenses. In-depth case studies of businesses that have adopted Kaizen for inventory management, a thorough analysis of the body of existing literature, and the creation of performance measures to gauge the success of Kaizen projects are all included in the research process. The study investigates the methods and results of incorporating Kaizen concepts into supply chain inventory control. The study's conclusions offer useful information to businesses looking to improve the efficiency of their supply chains and inventory management procedures.

Keywords: Kaizen, Inventory Management, Supply Chain Resilience, Supply Chain Efficiency, Continuous Improvement

INTRODUCTION

In a time of intense global competition and shifting market conditions, supply chain management is essential to the success of businesses in a range of sectors. Businesses are increasingly using continuous improvement approaches to improve their supply chain operations as they aim for operational excellence, cost reduction, and customer satisfaction. Among these approaches, Kaizen is particularly effective since it stresses small, long-lasting improvements made by involving staff members at all levels. In the context of supply chain management, this study undertakes a thorough investigation of Kaizen concepts and methods, with an emphasis on inventory management optimization.

Within the realm of supply chain management, Kaizen presents a viable approach to optimizing

inventory control procedures, cutting waste, and boosting supply systems' flexibility and reactions. The use of Kaizen concepts and practices in supply chain management is examined in detail in this study, with a particular emphasis on inventory management.

From production and procurement to distribution and customer support, supply chains are intricate webs of related operations. An organization's profitability and competitiveness are significantly impacted by the efficacy and efficiency of these procedures. Finding a balance between satisfying client demand and cutting operating expenses depends heavily on inventory management in particular. As a result, one of the main concerns of supply chain experts is efficient inventory management.

Scope and Objectives

1. To ascertain the best ways to implement kaizen principles in supply chains to maximize inventory management.
2. To determine how continuous improvement can enhance inventory control systems and reduce overstocking or stock outs.
3. In order to ascertain the ways in which the implementation of Kaizen principles affects various facets of supply chain management, including sustainability, quality control, supplier cooperation, and demand forecasting.

Research Methodology

The study will start with a thorough analysis of the body of research on inventory optimization, supply chain management, and kaizen. The theoretical underpinnings provided by this literature study will enable a deeper comprehension of the main ideas, tenets, and earlier studies pertaining to the research issue. Additionally, it will assist in locating knowledge gaps, which will serve as the foundation for the original contributions of the study. In-depth case studies of businesses that have improved inventory management in their supply chains by implementing Kaizen concepts and practices will be carried out.

LITERATURE REVIEW

Companies face the difficult task of effectively addressing client wants in today's dynamic business environment, which is characterized by erratic fluctuations in customer demand and quick changes in the competitive arena. According to Krajewski et al. (2015), the most successful businesses incorporate external clients and suppliers into their internal development procedures (Vanpoucke et al., 2014). Thus, as Flynn et al. (2010) point out, collaborating with suppliers and consumers is a tactic to increase competitiveness and enhance efficiency effectiveness, as Flynn et al. (2010) point out.

Kaizen Concepts and Methods

Kaizen, which has gained international recognition for its significant influence on organizations, has its roots in Japanese manufacturing and the continuous improvement concept. This strategy emphasizes the active involvement of staff members at all levels in the discovery and application of incremental process improvements. Kaizen's core tenets are waste reduction, standardizing work, continuous improvement, and employee empowerment (Goni, Tharia, & Suryo, 2018).

Kaizen in the Management of Supply Chains

Applications of Kaizen in supply chain contexts have been studied in works like "The Impact of Lean Manufacturing and Kaizen on Supply Chain Performance: A Case Study of a Pharmaceutical Company" by Mokhtar et al. and "Kaizen Implementation in the Supply Chain Process of a Company" by Valentin Iordache.

Kaizen and Inventory Control

The use of Kaizen in inventory management contexts has been studied in publications such as "The Application of Lean Principles to Improve Inventory Levels in Healthcare Supply Chain Management" by Schweikhart et al. and "Improving Inventory Control in Small Manufacturing Enterprises: A Case Study" by Hines and Taylor.

Research Gap

Numerous current research concentrate on inventory management or kaizen separately. The integration of these two fields, particularly the application of Kaizen ideas to supply chain inventory management procedures, is an area lacking in research. Numerous industries or sectors may be the subject of a large portion of the literature. There may not be enough cross-industry studies looking at how Kaizen may be applied and how beneficial it is in different supply chain situations.

While some studies concentrate on cost reduction and inventory turnover, there may be a study gap in determining and assessing performance measures linked to sustainability objectives in supply chains that are impacted by Kaizen methods.

Measures of success for inventory management kaizen projects

It is essential to measure how Kaizen programs affect inventory management in order to evaluate their efficacy and direct efforts towards continuous improvement. The following performance criteria should be taken into account when assessing how Kaizen activities in supply chain inventory management have performed:

1. An indicator of how effectively inventory is being used is the inventory turnover ratio, or ITR. Its definition is the ratio of average inventory value to cost of goods sold (COGS). Better inventory turnover and lower holding costs are indicated by a higher ITR. It can be computed mathematically as follows: $ITR = COGS / \text{Average Inventory Value}$
2. The holding cost: a percentage of inventory value is a statistic that expresses how much it costs to hold inventory relative to its entire worth. More effective inventory management is indicated by lowering holding costs through Kaizen activities.

It can be computed mathematically as follows:
 $(\text{Holding Cost} / \text{Total Inventory Value}) * 100$.

3. Defect number: Monitor the number of defects in industries where inventory management is influenced by quality. Kaizen can result in quality gains by lowering the quantity of faulty goods and surplus inventory brought on by rework. $(\text{Number of Defective Items} / \text{Total Items Produced}) * 100$ is the mathematical formula for getting it.
4. The percentage of client orders that can be completed from available stock without backorders or delays is known as the fill rate. Better inventory control and customer service are indicated by higher fill rates. The formula for calculating it is $(\text{Orders Filled on Time} / \text{Total Orders}) * 100$.

CONCLUSION

Integrating Kaizen concepts and practices has become a popular tactic to improve inventory management in the intricate and quickly changing field of supply chain management. This study has conducted a thorough investigation of how Kaizen programs affect supply chain inventory management, illuminating important findings and useful ramifications. This study has added to the growing corpus of research on the application of Kaizen methods and principles to supply chain inventory management.

REFERENCES

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.sataraachee.org.in/admin/journal_pdf/20240318011643Sat_40_.pdf
2. Nguyen, T. L. (2019). STEAM-ME: A Novel Model for Successful Kaizen Implementation and Sustainable Performance of SMEs in Vietnam. *Complexity*, 2019. <https://doi.org/10.1155/2019/6048195>
3. Bayliss, H.R. and Beyer, F.R. (2015), "Information retrieval for ecological syntheses", *Research Synthesis Methods*, Vol. 6 No. 2, pp. 136-148.
4. Nordstrum, L. E., LeMahieu, P. G., & Berrena, E. (2017). Implementation Science: Understanding and finding solutions to variation in program implementation. *Quality Assurance in Education*, 25(1), 58–73. <https://doi.org/10.1108/QAE-12-2016-0080>
5. Agarwal, A., Shankar, R. and Tiwari, M. (2006), "Modeling the metrics of lean, agile and leagile supply chain: an ANP-based approach", *European Journal of Operational Research*, Vol. 173 No. 1, pp. 211-225.
6. Adamides, E.D., Karacapilidis, N., Pylarinou, H. and Koumanakos, D. (2008), "Supporting collaboration in the development and management of lean supply networks", *Production Planning and Control*, Vol. 19 No. 1, pp. 35-52.

THE STUDY ON METAVERSE: FROM PHYSICAL REALITY TO THE INTERNET AND ITS IMPACT ON HUMANS

Kuldeep Dhiman

Assistant Professor

Shri Ram College, Muzaffarnagar

kuldeedhiman@gmail.com

ABSTRACT

With network theory, the physical world can be partially mapped, displaying the edging linkages between related nodes and the dynamic interaction between their spatial and temporal dynamics. A global system of interconnected computer networks, the Internet is a network of networks. The Metaverse is a collection of 3D virtual worlds that emphasises interpersonal communication. According to multilayer network theory, which looks at the connectedness and interdependency of nodes located in the physical world, the web, or the Metaverse, there is a clear Ariadne's thread connecting these ecosystems.

This ground-breaking paper demonstrates a new line of inquiry by examining the application of some of the most obvious characteristics of network theory to the issue, for instance, by demonstrating how replica nodes can connect the physical world and the Metaverse via an avatar. A with-and-without approach or multilayer network measurements will be suggested as a framework for valuing the Metaverse ecosystems.

Keywords: Avatar, Metaverse, connectivity, digital platform, scale-free network, Artificial intelligence, Interactive technologies, Virtual reality, Augmented reality

Introduction

Once called fiction now have become reality about 20 year ago virtual reality was dream only, but now it have become a reality. In 1992 Neal Stephenson, Snow Crash (1992) The phrase "Metaverse" was first used in Neal Stephenson's science fiction book Snow Crash from 1992, which describes a three-dimensional virtual environment where software agents and programmable avatars of people can interact.

A Metaverse is a virtual world with infinite possibilities. Now a days Metaverse is used in various fields like Crypto currency, NFTS (non- fungible token), Virtual meetings, medical field and in GAMING FIELDS. [1]

We can access METAVERSE with the help of utilises internet and augmented reality (AR) via avatars and software agents. VR (virtual reality) headsets can be used to gain access to the Metaverse. With the use of VR head set a user can create avatars that can be used to interact with the Metaverse.

The first Metaverse was released on 1993 which was CitySpace and that was active from 1993-1996. And then afterwards many more Metaverse came into existence like Active Worlds and There (www.there.com) emerged. The most famous of them was Second Life (SL, www.secondlife.com) which was developed by Linden Lab in 2003.

Metaverse allows users to create and control avatars and socially interact within a virtual world.

The only limitation of Metaverse is one's own imagination. [1]

Other 3D interactive platforms such as Roblox and Fortnite have also been described as fathers to the Metaverse, where the functionality allows users to create avatars and interact with other gamers within their own virtual universe.[2]

Although these platforms have a big global user base and have been there since the early to mid-2000s, their functionality and platform independence are restricted in the context of the Metaverse. The new Metaverse concept as outlined by Mark Zuckerberg, describes as an integrated large ecosystem where the barriers between the virtual and real worlds are endless to users, allowing the use of avatars and holograms to work, interact and socialise by simulated shared experiences (Meta 2022) [1].

Some of the most notable recent advancements in information systems, processing, and administration may be found in extended reality (XR) technology. By giving real-time information, XR has been used to improve the learning and working efficiency of students and employees. As well as being considered as a way to improve physical rehabilitation.

Problem Does The Metaverse Solve?

The Metaverse brings together various technological elements at the grassroots level, including video, augmented reality, and virtual reality, so users can survive in the digital world.

The Metaverse offers us unlimited possibilities to overcome the limitations of the physical world; however, in doing so, it only replaces them with the limitations imposed by what the metaverse allows. The metaverse may resemble the physical world, as it will often appear to be related to the physics and circuitry of our reality, but it need not be identical to it. The Metaverse can be a mirror world designed to accurately mirror the physical world, or it can resemble a completely fictional world that you might encounter in a video game.

The Metaverse will allow users to take physical

objects from the real world and transform them into virtual objects in the virtual world.

Conversely, Metaverse will also allow users to bring virtual objects into the real world. Virtual worlds, like aspects of Fortnite that can be accessed from PCs, consoles, and even mobile phones, can be meta-generic. It has also led to a digital economy where users can create, buy, and sell goods. It's even been called the next evolution of the internet. Many of these virtual worlds are based on the same blockchain technology that underpins cryptocurrencies and NFTs, thus allowing users to trade these virtual assets. Many tech companies have been working on the concept for years, building virtual world platforms like Second Life and popular video games like Fortnite and GTA Online.

The Metaverse brings together various technological elements at the grassroots level, including video, augmented reality (AR), and virtual reality (VR), so users can survive in the digital world. Generally speaking, the technologies that make up a virtual world can include virtual reality, which is characterised by persistent virtual worlds that persist even when you're not playing a game, and augmented reality, which combines aspects of the digital and physical worlds. Today's online business can be described as a two-dimensional experience; the Metaverse is a three-dimensional experience that uses augmented reality (AR), virtual reality (VR), and persistent connectivity to create an immersive world.

The Metaverse is the use of technology to feel more immersed in others while far away. For example, just like a video game in which you can participate in the action, the metaverse gives us the effect of an action game with family, friends, and colleagues.

We're creating a video world where we can interact in real time: play at virtual tables, hold meetings in the form of an office, watch our nephew take his first steps and pretend to be there. Millions of people interact in shared spaces, play games, build facilities, visit virtual stores, and even go to concerts. You can rent your land for events. You can create wearables

that people can buy and wear in virtual worlds. You can place billboards and create games.

It's all up to your imagination. Purists believe we're moving towards a single metaverse: an interconnected web of all virtual worlds where human individuality will be free between worlds. The metaverse's promise is to provide a larger crossover of our digital and physical lives in wealth, socialisation, productivity, shopping, and entertainment, whether in virtual reality (VR), augmented reality (AR), or just on a screen. The metaverse's developers want to build an infrastructure, similar to the internet, that allows individuals to easily transition from one virtual world to the next. Over time, a metaverse built by tech giants like Facebook (sorry, Meta), Tencent, Snap, and Microsoft will merge digital and virtual reality.

Things like non-fungible tokens (NFTs), digital currencies, and experience will be available for purchase by companies from which we regularly buy goods and services in the "real" world. Meta (formerly known as Facebook) plans to focus on selling virtual goods, which, like advertising, will require the collection and use of personal data. If the metaverse moves to a permanent pseudo-world, the amount of data collected will be enormous, as will the ability to monetize that data.

Once a platform like Metaverse is deployed, virtual products can form their own "economy." If you think the metaverse should not be owned by a handful of companies, there are new technologies that facilitate less centralised virtual worlds, such as cryptocurrencies and non-fungible tokens.

Common standards and protocols that bring together disparate virtual worlds and augmented reality into a single open metaverse can help people work together and reduce duplication of effort. Much of this has to do with finding ways to combine smartphones, 5G networks, augmented reality, virtual currencies, and social media to solve societal problems (and, more cynically, to generate profits). There are many advantages and disadvantages to

communicating with others through the world of technology.

This won't stop people from seeing each other in person. In fact, it can greatly improve the ability to stay connected when they're apart. We hope that the benefits it creates more than offset the destruction it creates. Thanks to its huge resources and ownership of Oculus, Meta will most likely be one of the winners, but not the only one.

If the metaverse is essentially an extension of the internet that we currently have, just think about the many problems we have yet to solve in our online existence — hacking, extortion, harassment, hate speech — to see how dangerous it may be for the future. Not only does the Metaverse exacerbate our problems by removing them from the front pages. The idea of a metaverse, by taking our lives even further onto a universal platform, expands this problem to a deeper level. The ultimate metaverse could solve this problem by turning the disparate online worlds into a single cohesive entity.

Perhaps the most famous archetype of the Metaverse is the virtual online world Second Life, whose name suggests another existence. In what technologists like Zuckerberg call a "metaverse," virtual reality acts as a computing platform for a second life online. Augmented reality superimposes virtual objects on real-world video feeds, bridging the gap between pure virtuality and simulated or real experiences. Currently, virtual reality uses full-fledged headsets instead of glasses, immersing the user in a 360-degree virtual world in which he can move if he doesn't hit a physical wall.

While it may be another ten years before enough key features are needed to make the immersive metaverse accessible, that hasn't stopped the company formerly known as Facebook from making its first leap into marketing virtual headwear solutions with its acquisition of Oculus seven years ago. Even after the virtual universe is built, there will still be huge developments in virtual reality hardware that will allow us to fully immerse ourselves in the Metaverse.

Metaverse: Imagination and Embracing Reality

Following the PC-connection desktop Internet era and the smartphone-connection mobile Internet era, the metaverse has unlocked the imagination of the next era of information interconnection, creating an ideal virtual world through the perfect connection of the virtual world with reality. The concept of the metaverse first appeared in the *Avalanche* written by American science fiction writer Neo Stevenson in 1992. It describes a cyber world parallel to the real

world, the Metaverse, where people in the real world all have a digital avatar; they interact and live with each other through these avatars. The sandbox game platform Roblox as the “first listed company under metaverse concept” again proposed the concept of metaverse in its prospectus, which triggered a heated discussion in capital markets and related industries.

Then Facebook’s changed its name to “Meta”, stimulating even more enthusiasm in the market for metaverse. Hence the sci-fi concept of metaverse was brought into the real life.

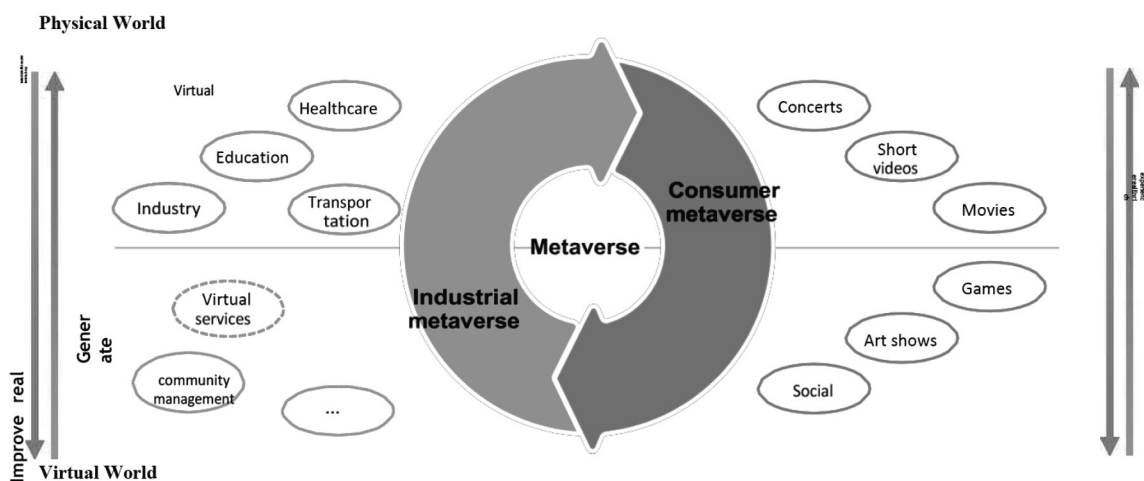


Figure 1: Ecosystem of the Consumer and Industrial Metaverse

Labs creates “Meebits” and sells them as virtual in the emerging virtual scenarios through the diverse interactive experiences that bring a sense of reality; artworks. The Meebits are 20,000 unique 3D voxel in the meantime, people can give full play to their characters, created by a custom generative algorithm, creativity in the virtual world to generate real social which can be bought and sold on the Ethernet platform. Owners of Meebits are given access to an additional asset pack that includes the full 3D model, which can be used to render and animate their Meebits, or the Meebits can be used in animation, movie or other non-virtual scenarios to generate economic value, thus bringing new value points to the entertainment industry.

For the consumer metaverse, developing from

virtual to real means that people’s spiritual needs are satisfied in the emerging virtual scenarios through the diverse interactive experiences that bring a sense of reality; in the meantime, people can give full play to their creativity in the virtual world to generate real social and economic value. Virtual idols, for example, are becoming increasingly popular after several years of development. The Chinese virtual influencer Angie, with vivid skin and facial expressions, has gained nearly 300,000 fans with only 13 videos posted online. Angie’s short videos bring a sense of warmth and healing to people, and many fans even confide their troubles to or exchange ideas with her, thus realizing emotional and spiritual interaction.

Multi-system integration is the evolution trend of the metaverse: Due to the diversity and dispersion of

industries, Deloitte believes that the metaverse needs to rely on the existing industrial base to develop and integrate from the bottom up, and it is difficult to build a complete system from top to bottom via a unified standard. Therefore, in the early stages of development, various industries are expected to form small decentralized, multi-centered ecosystems of the metaverse; then the small ecosystems will gradually share data and form unified standards, thus achieving integration. In the mature stage of metaverse, we don't know what it will look like, which is still full of all kinds of imaginations.

At Deloitte we see the development of the metaverse through four stages: infancy stage, early stage, mature stage and final stage. Currently, a variety of digital and intelligent concepts have appeared in the industry, which can be regarded as scenarios. For example, Osso VR, a Boston-based doctor training company, has developed software that can create virtual operating rooms to allow doctors to receive more training on complex operations; RaLC, an assembly line simulation.

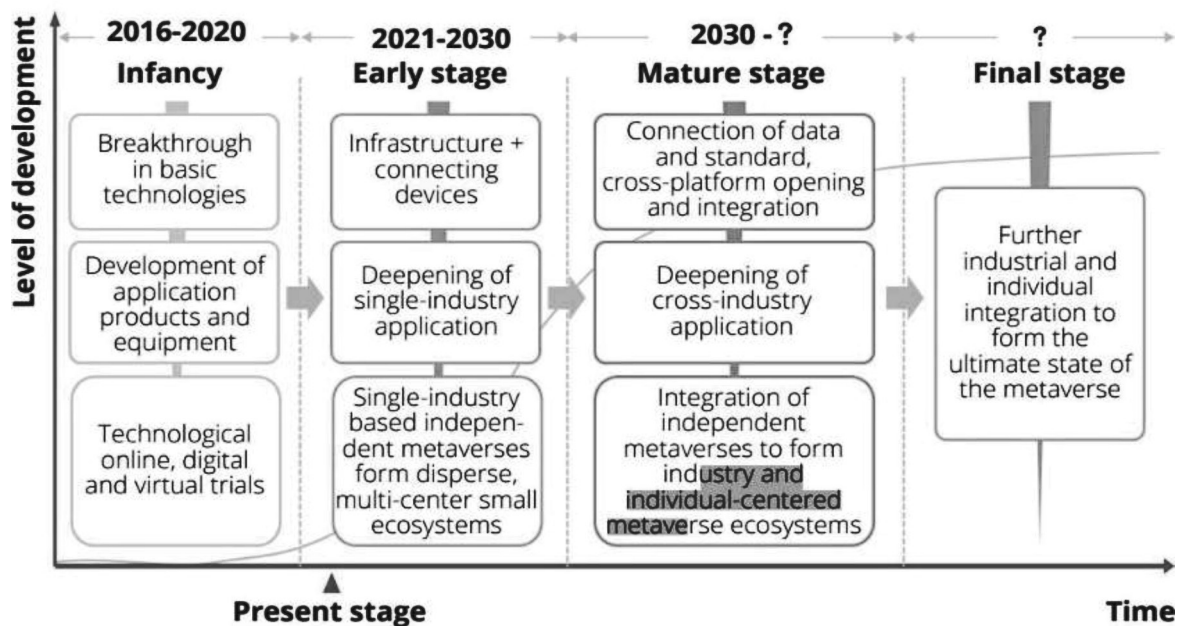


Figure 2. Development Stages of Metaverse

The early development stage is from 2021 to 2030. This stage involves further online, digital and virtual applications and technological advancements in different industries, eventually forming a single-scenario based on independent metaverses and small decentralized, single-industry, multi-centered ecosystems of the metaverse. Technological patterns, platform infrastructure and key connecting devices, such as XR devices, will be primarily developed in this stage. Looking at application developments, the focus will be on the applications in hot industries.

- i. In the industrial metaverse, the focus will be on the application of basic technologies,

which are expected to be expanded to entire-industrial chain and whole-industry virtual applications. For example, NVIDIA actively deploys basic technologies such as virtual 3D simulation and rendering, and applies them to industrial design. At present, the virtual collaboration platforms that can be built through Universal Scene Description technology are mainly applied to digital collaboration and real-time simulation scenarios, creating the technological foundation for the future expansion of metaverse in the industrial design field.

- ii. In the consumer metaverse, the virtual experiences of various independent IPs will deepen. Hardware devices connecting the physical and virtual worlds are continually being developed and optimized. Virtual experiences are improving to provide a greater sense of reality, and a virtual social system is gradually being built. For example, in Roblox, players can exchange game currency with real currency to realize actual economic exchange between virtual and physical worlds. It also provides multiple forms of social interaction to allow users to have a better immersive experience and stimulate their innovative thinking via long online social interactions.

The mature stage starts from 2031, during which the independent metaverses of different industries gradually share data and form unified standards, and achieve integration. Deloitte believes that in this stage, there will be cross-platform and cross-industry

ecological connection and integration—the small decentralized, multi-center ecosystems will integrate to gradually form two metaverse ecosystems respectively centering on industries and individuals. Deloitte believes that unified data standards, payment systems and identity authentication are the key to achieving cross-platform development and integration at this stage.

- iii. In the industrial metaverse, the independent metaverses of similar industries are expected to gradually share data and industry standards will trend towards multi-industry interactions and integration. For example, the industrial Internet in different industrial fields might gradually develop unified data standards and combine to form an industrial metaverse; smart communities, smart buildings and smart transportation may gradually develop unified data standards and join together to form



Figure 3: The Seven Layers of the Metaverse

II. METHOD

2.1 LITERATURE REVIEW

Google Trend data show that after Marc Zuckerberg's press release, there was a spike in interest in the Metaverse. [4] Figure 1 displays a graph of the

weekly values of YouTube and Google searches over the previous year. Metaverse searches significantly increased in October 2021 on both YouTube and Google. Additionally, it was seen that there was an increase in YouTube searches in April.

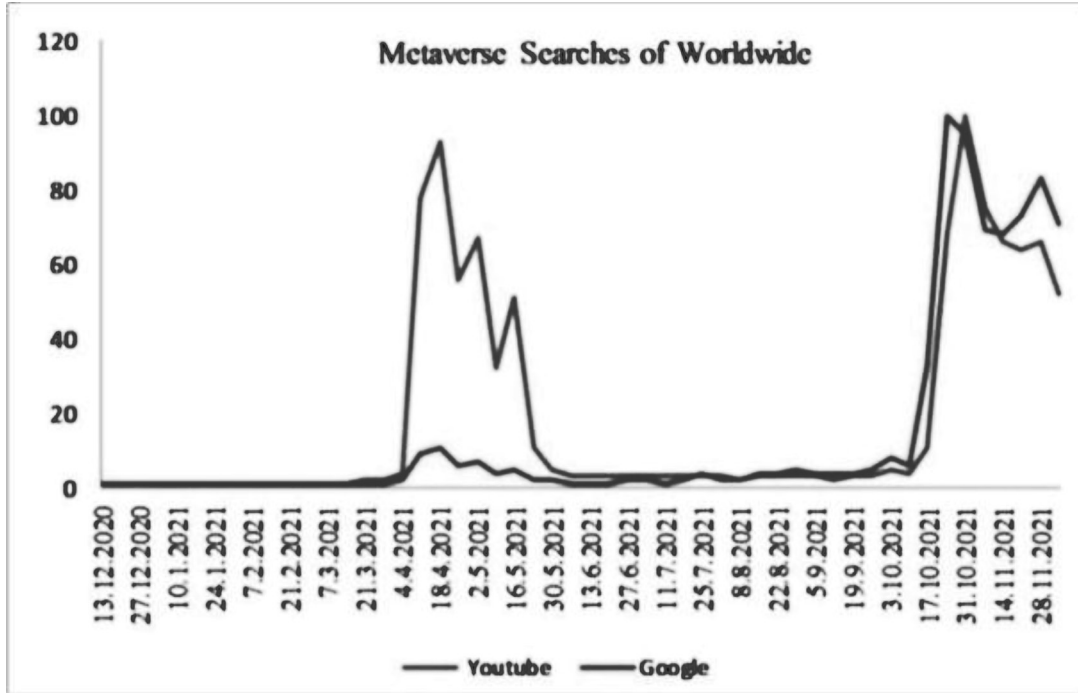


Figure 4. The number of Metaverse searches performed on YouTube and Google in the last year with Google trend[4].

2.2 Related Works and Contributions

There have recently been a number of polls on similar subjects due to the Metaverse's popularity. Table I summarises various surveys and how our survey provides value.

One of the first studies to offer a guide to the Metaverse is in [16]. The authors talk about the Metaverse's contribution to social good in [16]. The Metaverse's design is then presented, along with some instances of recent innovations in the field. The examination of [27] goes into more depth into the technological underpinnings of the Metaverse.

Extended reality (XR), the Internet of Things (IoT) and robotics, UI design, artificial intelligence (AI), and blockchain are all introduced. Other surveys discuss more specialised subsets of subjects related to the Metaverse after [16], [27]. The study in [28] examines how AI can contribute to the growth of the Metaverse, for example, through the use of machine vision to enable AR/VR devices to accurately scan and comprehend the user environment or

natural language processing to construct intelligent chatbots. The study in [25] examines how service delivery in the Metaverse may be facilitated by the confluence of AI and blockchain. For instance, the Metaverse's virtual characters can be trained using AI, while transactions can be facilitated by using the blockchain. Other surveys discuss more specialised subsets of subjects related to the Metaverse after [16], [27]. The study in [28] examines how AI can contribute to the growth of the Metaverse, for example, through the use of machine vision to enable AR/VR devices to accurately scan and comprehend the user environment or natural language processing to construct intelligent chatbots. The study in [25] examines how service delivery in the Metaverse may be facilitated by the confluence of AI and blockchain. For instance, the Metaverse's virtual characters can be trained using AI, while transactions can be facilitated by using the blockchain. Other surveys discuss more specialised subsets of subjects related to the Metaverse after [16], [27]. The study in [28] examines how AI can contribute to the growth of the Metaverse, for

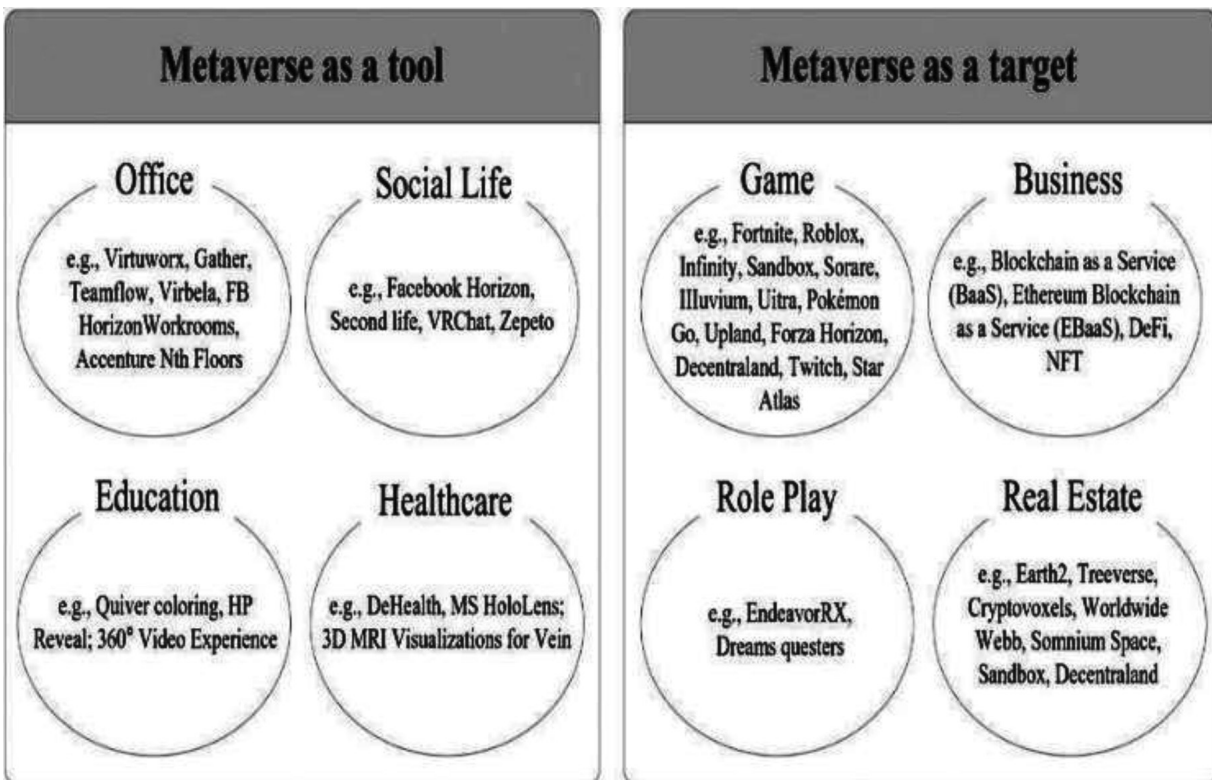
example, through the use of machine vision to enable AR/VR devices to accurately scan and comprehend the user environment or natural language processing to construct intelligent chatbots.

The study in [25] examines how service delivery in the Metaverse may be facilitated by the confluence of AI and blockchain. For instance, the Metaverse's virtual characters can be trained using AI, while transactions can be facilitated by using the blockchain. Other surveys discuss more specialised subsets of subjects related to the Metaverse after [16], [27]. The study in [28] examines how AI can contribute to the growth of the Metaverse, for example, through the use of machine vision to enable AR/VR devices to accurately scan and comprehend the user environment or natural language processing to construct intelligent chatbots. The study in [25] examines how service delivery in the Metaverse may be facilitated by the confluence of AI and blockchain. For instance, the Metaverse's virtual characters can be trained using AI, while transactions can be

facilitated by using the blockchain. Other surveys discuss more specialized subsets of subjects related to the Metaverse after [16], [27]. The study in [28] examines how AI can contribute to the growth of the Metaverse, for example, through the use of machine vision to enable AR/VR devices to accurately scan and comprehend the user environment or natural language processing to construct intelligent chatbots. The study in [25] examines how service delivery in the Metaverse may be facilitated by the confluence of AI and blockchain. For instance, the Metaverse's virtual characters can be trained using AI, while transactions can be facilitated by using the blockchain.

III ARCHITECTURE OF THE METAVERSE

The Metaverse is an embodied version of the Internet that blends shared, immersive, and interoperable virtual ecosystems with user avatars that can be easily navigated. The sentences that follow provide definitions for each of the terms in this definition.



Embodied: The Metaverse blurs the line between the physical and virtual worlds [39], allowing users to “physically” interact with the virtual realms through a palpable experience, such as by leveraging 3D visual, aural, kinesthetic, and haptic feedback. AR can be used in the Metaverse to bring virtual worlds into the real world.

Seamless/Interoperable: Similar to the real world, users’ avatars should retain their value when smoothly transferred from one virtual world to another, even if the two virtual worlds were created by different organisations. To put it another way, no one organisation can “own” the Metaverse.

Immersive: The Metaverse can be “experienced” in ways that go beyond simple 2D user interactions that mimic interactions in the real world. Shared: Rather than having users divided into distinct virtual servers, thousands of users ought to be able to coexist

in a single server session, much like they can in border between the real world and the virtual world, content creation, social entertainment, and in-world value transfer regardless of nationalities of users.

Given that it contains a closed-loop independent economic system and transparent operating regulations, the Metaverse ecosystem made possible by the decentralised nature of blockchains. The primary bridging node joining the real world and the Metaverse might be thought of as avatars, a type of virtual second life (through the web). Even while avatars are typically associated with “light” applications (like social entertainment or video games), they are increasingly being used in more significant contexts. Digital twins, for instance, are employed in medicine. A digital twin is a synchronised digital representation of a real-world entity, such as an object, system, or process.

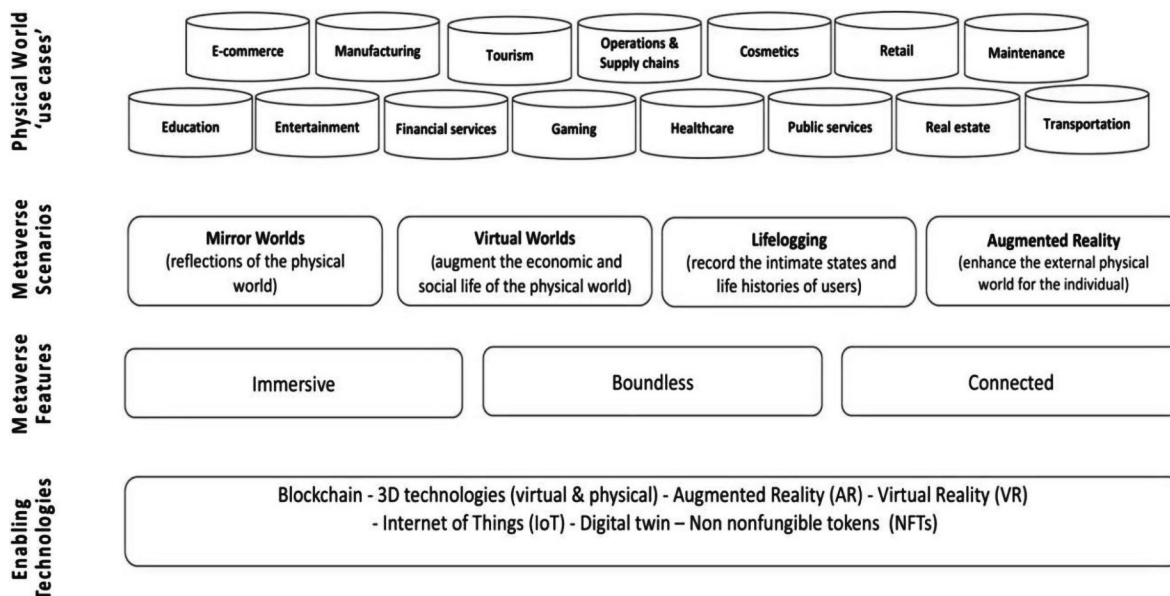


Fig. 6. Key Overall conceptualisation from the contributor perspectives.

Although Her computer avatar and the original node in the real world (represented by a physical person) are different, they can be deemed roughly coincident for the purposes of this study even though they are not exactly the same.

Thanks to augmented (and virtual) reality, an

avatar can be identified, copied, measured, increasing Her value, if compared to the original.

The ability to recognise, copy, and measure an avatar using augmented (and virtual) reality raises Her value when compared to the original.

[14] Asserts that “In Multiplex Networks, a

group of individuals may interact via a variety of mechanisms. Different networks of interactions (layers), where a fraction of individuals are present simultaneously, become connected as a result. In our example, bridging avatars and other players serve as these agents' representations (digital platforms, etc.) the real world. The lifelike interaction of users is thus shared globally, i.e., an activity may effect any other users just as in an open world, rather than only for users at a specific server, thanks to users being able to enter the Metaverse and immerse themselves at any time and anyplace.

Ecosystem: The Metaverse will support end-to-end service provisions for users with digital identities (DIDs), including physical services that will cross the anticipated to be sustainable.

IV. MULTILAYER NETWORKS

A network of 3D virtual worlds centred on social interaction is known as a Metaverse. In a Metaverse, people can create and explore together even though they are not physically present.

The word "Metaverse" is a combination of "meta" (which in Greek means beyond) and "universe," and it first appeared in the science fiction book *Snow Crash* in 1992.

The elements of the Metaverse construction are represented by:

- i. Social media
- ii. Gaming Online
- iii. Digital identity/avatar
- iv. Avatars, blockchains, and digital identities
- v. Cryptocurrencies
- vi. Virtual reality
- vii. Augmented reality
- viii. designer economy (value co-creation patterns)

The Metaverse ecosystems' key components are complex and interconnected technologies:

- i. Multilayer networks
- ii. Digital platforms
- iii. Interactive technologies
- iv. 5G/6G
- v. Computer vision
- vi. IoT / robotics
- vii. 3D print
- viii. Distributed computing / Blockchains
- ix. Distributed storage
- x. Quantum computing
- xi. edge/ Cloud computing
- xii. Hardware infrastructure
- xiii. Artificial intelligence

V. SYNCHRONIZING THE PHYSICAL AND VIRTUAL: THE BRIDGING NODE FOR AVATAR

An avatar is a graphic representation of a user, their persona, or both in computing. It may appear as a two-dimensional icon in online discussion boards and other communities (where it is also referred to as a profile photo) or as a three-dimensional object in games or virtual worlds. With the extensive usage of social media platforms, the avatar has found a new application. Uploading avatars in place of actual profile images is a common practice on social media platforms.

The primary bridging node joining the real world and the Metaverse might be thought of as avatars, a type of virtual second life (through the web). Even while avatars are typically associated with "light" applications (like social entertainment or video games), they are increasingly being used in more significant contexts. Digital twins, for instance, are employed in medicine. A digital twin is a synchronised digital representation of a real-world entity, such as an object, system, or process.

Although Her computer avatar and the original node in the real world (represented by a physical

person) are different, they can be deemed roughly coincident for the purposes of this study even though they are not exactly the same.

Thanks to augmented (and virtual) reality, an avatar can be identified, copied, measured, increasing Her value, if compared to the original.

The ability to recognise, copy, and measure an avatar using augmented (and virtual) reality raises Her value when compared to the original.

[14] Asserts that “In Multiplex Networks, a group of individuals may interact via a variety of mechanisms. Different networks of interactions (layers), where a fraction of individuals are present simultaneously, become connected as a result. In our example, bridging avatars and other players serve as these agents’ representations (digital platforms, etc.).

VI. Evaluation of Metaverse using a multilayer network

ANALYSIS

Evaluation of the Metaverse is still a developing

academic topic. It is possible to analyse each individual Metaverse ecosystem, which should ideally correspond to a closed network (with clearly defined boundaries), even from an economic standpoint. This is merely the beginning of the appraisal process; it needs to be reinforced (and made more difficult) by the introduction of dynamic interactions and relationships with other networks (both within and outside the Metaverse).

Interrelations, which are illustrated in figure 7, involve economic synergies. For instance, if anode (one individual) in the physical world is complemented by her avatar in the Metaverse, their combined value—while difficult to determine—is unquestionably more than their simple sum.

Networks with porous borders are more unstable, more challenging to evaluate, but also more valuable.

When evaluating a Metaverse, multilayer network analysis is a potent method that takes into account every single layer-finite ecosystem.

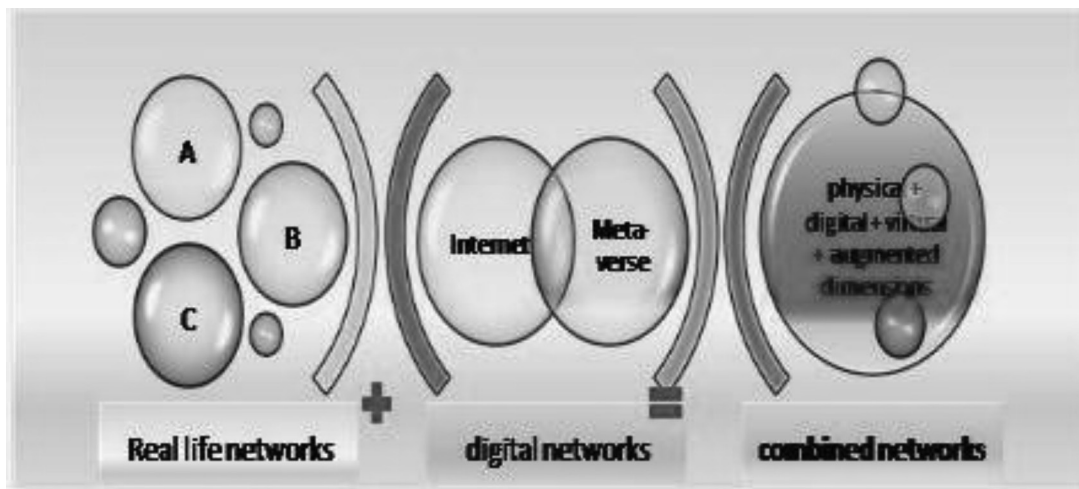


FIGURE 7. NETWORK INTERRELATIONS, FROM THE REAL-LIFE TO THE METAVERSE

The evaluation patterns that should conveniently take into account:

- a) The architecture of the Metaverse network (scalefree, etc.);
- b) The number of its nodes and edges;
- c) The intensity of the edging relationships;
- d) The hyperlink with other (multilayer) networks (real life, the internet, other metaverses); and
- e) The dynamic evolution of both the networks

and their interactions are governed by the mathematical properties of the network and its multilayer extensions.

The ultimate valuation goal shines out as the monetization of the edging relationships inside and beyond the Metaverse.

DISCUSSION

Investigating the potential market value of Metaverse ecosystems utilising a with-and-without strategy or multilayer network metrics is the research question of this study. The Metaverse is consistent with network theory, an established field that is yet underutilised in terms of its economic implications, and can be thought of as a digital (virtual/augmented) social network.

Network theory is well equipped to serve as a cornerstone in the interpretation of the evolutionary path from the actual world to the Metaverse because of its multilayer extensions. The attempt to provide a ballpark assessment of the potential economic worth of Metaverse layers is likewise consistent with this hypothesis. The Metaverse is consistent with network theory, an established field that is yet understudied in terms of its economic implications, and can be thought of as a digital (virtual/augmented) social network.

Even though it may become a significant problem in the future, the separation of the Metaverse from the real world and the bridge internet does not currently pose a serious threat. The main factor causing isolation, a condition that often decreases value, is node or edging deletion (erasing the synergies between the real-life and the Metaverse). Network theory [17] has made this occurrence well recognised, and it should be thoroughly analysed in order to foresee and potentially correct unintended outcomes (e.g., digital identity theft, when the avatar is detached from the originating individual). Most networks have a high probability of having some nodes vanish. The scale-free nature of the network can endure as long as it keeps expanding [4].

Further Scope

As new businesses enter the market, the breadth of the Metaverse is growing daily. Metaverse is able to reach its full potential thanks to virtual reality and augmented reality. With the use of smart glasses, VR and AR-capable headgear, and handles, users can enter a virtual world. These tools alter the physical objects in attractive ways in the virtual world, causing users to perceive their environment from a different perspective. Metaverse is very well-liked since it includes 3D graphics, audio, texts, and interactive elements. Users can immerse themselves in a digital environment with superior security and transparency thanks to the technology.

CONCLUSION

This exploratory study examines the value chain relationship between real-world networks and Metaverse networks, going through the internet (which is anticipated to “merge” with the Metaverse at some point in the future).

These results support the definition given below: “The Metaverse is a permanent and persistent multiuser environment that combines physical reality and digital virtuality. It is the post-reality cosmos. It is built on the convergence of technologies, such as virtual reality (VR) and augmented reality, that allow for multimodal interactions with digital objects, virtual surroundings, and people (AR). As a result, the Metaverse is a network of persistent multiuser platforms with social, networked immersive experiences [18].

Networks are common and connected by replica nodes since most complex ecosystems are made up of interacting components. Multislice networks depict time-dependent interactions, which are a fundamental component of temporal social networks that organically evolve. This dynamic architecture that instantly includes socio-pattern data is consistent with real-time updates of Metaverse interactions.

Networks are a potent shared factor in both the actual world and the digital world, providing a hint for

collaborative interpretation. Multilayer networking applications must be taken into account because these networks function on several layers. While the research field is intriguing, the evaluation problems are made more difficult by a number of aspects, from the novelty of yet unstable metaverses to the mathematical complexity of multilayer networks.

Adjacency matrices, which are in line with the with- and-without method, the network effect laws, and the multilayer network interpretation, constitute a formidable tool for estimating the potential value of any Metaverse subset.

More investigation is required for a more thorough dynamic appraisal that motivates and supports the enormous investments that Big Techs are making in the Metaverse.

To the advantage of all real and virtual stakeholders, a greater grasp of the mathematical and appraisal properties of these extended networks, from real-life to the Metaverse, might make it easier to identify value co-creation patterns, systemic failures, and shock resilience.

REFERENCES

- [1] Kawarase IV, M. A., & Anjankar, A. (2022). Dynamics of Metaverse and Medicine: A Review Article. *Cureus*, 14(11).
- [2] Schroeder, R., Huxor, A., & Smith, A. (2001). Activeworlds: geography and social interaction in virtual reality. *Futures*, 33(7), 569-587, Access date: 14/12/2021, <http://metaverse.sourceforge.net/>
- [3] Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., & Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 66, 102542.
- [4] Narin, N. G. (2021). A content analysis of the Metaverse articles. *Journal of Metaverse*, 1(1), 17-24.
- [5] Google Trend, Access date: 13/12/2021, <https://trends.google.com.tr/trends/?geo=TR>
- [6] E. Estrada, and P. A. Knight, *A first course in Network theory*. Oxford: Oxford University Press, 2015.
- [7] M. O. Jackson, *Social and Economic networks*. Princeton: Princeton University Press, 2008.
- [8] M. Van Steen, *Graph theory and complex networks. An introduction*. Amsterdam: Maarten VanSteen, 2010.
- [9] J. Radoff, *Network Effects in the Metaverse*, 2021. In <https://medium.com/building-the-metaverse/network-effects-in-the-metaverse-5c39f9b94f5a>.
- [10] Y. J. Hyoun, P. Arum, and J. L. Kyoung, "Why Are the Largest Social Networking Services Sometimes Unable to Sustain Themselves?" *Sustainability*, vol. 12, no. 2, 2020.
- [11] A. Odlyzko, and B. Tilly, *A refutation of Metcalfe's law and a better estimate for the value of networks and network interconnections*. Minneapolis: University of Minnesota, 2005.
- [12] G. Bianconi, *Multilayer networks*. Oxford: Oxford University Press, 2018.
- [13] K. M. Lee, B. Min, and K-I. Goh, "Towards real-world complexity: an introduction to multiplex networks", *European Physical Journal B*, vol. 88, no. 2, 2015.
- [14] E. Cozzo, G. Ferraz de Arruda, F. A. Rodrigues, and Y. Moreno, *Multilayer networks: metrics and spectral properties*, 2016. In https://cosnet.bifi.es/wpcontent/uploads/2016/03/CF_RM01.pdf.

- [15] F. Wang, R. Quin, X. Wang, and B. Hu, "MetaSocieties in Metaverse: MetaEconomics and MetaManagement for MetaEnterprises and MetaCities", *IEEE Transactions on Computational Social Systems*, vol. 9, no. 1, 2022.
- [16] H. Duan, J. Li, S. Fan, Z. Lin, X. Wu, and W. Cai, "Metaverse for social good: A university campus prototype," in *Proc. of the 29th ACM International Conference on Multimedia*, Virtual Event, China, Oct. 2021, pp. 153–161
- [17] H. Jeong, Y. Yi, and D. Kim, "An Innovative E- Commerce Platform Incorporating Metaverse To Live Commerce February", *International Journal of Innovative Computing Information And Control*, vol. 18, no. 1, pp. 221–229, 2022.
- [18] Q. Yang, Y. Zhao, H. Huang, Z. Xiong, J. Kang, and Z. Zheng, "Fusing blockchain and ai with Metaverse: A survey," *IEEE Open Journal of the Computer Society*, vol. 3, pp. 122–136, Jul. 2022.
- [19] L.-H. Lee, T. Braud, P. Zhou, L. Wang, D. Xu, Z. Lin, A. Kumar, C. Bermejo, and P. Hui, "All one
- [20] Y. Siriwardhana, P. Porambage, M. Liyanage, and M. Ylianttila, "A survey on mobile augmented reality with 5g mobile edge computing: needs to know about Metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda," *arXiv preprint arXiv:2110.05352*, Oct. 2021, [Online]. Available: <https://arxiv.org/abs/2110.05352>.
- [21] T. Huynh-The, Q.-V. Pham, X.-Q. Pham, T. T. Nguyen, Z. Han, and D.-S. Kim, "Artificial intelligence for the Metaverse: A survey," *arXiv preprint arXiv:2202.10336*, Feb. 2022, [Online]. Available: <https://arxiv.org/abs/2202.10336>.
- [22] H. Ning, H. Wang, Y. Lin, W. Wang, S. Dhelim, F. Farha, J. Ding, and M. Daneshmand, "A survey on Metaverse: the state-of-the-art, technologies, applications, and challenges," *arXiv preprint arXiv:2111.09673*, Nov. 2021, [Online]. Available: <https://arxiv.org/abs/2111.09673>. N. Abbas, Y. Zhang, A. Taherkordi, and T. Skeie, "Mobile edge computing: A survey," *IEEE Internet of Things Journal*, vol. 5, no. 1, pp. 450–465, Sep. 2017.
- [23] J. Lin, W. Yu, N. Zhang, X. Yang, H. Zhang, and W. Zhao, "A survey on internet of things: Architecture, enabling technologies, security and privacy, and applications," *IEEE internet of things journal*, vol. 4, no. 5, pp. 1125–1142, Mar. 2017
- [24] S. M. Park, and Y.G.A. Kim, (2022). "Metaverse: Taxonomy, Components, Applications, and Open Challenges", *IEEE ACCESS*, vol. 10, pp. 4209–4251, 2022.
- [25] M. Pesce, "Mirror Worlds the Metaverse could help us better understand reality", *IEEE SPECTRUM*, vol. 58, no. 11, pp. 25–25, 2021.
- [26] B. Q. Shen, W. M. Tan, and P. Qin, "How to Promote User Purchase in Metaverse? A Systematic Literature Review on Consumer Behavior Research and Virtual Commerce Application Design", *Applied Sciences-Basel*, vol. 11, no. 23, 2021.
- [27] A. Barabási, *Network Science*. Cambridge: Cambridge University Press, 2016.
- [28] G. Caldarelli, and M. Catanzaro, *Networks. A very short introduction*. Oxford: Oxford University Press, 2011.

A CASE STUDY OF NEWSPAPER READING HABITS AMONG STUDENTS

Ravi Gautam

HoD, Department of Journalism and Mass Communication, Shri Ram College Muzaffarnagar, India

ABSTRACT

This research paper focus on Newspaper reading habits among Under Graduate and Post Graduate students studying in Chaudhary Charan Singh University. There are 100 questionnaires were distributed to the students. Among them 70 questionnaire response received from the students. The collected data has been analyzed and its results are presented in the form of tables according to the objectives of the study.

Keywords: Newspaper Reading Habits, UG and PG students, Chaudhary Charan Singh University.

Introduction

Newspapers are the most powerful medium of journalism and mass communication. Newspapers are published in many languages. Every morning we are enthusiastically waited for the newspaper to come because they provide information and knowledge about current happenings in the world. Newspapers are available online and offline all over the world. It caters to the needs of various sections of society.

A newspaper has great influence on society. It shapes public opinion and influences government decisions and policies. In Indian democracy Newspaper play a crucial role of the guardian of the rights of the people. Newspapers are like watch dog that keeps government more active, alert against their duties. They show us the bare truth and harsh reality of common man. They serve as a link between the government and the people. They raise voice against the cruelties committed on the common people in the society.

Newspapers publish articles on various critical issues like political, economical, social, religious, cultural, sports, and entertainment etc. They provide solution to various economical, social and political and cultural problems of the society. It is through newspapers and magazines that politicians come to know about the news and reviews of others on certain

policies of government and political parties. Those interested in entertainment can learn about their favorite celebrity. They help the job seekers in finding jobs of their preference and choice. Newspapers give report about important financial activities. A businessman comes to know about the moods of the share market through newspapers.

Newspapers provide up to date weather forecasts. This massively helps the farmers in deciding about the cropping activities and gives tips related to organic farming. Newspapers help in developing critical analysis skills and reading habits. Many people who don't start their daily routine unless they go through the newspapers. There are candidates preparing for various competitive examinations like UPSC, CGL and other railway examination who regularly read the newspapers to keep themselves abreast of the general knowledge and current affairs. Senior citizen read the newspapers everyday as a matter of routine. Even the low people income can afford newspapers easily. Thus newspapers play major role in a society and democracy. So we should cultivate a habit of newspapers reading and develop critical analysis.

Chaudhary Charan Singh University

Chaudhary Charan Singh University is one of the reputed university of India. Chaudhary Charan Singh

University, formerly Meerut University, is a public state university located in Meerut, Uttar Pradesh, India. The university was established in 1965. It was later renamed to its current name after Chaudhary Charan Singh, former Prime minister of India.

Chaudhary Charan Singh University (CCSU) has a lavish green campus spread over 222 acres. The University is in the rapid process of transformation to an institution of excellence. In this process, digitalization of the University is being done to develop an efficient and transparent system that would further facilitate a learner's experience in the University.

The University programmes combine the enduring value of a liberal arts education with the skills and experience offered by professional departments. The University offers 162 courses on the campus in 35 Departments/institutes through a highly qualified faculty. The University also plays an crucial role in providing higher education to the youth of the State through its approx 400 affiliated Aided and self-financed institutes in Uttar Pradesh.

The campus of the University has often been rated as one of the most beautiful campuses in India. It resembles a large, self-contained educational village with lecture theaters, smart class rooms, Wi-Fi campus, 24 hrs library facility, laboratories, on campus hostel accommodation, cafeterias, canteens, market, swimming pool, gymnasium, bank, ATM's, post office and world-class sports facilities. The most remarkable feature of the campus is a seamless interconnection of nature and the built environment. There are a number of lush green gardens, water fountains and sidewalks which provide an ideal environment on the campus for study and leisure.

Literature Review

There are various previous studies which have been done related to the present study. They are: Bala subramanian and others (2014), Devendra Kumar, and others (2011), Dipika Majumder and Hasan,(2013), Nagashetti and Kenchak kanavar (2015), Sudha Rani Y. (2014).

Bharucha Jehangir (2017) made an analysis of newspaper reading patterns among the youth. The main aim was to determine how regular they read the newspaper, the time spent, most read newspapers, and sections of newspapers read most by students and opinion about electronic reading online newspaper.

Aggarwal and Akhter (2015) made a study to know the newspapers reading habits of students and faculty members of Punjabi university Patiala. The main objectives of the study was to know the preferred language, preferred format, preferred section and to know the number of newspapers, time spent daily by the students for reading newspapers. AlShaqui, Obaid S (2013), Chinnasamy, K (2017), Dharani, H (2016) etc were also conducted similar studies on the newspaper reading habits of students and others.

Angela M. Lee and Michael X. Delli Carpini (2010) concluded that media habits are mainly impacted by the media atmosphere around which a person grows up, and suggested that appropriate promotion of news consumption among the younger generations, would brighten the prospects of the American news industry.

International News Media Association (INMA), in its survey "Newspaper outlook2006"³² has reported that the circulation and readership fortunes of newspapers will depend excessively on market environment than internal practices of that organization, hence major concern for newspapers is coping with the dynamic changes taking place in the media landscape.

It was suggested that newspapers should take the customer perceptions in to account while taking decisions as the newspapers were repositioned as a 'need' to a 'want'. This report also observes young readers news consumption patterns have changed with information being available everywhere, and they are involved in multi-tasking with multiple media options.

Media multi-tasking phenomenon has been reiterated by Ulla G. Foehr, Ph.D. (2006) which suggests that young people are more likely to media

multitask than others, as they have more media choices, sensation seekers. These qualities of youth, seem to point at two factors that are likely to drive media multitasking – a need or a motivation to media multitasking. This study also concluded that many people devote time on Television for news.

Connie Browning Budden, Michael C. Budden, Michael A. Jones (2007) 35 found that though the youth is spending more time on internet yet depend on conventional media like TV, Radio to a large extent. Still the use of these traditional media usage exceeds internet usage by a large extent. This study reiterates the involvement of male and female on internet is similar but with different usage patterns. One more study Young People and News (2007)36, also showed that young Americans depend rarely on the daily newspaper, more on television than on the Internet for getting their daily dose of news. Unlike the older American readers, youngsters get news from multiple sources and have no fixed routine for this. This study has categorically stated that there is a sharp decline in the newspaper sales, and dropping viewership for TV coincides with the emergence of web as a medium of news, entertainment etc.

The report on Youth Media DNA (2008) 38 finds that majority among those who stopped reading newspapers said that they have stopped at the age of 18-19 years. Hence young adult segment is crucial and hence newspapers need to find ways to engage young readers. According to this study, Television and Internet are the most frequently used media of young people. Even in the total media time spent, Television has a 37percent share of young people's media time, against 10percent for newspapers.

Seth C. Lewis (2008) 39 has sound that students are more likely to get news from conventional sources and print newspaper readership is likely to experience a steep increase. This study also found that this group has positive perception of news and are significantly likely to become regular users of conventional sources in the future. This study also asserted on the underlying need for this type of studies to understand future trends in readership.

A study "News Media Consumption among Gen Y" (2009) 40 felt that focusing on readers in 18- 24 age group is crucial, as this is said to be the first generation who has access to computer since their formative years and have grown up in the internet era. This study found that only 13 percent of college students depend on newspapers and 85 percent get most of their news from online sources, out of the online users, 88 percent use conventional news websites as their main source of news. Alternative media such as Blogs and other news websites represented the remaining 12 percent.

Study results of "Students and the Media" by Marko Prpiè (2009)41 show that female students read the print considerably more regularly than their male counterparts. Readership of weeklies is low and dropping among students. This study reveals that most of the students in Slovenia have access to internet and mobile phones are mainly used for calls and texting. With regard to content, a large proportion of students seek more variety on TV and print media.

In a study report submitted by **Sondeen, Alexandra L** (2009)42 it was clearly stated that the media choices of 18-34 years age group are important as they are likely to continue with the same media when they grow old. While online news consumption is on the raise, a survey shows that newspapers are considered most trusted medium, reports Philipp M. Natter Mann(2009)43 . This study reports that daily news consumption time has gone up across all age groups when compared to 2006. This increase predominantly is among those below 35 years. This age group prefer to get news from television and internet. The print has emerged as most trusted medium and the respondents felt that newspaper advertising is more "informative and inspiring confidence".

A study of "College students' heterogeneous use of online news features and its impact on news acquisition" (2010)47 has divided young online media users as, non-users, light users and heavy users. It was found that nearly 42percent of the students are non-users and 44percent are light users and heavy

users are amounting to 14percent. This study has also shown that there is an intense relation between use of online news and online skills. Students who consider themselves, to be tech savvy use more online news than others.

Dipika Majumder, Md. Mehedi Hasan (2013)⁵⁹ found that local language newspapers are preferred source of news which are read especially to improve general knowledge. This study recommends that parents should create an environment for the students to read newspapers and encourage them to start reading from an early age. According to Karen Sabina Freeman (2013)⁶⁰ the Malaysian youth are intensive users of online news, especially in the age group of 21-24 years, while the 18-20 age group of youth use relatively less online news. This study shows that the interest for news consumption grows with age.

Though the readership for newspapers is dropping, enthusiasm for news and information is fairly on the higher side. Economic Times, a financial daily in India (2013) ⁶¹ has reported that the media market is dominated by television (56 per cent), followed by print (28 per cent). The report also said that the new mediums such as Internet though smaller in size are likely to grow faster than the industry average.

Angela M. Lee (2013) study suggested that different people have different kinds of news motivations. Age is the most important predictor of all the age groups. Older adults read news for the purpose of information needs, whereas younger adults follow for entertainment and social news

consumption. It is also observed that 60 percent of the respondents are not willing to pay for the online content and only 6percent are prepared to pay for it.

Objectives of the Study

The present study is to find out the following objectives:

1. To know the Gender wise response on reading habits of newspapers among students
2. To investigate the time being devoted by students for reading newspapers
3. To study which Newspapers they are reading and to know the interest area of students in newspaper
4. To determine the students motives and purpose in Newspapers reading

Scope and Limitation of the Study

The present study is limited to under graduate and post graduate students of Chaudhary Charan Singh University, on the subject of the newspaper reading habits.

Research Methodology

A research study was based on questionnaire method was used to collect data about reading habits of newspapers in the Chaudhary Charan Singh University. A total number of 100 questionnaires were distributed to the students to collect the primary data. Out of them 70 questionnaires are returned by the respondents with 70.00 %.

Data analysis and Interpretation

Table 1. Category wise questionnaires distribution and response received from students

Category	No. of questionnaire distributed	No. of questionnaire received	Percentage
UG Students	50	28	56.00
PG Students	50	42	84.00
Total	100	70	70.00 %

Table 1 shows that the category wise questionnaire distribution and response received from students.

There are 56.00% of the undergraduate students were responses. Followed by this 84.00% are postgraduate students.

Table 2. Gender wise questionnaire response

Gender	No. of Respondents	Percentage (%)
Male	32	45.71%
Female	38	54.28%
Total	70	100%

Table 2 finds gender wise responses to the questionnaires. It is observed that 54.28% of respondents are female and 45.71% of respondents are male. This shows females respondents are more interest than male in newspaper reading habit.

Table 3. Time spent for newspaper reading

Time Spent	No. of Respondents	Percentage (%)
Less than 1 Hour	20	28.57
1 Hour	15	21.42
2 Hour	22	31.42
3 Hour	10	14.28
4 and above	03	04.28
Total	70	100.00%

Table 3 shows time spent on reading newspaper. There are 28.57% of students spent less than one hour for reading of newspaper. Followed by 21.42% of students spent 1 hour, 2 hours with 31.42%, 3 hours with 14.28% and 4 & above hours with 04.28%.

Table 4. Types of Newspapers preferred for reading

Name of Newspaper	No. of Respondents	Percentage (%)
Times of India	22	31.42
Indian Express	12	17.14
Hindustan Times	12	17.14
Dainik Jagran	8	11.42
Dainik Bhaskar	8	11.42
The Hindu	8	11.42

Table 4 shows that Newspapers preferred for reading. Majority 22(31.42%) of students preferred reading Times of India, followed by 12(17.14%)

students preferred Indian Express, 12(17.14%) students favored with The Hindustan Times. 8(11.42%) students preferred Dainik Jagran, 8(11.42%) students says Dainik Bhaskar, 8(11.42%) preferred The Hindu Newspaper.

Table 5. Motives and Purpose for reading News papers

Purpose	No. of Respondents	Percentage (%)
To improve Current Affairs and General Knowledge	20	28.57
For Employment and Job advertisement	12	17.14
To know National and International News	10	14.28
To know Political and Social News	8	11.42
To know Cinema and Entertainment	8	11.42
Letter to the Editor	6	8.57
For Time pass	6	8.57

Table 5 shows the motives and purpose of reading newspapers. There are 20(28.57%) students express their opinion on reading newspapers for improve their current affairs and general knowledge, followed by 12(17.14%) students read newspapers for employment and job advertisements, 10(14.28%) students favored with national and international news. 8(11.42%) students for political and social news, 8(11.42%) students for read cinema and entertainment news, 6(8.57%) students read letter to the editor 6(8.57%) students read newspaper for time pass.

Findings and Conclusion

1. The research paper found that a total of 70.00% of students responses questionnaires.
2. Majority of 54.28% of questionnaire responses are female and 45.71% are male.

3. 28.57% of students spent less than one hour to read newspapers. Followed by 21.42% of students spent 1 hour of reading newspaper. 31.42% students spent 2 hours on newspaper.
4. 28.57% of respondents read Newspapers for improve their current affairs and general knowledge.
5. Majority 31.42% of respondents are read Times of India newspapers which are occupied in first place.

Conclusion

Newspapers help and boost students to improve reading habits, current affairs, knowledge, and general awareness. Newspapers are not only providing current news, but they are providing various types of information to the students for example opinion editorial, letter to the editor, informative article, features of society, editorial, social and economic status of the country. Newspaper reading improves communication skills, boost critical analysis, changing life style, increasing current general knowledge about society, language ability and relevant and credible information of the world.

REFERENCES

1. Aggarwal, Anu and Akhter, mohd. "Newspaper reading habit: A study of Punjabi university Patiala". Journal of international Academic research for multidisciplinary 2.12 (2015):371-378. www.researchgate.net.com. Web. 10 March 2017.
2. Al-shaqsi, Obaid S. "Readership and Reader's perception of Omani newspapers". Global media journal spring (2013):1-39. www.researchgate.net.com. Web. 10 March 2017.
3. Dhiman, D. (2022). Condition of Women Prisoners in Model Jail, Chandigarh: A Communication Study. Condition of Women Prisoners in Model Jail, Chandigarh: A Communication Study (August 26, 2022).
4. Malik, D., Singh, P., & Dhiman, D. (2022). Science Communication in India: Current Trends and Future Vision. Science Communication in India: Current Trends and Future Vision (June 10, 2022).
5. Dhiman, B. (2019). Effects of Online News Applications for Android–A Critical Analysis. European Journal of Business and Social Sciences, 7(2), 815-819.
6. Dhiman, B. (2021). The Practice of Media Education and Media Research: A Review on Five Asian Countries. Global Media Journal, 19(44), 1-7.
7. Pawan Singh Malik, Bharat Dhiman (2022) Science Communication in India: Current Trends and Future Vision. Journal of Media & Management. SRC/ JMM-171. DOI: doi.org/10.47363/JMM/2022(4)144
8. Dr. Abid Ali, Bharat. (2021). Impact of Smartphone: A Review on Negative Effects on Students. PalArch's Journal of Archaeology of Egypt / Egyptology, 18(4), 5710-5718. Retrieved from <https://www.archives.palarch.nl/index.php/jae/article/view/7164>
9. Dr. Abid Ali, Bharat. (2020). Influence of Social Media in Developing Social Anxiety: A Study of Chaudhary Charan Singh University Students. PalArch's Journal of Archaeology of Egypt / Egyptology, 17(12), 1585-1592. Retrieved from <https://archives.palarch.nl/index.php/jae/article/view/7167>
10. Dhiman, D. (2021). Awareness of MOOCs among Students: A Study of Chaudhary Charan Singh University. International Journal of Interdisciplinary Organizational Studies.
11. Dhiman, D. (2021). Newspaper Reading Habits among UG and PG Students of Chaudhary Charan Singh University: A Case Study. International Journal of Interdisciplinary Organizational Studies.

12. Kohli, P., & Dhiman, B. Awareness of MOOCs among Students: A Study of Chaudhary Charan Singh University.
13. Dhiman, D. (2021). Use of E-Resources by Research Scholars of Chaudhary Charan Singh University: A Case Study. *International Journal of Interdisciplinary Organizational Studies*.
14. Dhiman, Dr. Bharat, Representation of LGBT Community: A Comparative Study of Indian and American Cinema (November 20, 2022). Available at SSRN: <https://ssrn.com/abstract=4288213>
15. Dhiman, D. (2022). Use and Impact of Social Media on Academic Performance of Chaudhary Charan Singh University Students: A Case Study. *Use and Impact of Social Media on Academic Performance of Chaudhary Charan Singh University Students: A Case Study* (September 8, 2022)
16. Dhiman, Dr. Bharat, Snapchat, Happiest and Personal Social Media Platform for Research Scholars, A Critical study (September 10, 2022). Available at SSRN: <https://ssrn.com/abstract=4215268> or <http://dx.doi.org/10.2139/ssrn.4215268>
17. Dhiman, Dr. Bharat, Identification of Psychosocial Issues Among Researchers of Chaudhary Charan Singh University: A Critical Study (September 5, 2022). Available at SSRN: <https://ssrn.com/abstract=4215283> or <http://dx.doi.org/10.2139/ssrn.4215283>
18. Dhiman, Dr. Bharat, Usage of Whatsapp Among Students of Chaudhary Charan Singh University: A Case study (September 10, 2022). Available at SSRN: <https://ssrn.com/abstract=4215291> or <http://dx.doi.org/10.2139/ssrn.4215291>
19. Dhiman, Dr. Bharat, Negative Impact of Television Viewing on Academic Achievements of Students: A Case Study of Subhash Nagar (September 13, 2022). Available at SSRN: <https://ssrn.com/abstract=4218010> or <http://dx.doi.org/10.2139/ssrn.4218010>

DESIGNING FOR THE FUTURE: INTEGRATING SUSTAINABILITY, TECHNOLOGY, AND WELL-BEING IN CONTEMPORARY INTERIOR SPACES

Kajal Mavi

Assistant Professor

Department of Home Science, Shri Ram College, Muzaffarnagar

ABSTRACT

This study explores the evolving landscape of interior design, focusing on the integration of sustainability, advanced technology, and well-being into contemporary spaces. As the demands for environmentally conscious and technologically adaptive designs grow, interior design is transforming to meet these expectations while prioritizing human health and comfort. The research delves into sustainable materials, energy-efficient solutions, and biophilic design principles that enhance ecological balance. Additionally, it examines the role of smart home technologies in creating connected and functional living environments. By emphasizing the interplay between aesthetics, functionality, and well-being, this paper highlights innovative strategies for designing spaces that are both future-ready and aligned with human needs. The findings aim to provide a roadmap for designers to create interior environments that are sustainable, technologically advanced, and conducive to overall wellness.

This research investigates the role of interior design in shaping contemporary spaces by integrating sustainability, advanced technology, and human well-being. In an era of environmental challenges and rapid technological advancements, interior design has become a critical tool for addressing ecological concerns while enhancing quality of life. The study explores the use of sustainable materials, energy-efficient practices, and biophilic design to create eco-friendly and harmonious environments. It also examines the role of smart home technologies, such as automation and IoT systems, in enhancing functionality and adaptability in modern spaces.

Furthermore, the research highlights the importance of prioritizing well-being by focusing on factors like natural lighting, ergonomic design, and the psychological impact of interior elements such as color and texture. By bridging aesthetics with functionality, this paper aims to provide innovative strategies for creating future-ready spaces that align with human and environmental needs. The findings emphasize the need for a holistic approach in interior design, ensuring that it contributes not only to sustainability but also to the comfort, health, and productivity of its users.

Introduction

The design of interior spaces has always been a reflection of human needs, aspirations, and cultural values. In today's rapidly evolving world, contemporary interior design must address a multifaceted set of

challenges that shape our daily lives. The integration of sustainability, advanced technology, and human well-being is no longer a choice but a necessity in designing for the future.

Interior design is evolving into a dynamic field

that not only responds to aesthetic and functional needs but also addresses pressing global issues and human-centric goals. As societies grow increasingly aware of environmental challenges, technological innovations, and the impact of spaces on human health, contemporary interior design must seamlessly integrate sustainability, advanced technology, and well-being. These three pillars are shaping the future of how we design and interact with interior environments.

Sustainability is at the forefront of modern design, driven by the need to mitigate climate change, conserve resources, and reduce waste. Designers are turning to renewable materials, energy-efficient systems, and circular economy principles to create interiors that prioritize environmental responsibility without compromising style or functionality. Green certifications and standards further push the industry toward adopting environmentally sound practices.

Simultaneously, technology is redefining how we live, work, and interact with our surroundings. Smart technology, Internet of Things (IoT) devices, and automation are becoming integral to interior spaces, offering unprecedented convenience, energy management, and customization. From intelligent lighting systems that adapt to natural circadian rhythms to voice-controlled assistants and augmented reality (AR) design tools, technology is unlocking new possibilities for creating adaptive and interactive environments.

Beyond ecological and technological advancements, the role of interior spaces in supporting human well-being has become a critical focus. Research shows that thoughtfully designed environments can reduce stress, enhance productivity, and improve mental and physical health. Concepts like biophilic design, which incorporates natural elements and patterns, and sensory design, which appeals to all human senses, are gaining prominence. Ergonomics, air quality, natural light, and noise control are being prioritized to ensure that spaces promote holistic wellness.

The Intersection of sustainability, technology, and well-being represents an exciting frontier in contemporary interior design. By adopting a holistic approach that harmonizes these elements, designers can create spaces that are not only visually compelling but also deeply functional, environmentally conscious, and nurturing for their occupants. This exploration of future-forward interior design principles serves as a call to action for professionals and stakeholders to rethink and innovate how we shape the spaces we inhabit.

Literature Review

1. Sustainability in Interior Design

A 2023 systematic review highlights the absence of comprehensive criteria for assessing sustainability in interior design, which hampers the effective implementation of sustainable practices. The study emphasizes the need for tailored guidelines that consider the entire lifecycle of interior spaces, including material selection, energy efficiency, and adaptability.

Another study focuses on the development of green interior design standards in Taiwan, identifying opportunities and challenges in creating region-specific sustainable design criteria. The research underscores the importance of localized standards to address unique environmental and cultural contexts.

2. Technology in Interior Design

Advancements in artificial intelligence (AI) are influencing interior environments, particularly in energy management and thermal comfort. A 2020 review discusses AI-assisted systems that balance energy efficiency with occupant comfort, highlighting the potential of intelligent control strategies in sustainable building design.

The integration of smart-home technologies is also evolving, with a focus on enhancing well-being and convenience. Trends indicate a shift towards intuitive lighting systems, air and water purification, and seamless technology integration that promotes

health and comfort in interior spaces.

3. Well-being in Interior Design

The incorporation of biophilic design principles continues to be a focal point in promoting occupant well-being. Recent discussions emphasize the psychological and physiological benefits of integrating natural elements into interior spaces, such as reduced stress and improved cognitive function.

Additionally, there is a growing emphasis on designing spaces that support mental health, particularly in environments like healthcare facilities. Design strategies that incorporate natural light, appropriate acoustics, and access to nature are being recognized for their therapeutic benefits.

4. Intersecting Domains

The intersection of sustainability, technology, and well-being is exemplified in the design of net-zero energy buildings that prioritize occupant health. Recent projects demonstrate how integrating renewable energy solutions with smart technologies can create environments that are both ecologically responsible and supportive of human well-being.

5. Emerging Trends in Wellness

Architecture

The Wellness Architecture & Design Initiative identifies a shift towards regenerative design incorporating biophilic principles. This trend focuses on promoting physical movement, mental wellness, and social connection, particularly benefiting aging populations by ensuring accessibility and practicality in design.

6. Challenges and Future Directions

Despite advancements, challenges remain in fully integrating these elements into interior design. A critical gap is the lack of comprehensive criteria for assessing sustainability in interior design, which hinders the effective implementation of sustainable

practices. Addressing this gap is essential for advancing sustainable interior design

Sustainable interior design ,Eco-friendly materials ,Technology ,Internet of Things Integration Themes ,Future-ready interiors ,Nature-inspired interiors,Innovative material usage

Methodology

1. Research Design

This study adopts a mixed-methods approach, combining qualitative and quantitative research techniques to achieve a holistic perspective:

Qualitative Methods: Focused on understanding underlying principles, design strategies, and theoretical frameworks.

Quantitative Methods: Used to measure and analyze the effectiveness and feasibility of integrating sustainability, technology, and well-being in interior spaces.

1. Research Objectives and Scope

Research Objectives

1. To identify effective strategies for integrating sustainability, technology, and well-being into interior spaces.
2. To evaluate the impact of these strategies on environmental performance, user experience, and occupant health.
3. To develop a practical framework for designers and practitioners.

Scope

1. Focus on residential, commercial, and healthcare interior spaces.
2. Explore global trends, but include region-specific adaptations for localized relevance.
3. Incorporate emerging technologies and materials that align with sustainability and well-being goals.

2. Theoretical Framework

a. Triple Bottom Line Approach

Evaluate sustainability, technology, and well-being through economic, environmental, and social lenses.

Explore intersections where these three areas mutually reinforce each other.

b. Systems Thinking

Use systems thinking to understand how interior elements interact with environmental and technological systems.

Consider the holistic impact of design choices on long-term sustainability and user well-being.

3. Data Collection Methods

a. Literature Review Expansion

Conduct meta-analysis of academic journals, industry reports, and case studies from 2018–2024.

Identify gaps in existing research to establish the novelty of the current study.

b. Field Studies and Case Analyses

Examples of Successful Integration: Document and analyze case studies of well-designed interiors that demonstrate effective integration.

Focus on metrics such as energy savings, occupant health data, and user satisfaction scores.

Examples may include net-zero energy offices, biophilic hospitals, or smart homes.

Comparative Analysis: Compare different projects to identify best practices, challenges, and areas for improvement.

c. Stakeholder Interviews

Design Practitioners: Architects, interior designers, and sustainability consultants to understand design and implementation processes.

Technology Developers: Insights on smart systems, IoT, and AI integrations for interior environments.

Occupants/Users: Feedback on comfort, usability, and overall satisfaction with designed spaces.

d. Surveys and Questionnaires

Collect quantitative data on preferences, behaviors, and perceptions from occupants.

Examples: Use Likert-scale surveys to assess user satisfaction with lighting, air quality, or technology usability.

e. Experiments and Prototyping

Design small-scale experiments using prototype models or VR simulations to test:

The impact of daylighting strategies on energy consumption.

Usability of smart home systems in various scenarios.

Psychological effects of biophilic elements (e.g., greenery, natural textures).

Test materials for durability, environmental impact, and indoor air quality under controlled conditions.

f. Quantitative Data Collection

Gather metrics from smart devices (e.g., energy meters, air quality sensors).

Use building simulation tools like EnergyPlus or DesignBuilder to model performance outcomes of sustainable and tech-driven designs.

4. Analysis Techniques

a. Sustainability Metrics

Life cycle analysis (LCA) of materials to evaluate their environmental impact.

Carbon footprint calculations for selected design solutions.

Energy performance assessments using simulation tools.

b. Technology Evaluation

Assess energy savings, operational efficiency, and

user-friendliness of technological solutions.

Examine integration challenges, such as compatibility of IoT systems with legacy designs.

c. Well-being Assessments

Use evidence-based design (EBD) principles to evaluate well-being impacts.

Measure improvements in occupant mood, productivity, and health through surveys and biometric data where applicable.

d. Multivariate Analysis

Examine relationships between sustainability measures, technological efficiency, and user satisfaction using statistical tools.

5. Framework Development

a. Practical Toolkit

Develop a checklist or guide for practitioners to implement integrated designs.

Include considerations such as cost, scalability, and cultural appropriateness.

b. Design Framework

Create a framework that balances environmental responsibility, technological advancements, and occupant well-being.

Example: A step-by-step process from material selection to post-occupancy evaluation.

6. Validation

Conduct focus groups with experts to validate findings and framework recommendations.

Perform pilot testing in real-world projects to assess the feasibility and effectiveness of the proposed framework.

7. Ethical Considerations

Ensure all stakeholder interviews and surveys adhere to ethical guidelines, including informed consent and confidentiality.

Consider accessibility and inclusivity in designs, ensuring they benefit diverse populations.

8. Deliverables

A framework for integrating sustainability, technology, and well-being in interior design.

Design guidelines and recommendations based on empirical findings.

Development of a toolkit or checklist for designers to apply these principles in practice.

9. Limitations and Challenges

Availability of case studies and access to cutting-edge technologies may pose challenges.

Difficulty in quantifying subjective well-being indicators.

Ensuring representativeness across various demographic and cultural contexts.

Results

1. Sustainability Outcomes

a. Enhanced Environmental Performance

Spaces designed with sustainable materials and passive strategies showed significant reductions in energy consumption, carbon emissions, and waste production.

Life cycle analysis of materials revealed the long-term environmental benefits of using reclaimed wood, recycled metals, and low-VOC finishes.

b. Adoption of Green Certifications

Case studies indicated that interiors adhering to certifications like LEED and WELL showed measurable improvements in indoor environmental quality (e.g., air purity, thermal comfort).

Certified projects demonstrated higher property value and market appeal, encouraging widespread adoption.

c. Challenges in Implementation

High upfront costs and lack of clear guidelines were noted as barriers to implementing sustainable practices, especially for small-scale projects.

Regional climate variations influenced the effectiveness of sustainable strategies, requiring localized solutions.

2. Technological Advancements in Design

a. Smart Integration Successes

Implementation of IoT devices and AI-driven systems improved energy efficiency by up to 30%, particularly in lighting and HVAC management.

Occupants reported increased comfort and convenience due to smart features, such as adaptive lighting, voice-controlled devices, and automated climate control.

b. User Interaction Insights

Surveys revealed that intuitive and user-friendly interfaces were critical for the successful adoption of smart technologies.

Complicated or poorly integrated systems often led to user frustration, highlighting the need for seamless design and usability testing.

c. Limitations

Initial setup costs and the need for regular maintenance emerged as significant challenges for technology adoption.

Privacy concerns regarding data collection and monitoring within smart environments were frequently raised by users.

3. Well-being Improvements

a. Positive Impact on Occupant Health

Biophilic elements, such as indoor greenery and natural lighting, were found to reduce stress and enhance productivity by 15-20%.

Spaces with improved acoustics and air quality saw a decrease in occupant complaints regarding fatigue and irritation.

b. Psychological and Social Benefits

Incorporating flexible layouts and communal areas fostered social interaction and collaboration, especially in workplace interiors.

Residential interiors with wellness-focused designs, such as meditation rooms or relaxation corners, improved mental health and overall satisfaction.

c. Challenges in Measuring Well-being

Subjective indicators like emotional well-being were difficult to quantify, requiring more qualitative approaches like interviews and diaries.

Cultural and demographic differences influenced perceptions of well-being, requiring tailored design solutions.

4. Synergies Between Sustainability, Technology, and Well-being

a. Holistic Benefits

Projects that successfully integrated all three pillars achieved superior environmental performance, operational efficiency, and occupant satisfaction.

For example, net-zero energy buildings with biophilic design principles and smart technology integration significantly enhanced both environmental and human outcomes.

b. Innovations in Design Practice

Designers reported using advanced software tools (e.g., BIM, VR simulations) to model and predict the impact of integrated solutions, leading to more informed decision-making.

Collaborative approaches involving multiple stakeholders—designers, engineers, and psychologists—emerged as a critical factor for success.

5. Practical Applications and Recommendations

Guidelines for Practitioners: Results were synthesized into actionable frameworks and toolkits to guide interior designers in implementing integrated solutions.

Prototype Models: Testing prototype interiors validated the feasibility of combining sustainable materials, smart technologies, and well-being features.

Educational Outcomes: The study underscored the need for training programs in sustainable and technology-driven design to equip professionals with the necessary skills.

6. Challenges and Limitations

a. Cost and Accessibility

High costs associated with advanced technologies and premium sustainable materials were highlighted as key obstacles, particularly in low-budget projects.

Limited access to region-specific data hindered the scalability of proposed solutions.

b. Standardization Issues

Lack of comprehensive and universally accepted assessment criteria made it difficult to benchmark and compare projects effectively.

c. Technological Dependency

Over-reliance on technology without adequate backup systems posed risks, especially during power outages or technical failures.

Discussion

1. The Interconnected Nature of Sustainability, Technology, and Well-being Synergistic Relationships

The intersection of sustainability, technology, and well-being is a dynamic space where each element amplifies the benefits of the others. For example,

smart systems designed to optimize energy usage (technology) not only lower environmental impact (sustainability) but also ensure thermal comfort and convenience for occupants (well-being).

These synergies emphasize the need for holistic design strategies that simultaneously address environmental, operational, and human factors.

Balancing the Three Pillars

Striking a balance between these pillars remains a key challenge. For example, prioritizing advanced technology without addressing sustainability could lead to energy-intensive solutions, while neglecting well-being could result in spaces that fail to support user needs.

Integrative frameworks are necessary to ensure that no pillar is overlooked in the design process.

2. Impacts on Interior Design Practices

Redefining Design Goals

The findings demonstrate a shift in the goals of interior design from aesthetics to functionality, sustainability, and user health. Designers must now consider life cycle impacts, resource efficiency, and inclusivity as fundamental aspects of their work.

This redefinition has encouraged the adoption of multidisciplinary approaches, where collaboration with environmental scientists, engineers, and psychologists enhances outcomes.

The Role of Technology

Technologies such as IoT, AI, and energy management systems have introduced unprecedented levels of efficiency and adaptability in interior spaces. These tools enable dynamic responses to occupant behavior and environmental conditions, making spaces smarter and more user-friendly.

However, the rapid pace of technological innovation poses challenges, including obsolescence, high costs, and the need for continuous user education.

3. Challenges and Barriers

Cost and Accessibility

High costs associated with sustainable materials and advanced technologies remain a primary barrier, especially for low-income communities and small-scale projects.

Solutions such as government incentives, mass production of sustainable materials, and open-source technological platforms can help bridge this gap.

User Adoption and Usability

For technology to be effective, it must be intuitive and user-friendly. Poorly designed interfaces or overly complex systems often result in underutilization, reducing the potential benefits of smart technologies.

The study suggests the need for user-centric designs that prioritize ease of use and education.

Subjectivity in Measuring Well-being

Unlike sustainability and technology, well-being is inherently subjective, making it challenging to quantify its impact on design. Cultural, demographic, and personal preferences influence perceptions of well-being, requiring tailored solutions.

Regional Adaptation

Solutions effective in one geographic or cultural context may not be applicable elsewhere. For instance, passive cooling techniques may work well in tropical climates but are less effective in colder regions.

Adapting designs to local conditions while maintaining global relevance is a critical area for improvement.

4. Opportunities for Innovation

Material and Process Innovation

The development of affordable, sustainable materials, such as bio-based composites, recycled options, and modular systems, has the potential to revolutionize the industry.

Advanced manufacturing techniques like 3D printing and prefabrication can enhance precision and reduce waste, aligning with sustainable design goals.

Technological Evolution

Emerging technologies such as augmented reality (AR) and virtual reality (VR) can allow designers and users to visualize spaces and test configurations before implementation, improving decision-making.

AI and data analytics can help optimize designs for energy efficiency, resource use, and occupant preferences in real time.

Promoting Inclusivity and Equity

By focusing on universal design principles, interior spaces can become more inclusive, ensuring accessibility for people with disabilities, the elderly, and other underserved groups.

Combining inclusivity with sustainability and technology creates environments that benefit diverse populations, fostering equity and social sustainability.

5. Policy and Industry Implications

Regulatory Support

Policymakers play a vital role in encouraging sustainable and well-being-driven designs through incentives, subsidies, and regulations. For instance, mandatory green building codes can drive widespread adoption of these practices.

Industry certifications like LEED and WELL provide measurable benchmarks for success, motivating designers to pursue higher standards.

Education and Training

As the field evolves, education systems must adapt to prepare future designers for the complexities of integrating sustainability, technology, and well-being.

Interdisciplinary programs that combine design, engineering, and environmental science can help bridge knowledge gaps and promote innovative thinking.

6. Broader Implications

The integration of sustainability, technology, and well-being reflects a fundamental shift in how spaces are conceived and utilized. These approaches directly address the challenges posed by urbanization, environmental degradation, and shifting lifestyle demands.

For Designers: This approach expands their role from creating visually appealing spaces to shaping environments that positively impact the planet and its occupants.

For Occupants: Smart, sustainable, and well-being-focused designs enhance quality of life, productivity, and health.

For the Planet: Reducing energy use, waste, and emissions contributes to mitigating climate change and preserving resources for future generations.

Conclusion

Designing for the future by integrating sustainability, technology, and well-being in contemporary interior spaces reflects a transformative approach to interior design. This integration prioritizes not only aesthetic and functional aspects but also the broader impacts on the environment, technological innovation, and human health and happiness.

Key Insights

1. Sustainability

Emphasizing sustainable practices, such as using eco-friendly materials and energy-efficient systems, reduces environmental impact and supports the global agenda for a more sustainable future.

Life cycle thinking and circular design principles ensure the longevity and adaptability of interior spaces, minimizing waste.

2. Technology

The incorporation of smart technologies, IoT, and AI empowers designers to create adaptable and

efficient environments that optimize energy use, resource management, and user experiences.

These advancements also pave the way for more interactive, customizable, and future-ready interiors.

3. Well-being

Designs that prioritize natural light, air quality, biophilic elements, and acoustic comfort significantly improve physical and mental well-being.

Inclusive and accessible design ensures that spaces cater to diverse populations, fostering equity and enhancing overall quality of life.

Challenges to Address

Despite its promise, this approach faces challenges, including:

1. High initial costs of sustainable materials and advanced technologies.
2. The need for user education and ease of use for technological systems.
3. Measuring subjective aspects of well-being and addressing cultural variability in design preferences.

Opportunities for the Future

1. **Material Innovation:** Developing cost-effective and high-performance sustainable materials.
2. **Advanced Technologies:** Leveraging AI, AR, and predictive tools to optimize design decisions.
3. **Policy Support:** Encouraging adoption through regulations, incentives, and certifications.
4. **Education:** Training designers to adopt interdisciplinary and human-centered approaches.

Final Thoughts

Designing for the future requires a paradigm shift in interior design, moving beyond traditional aesthetics to embrace sustainability, technological advancement, and user well-being. By adopting this integrated approach, the industry can contribute to

a healthier, more equitable, and environmentally responsible built environment. This vision not only addresses current challenges but also sets a foundation for creating spaces that are adaptable, inclusive, and resilient for generations to come.

REFERENCES

1. Lighting Trends for 2025

These 6 Lighting Trends Will Be Illuminating Homes in 2025.

This article discusses upcoming lighting trends that blend technology, design, and sustainability, including organic shapes, smart features, wellness-focused lighting, and sustainable innovations.

2. Future Living and Design Trends

How will we live in 2025? Trends in design, interiors and gardening to look out for.

This piece explores anticipated trends in interior design, emphasizing DIY aesthetics, multifunctional items, sustainable materials, and the integration of nature to enhance well-being.

3. Furniture Trends Emphasizing Sustainability and Well-being

6 Furniture Trends That You'll See in Every Home in 2025, According to Designers.

This article highlights furniture trends focusing on organic materials, sustainable designs, and personalized pieces that contribute to well-being.

4. Sustainable Interior Design Practices

Sustainable interior design integrating technology in eco-friendly spaces

This resource provides tips on creating sustainable interiors that incorporate technology to enhance eco-friendliness and occupant well-being.

5. Disaster-Resilient and Sustainable Homes

New Tech Tries to Catastrophe-Proof Your Home

This article discusses how emerging technologies and sustainable building practices are creating homes that are both energy-efficient and resilient to natural disasters.

6. Case Study: Sustainable Home Design

This Sustainable Home in Brazil Blends Into Nature

An Architectural Digest feature on a Brazilian residence that seamlessly integrates sustainable design, technology, and well-being by incorporating natural light, eco-friendly materials, and smart design elements.

Books and Journals

1. "Sustainable Design for Interior Environments" by Susan M. Winchip

This book discusses strategies for incorporating sustainability into interior design, focusing on eco-friendly materials, energy-efficient designs, and human well-being.

2. **“Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life”** by Stephen R. Kellert and Elizabeth F. Calabrese

A comprehensive guide to integrating biophilic principles in design, emphasizing the positive impact on occupant well-being.

3. **Journal of Sustainable Design and Interior Spaces**

Articles on emerging technologies and their integration with sustainable design practices in interior spaces.

Research Articles

4. **“The Impact of Smart Technologies on Sustainable Interior Spaces”**

This study explores the role of IoT and AI in creating adaptive, efficient, and sustainable interiors.

(Journal of Advanced Design, 2024)

5. **“Indoor Environmental Quality and Its Role in Human Well-being”**

A systematic review highlighting how interior design can improve air quality, lighting, and acoustics for better health outcomes.

(Environmental Design Research Journal, 2023)

Reports and White Papers

6. **“Designing for Resilience: A Roadmap to Sustainable and Smart Interiors”**

Published by the International Interior Design Association (IIDA), this report outlines strategies for integrating sustainability and technology into interiors while enhancing occupant well-being.

7. **“Smart and Sustainable Interiors: Trends and Challenges”**

A white paper by the American Society of Interior Designers (ASID), focusing on the intersection of smart technologies and sustainable practices in modern interiors.

Online Articles

8. **“Future-Proofing Interior Design with Sustainability and Technology”**

An article discussing how designers are embracing emerging technologies to create eco-friendly, health-focused spaces.

(designboom.com)

9. **“The Role of Biophilic Design in Enhancing Workplace Wellness”**

This piece highlights how incorporating natural elements into workplace interiors improves employee productivity and satisfaction.(workdesign.com)

Case Studies

10. **“Net-Zero Interior Spaces: A Case Study”**

Analysis of a residential project that combines smart technologies and sustainable design to achieve a net-zero energy interior.

(Green Building Council Report, 2023)

11. **“Transforming Urban Apartments with Smart and Sustainable Design”**

A case study on integrating AI-driven smart systems with recycled materials in urban housing.

(Urban Design Institute, 2024)

RETHINKING ON THE DEVELOPMENT OF THE INDIAN SUGAR INDUSTRY

Dr. Atul Kumar¹, Prachi Chaudhary², Shruti Mittal³, Anas Rana⁴

^{1,2}Assistant Professor

^{1,2}Department of Commerce, S. D. College of Commerce, Muzaffarnagar (U.P.)

^{3,4}Assistant Professor

^{3,4}Department of Business Administration, Shri Ram College, Muzaffarnagar (U.P.)

ABSTRACT

The article comprises an extensive primary research study using a structured questionnaire and semi-structured interviews with industry experts on emerging issues in the sugar industry value chain. Applicants were selected using purposive collection for the primary research and the quantitative data collected was validated through multi-stream modeling. It has been observed that the government, as a central formulation, has a deep presence in the entire value chain: supplier mechanism, sugar marketing and infrastructure expansion of sugar industries. This is a cost-by-cost issue. Instead of an authoritarian state policy, sugar policy is based on mutual, rational and proportionate interests: government, industry managers and sugarcane farmers make collective decisions and diversify. The chronological proposed solution problem.

Introduction

The name 21st century derives from the fact that Asian economies are primarily based on agriculture. Agricultural industries such as sugar are the primary source of rural income and employment in the economy.

The Asian sugar industry studies the global sugar market year after year. Thailand has become the world's second largest exporter after Brazil, Indonesia and India and the world's third largest importer after China and the Philippines. There are many examples of Asian countries becoming versatile exporters in the last decade. Sugar industry holds an important place among the organized industries in India. India is known as the birthplace of sugar and sugarcane. India is the world's number one sugar consumer and second largest sugar producer. India has also managed to remain among the top 10 sugar exporters worldwide for the last 5 years. Moreover, the Indian sugar industry generates huge revenues; around Rs 30

billion annually to the Indian exchequer and provides many social and economic benefits to the sugarcane growers. Considering the important role of sugar industry in the Indian economy.

Apart from promoting rural development, sugar wholesalers, retailers and entrepreneurs scattered across India also benefit from the activities of the sugar industry. India is in the fundamentals i.e. 5.40 million hectares respectively.

The sugar industry has been fighting for decades and debt on sugar cane is deeply all the conditions for the culture of sugar cane; Currently, 32.35% of the total price payable to farmers is registered as a debt and the difference between the total year after payment contributions. An additional aspect of this incredible story is associated with the productivity of the sugar industry of India.

Thirty percent of the net worth of major sugar factories is considered negative, almost all factories have negative retained earnings, and the debt ratio

has reached alarming levels. This calls into question the solvency of the sugar industry. Also, profitability indicators such as net profit margins and ROCE have been in the 1-10 range for the past decade. But in recent years, many sugar industries have filed for insolvency, but the Indian government does not support the idea of insolvency or liquidation instead of working on viable and feasible solutions for revival. In the face of this terrible decision of this industry, there has been a discussion on identifying the problem areas and development system in all the activities of the chain, the Indian sugar industry has become of paramount importance. Consistently, the study is structured as follows: first, the literature on the determinants suggested by Centobelli (2016, 2017) is reviewed to gain insight into the development system of the global sugar market, followed by a brief description of the Multi-Streams model – a theory of policy making and its application in the presentation of quantitative and qualitative research.

Key factors determining the development of the sugar industry

Co distortions persist in the world sugar market, with freely traded sugar accounting for only 30-40% of total sugar production. Furthermore, global sugar is characterized by a certain protectionism imposed by respective governments, diversified sugar production systems (with sugarcane and sugar beet as raw materials), standardized and non-standardized plant infrastructures, anomalous supply patterns and different marketing practices. Not surprisingly, these specific characteristics offer many opportunities for development, as they also present various challenges for the industry. It should be noted that the global sugar industry is a combination of a wide range of diverse producers and exporters, but the background literature presented below focuses mainly on examples from some Asian sugar economies, India, China, Thailand, although brief examples from Australia, Brazil, the European Union and Africa are also cited in the following sections.

Development and government support system

Firstly, and most importantly, the role of the government cannot be underestimated. The government is considered to be the main actor in shaping public sector organizations. In particular, in the case of agricultural products, the government is too clear. In fact, the government helps a lot of protection and control over domestic production is not alone and international trade is intended. This next section therefore highlights the support of experts and governments, and the opposition to conservatism, in the context of large sugar-producing economies. The classical principles of the industry favor free trade in products, also known as the trade openness element. However, although international trade is on the rise and is expected to flourish in a relatively free environment, some companies continue to take excessive protectionist measures due to vested interests, political interests, the spread of aggression and the particularities of the industry. Similarly, the simplicity of the sugar economy attracts discerning buyers from around the world, ensuring better trade expectations for both countries in the Aryan economic bloc. Thailand, China and India share a tradition of sugar protection, but what is going on in these economies? These highly protected countries dishonestly inflate prices and favour domestic producers by sharing domestic costs, resulting in higher costs for customers. These efforts have led to a decline in competitiveness in sugar production and export. Observations from the existing literature suggest that such isolationist decisions have always been driven by political objectives and underpinned by national sovereignty, with mass consumers considered superior in a free trade environment. In the meantime, one has to appreciate the efforts made to avoid protectionism and regulation, and there is substantial empirical evidence that regulation is being implemented. The long-awaited deregulation was introduced in 2013 in India to stabilise the industry in question.

Marketing mechanism and development

Four main disciplines support global sugar marketing: price, location, product, and promotion, all unique to Brazil Sugar and ethanol production in Brazil is heavily dependent on the world's largest supplier-based blend of raw, refined, conventional and alternative sweeteners, manufactured by major sugar marketing promotions. Centuries ago, large-scale raw sugar production was simply a cash-grab system driven by accumulated profits that could be claimed when exporting refined sugar made from imported raw sugar. In this study, India and Thailand are the major producers of raw sugar.

In case of India, marketing and promotion benefits are announced by the Indian government to motivate producers to produce raw sugar and export it. Even though sugar prices have remained stable for five years, these sugar economies have experienced consolidation and diversification of activities. As a result, these countries are highly economically viable in producing refined sugar from raw sugar.

Australia, which is home to large-scale raw sugar production, and India continue to purchase and export raw sugar from countries with surplus finished products for the rest of the world. Let's start with India. India's sugar policy includes a wide range of approaches: sales, marketing and pricing systems. Currently, the Indian sugar industry has two types of price structures.

It is a reasonable price setting system for state advice and fair prices, and has received prices according to the official distribution of income by sugar cane.

Mechanism and growth of supplier

Relations between manufacturers and owners of sugar industries have always been a particular problem in all sugar industries. The economy and the opposite policy are always supported by the two parties. According to Goucher et al., competition in the sugar market is highly dependent on good

relationships between all stakeholders, especially producers and mill owners. It also noted that the discussed stakeholders integrated supply mechanism was proposed as a holistic solution for better alignment that can ensure optimal capacity utilization across all plants and support development. The feedstock, sugarcane, is a globally controlled and very low margin commodity. In fact, it is expected to have a factory nearby. In the sugar industry, this is a constitutional duty called the "Zoning System", and two parties are linked to agreements on the guarantee of the manufacturer and the requirements of the industry owner. Generally, this type of arrangement was introduced to address the domestic problem of malnutrition, especially in India. Even the supply of discarded sugarcane varieties has put an additional strain on the industry. However, farmers have to wait for long periods of time for their turn to unload the trucks at the factory premises to sell their produce to the associated factories, which ends up affecting the sucrose content.

Business diversification and development

Diversification is a viable way to increase productivity, achieve economies of scale, and solve financial problems arising from a single production process. This can be attributed to highly related product lines such as: Integrated glycoconjugates are diverse and valuable phenomena that generate green energy such as bioethanol, bioenergy, and biofertilizer. The entire sugarcane biomass (Food cum-bio-commodity) is usable which signifies that all remaining in the entire value chain can yield significant revenue. After some time it is founded that the industries with power generation plants are earning higher revenue and profits than those who have so far adopted the ISC model.

On the other hand, being a sustainable source of clean energy and fuel, cane ethanol producers (in case of excess production as an optional choice to sell their products), sugar producers (declining financial viability as a viable business) due to its importance.

To diversify the article, the oil marketing company (to fulfill obligations as per government orders) and the government.

Internal infrastructure and industry development

In sugar production, the proportion of labor costs in the total production cost is high, so mechanization is increasing in both the cultivation and milling processes. Furthermore, the choice between raw and refined sugar production also depends on government support, and the infrastructure mainly consists of the installation of refineries, the renovation of production and processes (installation of new plants and tools in the sugar industry), mechanization of agricultural processes, etc. Components such as TQM, introduction of ICT, and compliance with environmental safety standards.

Research methodology and data

After research and observation, it can be said that this study is mainly focused on discussing the development options available in the area of current political trends. According to information obtained from reports of research agencies (Food and Public Distribution Board of India, Indian Sugar Mills Association, CRISIL), reputed trade journals and databases such as the database that records the financial crisis faced by the industry have identified it as the major issue of financial crisis faced by the industry and listed companies by economic watchdogs in India. Moreover, sugar is a controlled commodity situation in India and since the introduction of the Industry Protection Act, 1932 and enactment of customs duties, relevant laws and legislations have regulated and prescribed various aspects of its pricing, marketing, distribution, export etc. advice.

Furthermore, the study was conducted from 2013 to 2015 keeping in mind the dire financial situation of the industry in question and to identify feasible and crucial factors for its viable growth. The primary respondents for this study were selected using an objective judgment sample from senior and middle

level managers. The sampling technique is essentially based on the cognitive selection of certain participants who are considered to be more informative. The adoption of this sampling technique also depends on the nature of the field of activity being studied and the availability of limited resources. The research approach adopted was mixed in nature, with survey methodology being the primary tool and qualitative discussions being the result of informal discussions with survey respondents during and after the quiz was completed. The questionnaire was designed to address the pre-established issues and more broadly the current political dynamics and viable solutions. Of the total 675 industry professionals, senior executives and listed sugar industry have extensive experience in the industry.

10. The supporting system of government

This segment is concerned with presenting the exact reason for government involvement in the industry and is selected on the basis of inspection bases such as frequency of intervention, associated benefits and the underlying nature of government regulations and assistance in the multidimensional radar chart approach to information. The maximum number of petitioners expresses the fact that the government continues to hamper the functioning of the sugar market, reflecting the malpractices of the industry. However, some candidates agree to encourage the government's role in providing insurance packages at a certain work scale. Therefore, it is very important that the government immediately asserts to complete the sugar industry. In other words, it is at the terrible entrance.

The mechanism of marketing

The marketing structure of the Indian sugar industry is a bit complicated in terms of transparency and business conduct. The published literature is rich in discussions on sugar and sugarcane pricing policies, sugar distribution policies and sugar supply to the domestic market. It was observed that as

finished sugar is under control, there is a need to harmonise decisions on raw materials like cane prices, separation system, quality of cane to be crushed etc. It has also been suggested that pricing system and national trade policy on balancing sugar production and cane prices are areas where the Government of India needs to pay special attention to other products. On the other hand, the prices of sugarcane and sugar are not set by sugar manufacturers, and the prices of raw materials are not based on quality standards. The sugar industry should not pay an amount less than the statutory minimum price determined by the government as per the sugarcane pricing, irrespective of its quality and the prices in excess of this statutory minimum price shall be fixed at the state level in form of SAP.

Conclusion

It is a well-known adage that the Indian sugar industry is “cyclical and sustained by the continuous support of the government” because the problem in the sugar sector is that the President has to take responsibility for many employees falling ill constantly. Therefore, the objective of this study is to justify the aspects of development that may increase the excessive ambition of the industry. Some voting issues published in the media have been impulsively highlighted by industry professionals with viable and trendy development solutions. Between the partial denationalization measures, special attention has

been paid to the sugar marketing mechanism and, in particular, the abolition of the levy quota and the early release system, a clear improvement has been seen in the declining sugar history yearbooks. Similarly, the FRP pricing system announced by the UPA government is also awaiting policy directions from various reputed committees grappling with the barrier of partial implementation. Supremacy of state governments; particularly, the pricing mechanism which is hampering the competitiveness of the sector at national and international levels. Moreover, isolationism is continuing in the 12th Five Year Plan; hence, this dominant industry needs a truly comprehensive solution because as per their approach and previous research, these subsidized and protectionist measures cannot ensure the development of the sector in the long run. In the analysis section, as we have seen, the industry largely supports exports as a source of liquidity by linking export policy harmonization and financial sustainability; furthermore, the Government of India has rectified the regulations of the sugar industry from time to time to provide relief to it. After improving sugar policy and marketing, diversifying production process and introducing technology across states to be at par with competitors. This emulsion seems viable for the country in terms of total installed capacity, biomass power and electricity generating capacity. India is among the top 5 sugar economies.

REFERENCES

1. Andrews Ganj, New Delhi-110049. Center for Monitoring Indian Economy
2. Anonymous, (2001) Indian Sugar Year book, Volume 1, Indian Sugar Mills Association
3. (CMIE), (2004) Agriculture, February, CMIE Pvt. Ltd, Mumbai-400093.
4. Kothari C.R., "Research Methodology Methods & Techniques", Second Edition, New Delhi, New Age International publisher, 2004.
5. Dr. Tulsian P.C., "Financial Management", New Delhi, S. Chand & Company Ltd.,2009.
6. Singh Yogesh Kumar, "Fundamental of Research Methodology and Statistics", New Age International (P) Ltd., Publishers, New Delhi, 2006.
7. Government of India, (1965) Sen Inquiry Commission Report on Sugar Industry of India, New Delhi: Ministry Of Food, Govt. of India.
8. Government of India (1969) Tariff Commission Report on Cost Structure of the Sugar Industry and the Fair Price for Sugar, New Delhi.

ECO-FRIENDLY TEXTILES: THE FUTURE OF FASHION DESIGN

Soni Srivastava

Assistant Professor

Faculty of Fine Arts, Shri Ram College, Muzaffarnagar, Uttar Pradesh, India

ABSTRACT

Sustainable fashion is beginning to emerge, even as more awareness about environmental issues becomes popular and as people start demanding ethicality in practice. This paper discusses eco-textiles, which are textiles derived from renewable, biodegradable, or recycled sources and are eco-sustainable alternatives to the environmentally polluting and resource-depleting traditional practices in fashion. The paper discusses prime innovations such as organic cotton, hemp, bamboo, recycled materials, and lab-grown leather, as well as by-products from algae-based textiles. Besides this, there are processes such as waterless dyeing and circular design principles, which also make it possible to decrease waste. Just as eco-friendly textiles are most likely to affect reductions in fashion carbon footprint, boost consumer perceptions, and benefit contributing efforts to make the entire world a more sustainable space, some challenges still remain: on cost and scalability, and consumer acceptance.

I. INTRODUCTION

Sustainable textiles are bringing a paradigm shift in the fashion industry through innovation and sustainability. People now prefer the sustainable practices of fashion as an increased awareness of environmental concerns. These eco-textiles are made from renewable, biodegradable, and recycled sources, which can reduce environmental harm, waste, and healthy and ethical production practices.

As even greener fabrics are put to use, eco-friendly fashion does not only bring with it efforts to tackle important issues such as pollution and resource depletion, but it also speaks for the future of fashion design, taking the industry to new and exciting dimensions. Innovations like organic cotton, bamboo fabrics, and bio-fabricated materials such as lab-grown leather and algae-based fibers demonstrate the potential to marry aesthetics, functionality, and sustainability.

In addition, the combination of sustainable dyeing processes and waterless processing technologies

underlines the commitment to minimizing garment production's ecological footprint. Eco-friendly apparel has paved the way for circular fashion economics, where waste remains limited and resources can quickly renew these into a continuous lifecycle for garments.

The outcome in this new age is that eco-friendly textiles have transcended a mere trend; they form the bedrock on which future fashion design is constructed, with the promise of perfect equilibrium between style, innovation, and environmental responsibility.

II. BACKGROUND AND SIGNIFICANCE

2.1 The Evolution of Sustainability in the Fashion Industry

It's got a complete makeover. Of course, gone are the days when fashion meant casual trends and mindless spending; today, the industry is moving to the texture of sustainability. Historically, the world of fashion has had its share of things-in-the-headless-cost and volumes. But, in real terms, it has been

ignoring the larger emitters, even to the extent of considering them hermetically infeasible. In these last couple of decades, awareness of issues like climate change, exhaustion of resources and unethical working conditions have increased several folds, bringing traditional practices into greater scrutiny. As a result, sustainability has emerged quite prominently, along with demanding brands to relay eco-friendly materials, enhance innovative technologies, and introduce circular design principles.

2.2 Environmental Challenges in Traditional Fashion Practices

The environmental impact of traditional textile production is staggering:

- i. **Water Usage:** Cotton farming and textile dyeing are among the largest consumers of freshwater resources. Producing a single pair of jeans can require over 7,000 liters of water.
- ii. **Carbon Emissions:** The global fashion industry contributes approximately 10% of annual greenhouse gas emissions, more than the aviation and shipping industries combined.
- iii. **Waste Generation:** Fast fashion encourages disposable clothing, leading to 92 million tons of textile waste annually, much of which ends up in landfills.

2.3 Ethical Concerns in the Fashion Industry

Besides the environmental challenges the industry has faced, it has been accused of exploitative labor practices like unsafe working conditions, unfair wages, and even child labor. The solutions to these problems currently include fair trade and the use of cruelty-free materials as ethical production methods. Eco-friendly textiles provide such a solution as environmental sustainability and ethicality are jointly promoted in manufacturing.

2.4 Eco-Friendly Textiles as a Catalyst for Change

The cornerstones of typical sustainable fashion rely heavily on eco-friendly textiles. These materials are produced from renewable, biodegradable, and recycled sources to meet environmental and ethical issues created by conventional textiles. Eco-friendly textile promises to represent the new birth in this country not only because it is high quality and durable but also by an innovative approach that leaves behind the present world global environmental goals.

2.5 Significance of the Study

This research is significant because it:

- i. Highlights the environmental and ethical benefits of adopting eco-friendly textiles.
- ii. Examines the potential of sustainable materials to reduce carbon emissions, conserve resources, and minimize waste.
- iii. Provides insights into innovative production techniques and circular design principles.
- iv. Serves as a roadmap for fashion designers, manufacturers, and policymakers to transition toward a sustainable future.

III. MATERIALS IN ECO-FRIENDLY TEXTILES

3.1 Natural Fibers

- i. **Organic Cotton:** Grown without chemicals; soft and breathable.
- ii. **Hemp:** Durable, water-efficient, and carbon-negative.
- iii. **Bamboo:** Rapid-growing, antibacterial, and soft; best when mechanically processed.
- iv. **Linen (Flax):** Minimal water use; biodegradable and durable.
- v. **Wool:** Renewable, insulating, and biodegradable.

3.2 Recycled Materials

- i. **Recycled Polyester (rPET):** Made from plastic bottles; reduces waste and energy use.
- ii. **Recycled Cotton:** Repurposed scraps or garments; lowers water usage.
- iii. **Recycled Wool:** Reused wool garments; retains warmth and durability.

3.3 Innovative Bio-Materials

- i. **Mycelium Leather:** Fungi-based, cruelty-free leather alternative.
- ii. **Algae Fibers:** Lightweight and biodegradable from renewable algae.

iii. **Piñatex:** Leather alternative from pineapple leaves.

iv. **Orange Fiber:** Silk-like fabric from citrus by-products.

3.4 Sustainable Dyes and Finishes

i. **Natural Dyes:** Plant-based, biodegradable colors.

ii. **Low-Impact Dyes:** Energy-efficient and non-toxic.

iii. **Eco-Friendly Finishes:** Plant-based water repellents and natural antibacterial treatments.

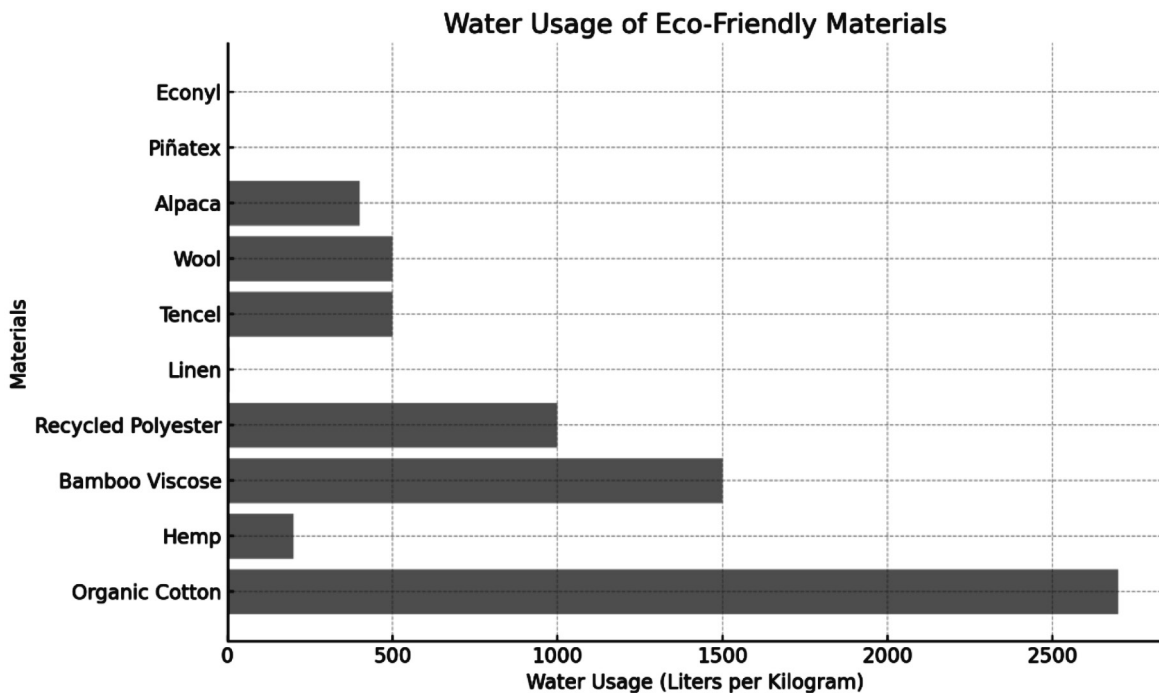


Figure 1: A Graph comparing Water Usage(Litres per Kilogram and Eco-Friendly Materials)

IV. DESIGN AND IMPACT OF ECO-FRIENDLY TEXTILES

Eco-friendly fabrics are to encourage transformation in green, eco-friendly design, and profound social, environmental, and economic transformations. Design strategies like zero-waste patterns, circularity, and minimalism aim to reduce fabric waste, increase longevity in products, and promote resource-efficient manufacturing. Such type

of textiles significantly reduces carbon production through their renewable energy, recycled materials, and carbon-negative fibers such as hemp. Water conservation is highly promoted through organic farming and water-less dyeing techniques that conserve millions of liters yearly. Recycling and upcycling cut down landfill contributions further into a circular economy.

Such fabrics will give social support to ethical

labor practices, assuring fair labor standards regarding wages and safety conditions, and empowering marginalized groups through fair trade programs. The market awareness has been raised through a transparent supply chain and through certifications such as GOTS or OEKO-TEX to encourage eco-conscious buying. Innovations in eco-textiles promise aesthetics through natural dyes and unique textures, along with high-tech features like antimicrobial property, UV-protection, and moisture-wicking to elevate functionality. Eco-textiles pave the way, merging sustainability, style, and practicality, for a greener, more responsible future in fashion and design.

V. RESULTS AND FUTURE DIRECTIONS

The results of the initiatives are now obvious. Environmentally, there is a phenomenal reduction in water use, carbon emissions, and chemical pollution. Economically, the green fashion market expands and creates opportunities for innovation, the design of ethical business models, and bold savings as renewable resources become more widely available. Socially, greener practices better labor conditions, provide fair wages, and build more trust and engagement between brands and their consumers.

The future of eco-friendly textiles lies in the integration of advanced technologies and sustainable practices. Innovations such as bioengineered materials like mycelium leather and algae-based fabrics will replace traditional animal and synthetic products. Smart textiles, capable of adapting to environmental conditions, will merge sustainability with cutting-edge functionality. A circular economy will become central, with efficient recycling systems transforming old textiles into new products, alongside increased use of biodegradable materials. Manufacturing processes will evolve with waterless dyeing and renewable energy becoming standard, reducing resource consumption and emissions. Additionally, global policies and consumer education will drive greater transparency and encourage shifts toward slow fashion and responsible consumption.

Environmental Benefits

- i. Significant reductions in water usage, greenhouse gas emissions, and chemical pollution. For instance, recycled polyester reduces emissions by up to 75% compared to virgin polyester.
- ii. Increased use of renewable resources like hemp and bamboo, which regenerate quickly and absorb CO₂ during growth.

Economic Opportunities

- i. Growth in the sustainable fashion market, offering new business models and job opportunities in recycling, upcycling, and ethical production.
- ii. Reduced long-term costs for brands adopting sustainable practices, as renewable materials and energy sources become more cost-effective.

Social Impact

- i. Improved labor conditions and fair wages through ethical sourcing and production.
- ii. Greater consumer engagement with brands that prioritize sustainability and transparency.

VI. CONCLUSION AND RECOMMENDATIONS

Summary of Key Findings

The fashion industry is undergoing a significant transformation toward sustainability, driven by growing concerns over environmental impact, resource depletion, and social responsibility. Key findings from this research highlight the following:

- 1. Environmental Impact of Traditional Textiles:** Traditional textiles like Cotton, Polyester, and Leather consume large amounts of resources, water, energy, and chemicals in their production, contribute to pollution, and create waste. Alarm bells have been rung with regard to their contribution

to global warming and biodiversity loss because other such practices also continue.

2. Emergence of Eco-Friendly Alternatives:

Such innovations as organic cotton, hemp, bamboo, recycled fibers, and plant-based leathers are eco-friendly innovations that give usable alternative fibers. Hence, these are sources of environmental footprint minimization by using little water, minimizing waste, and reducing the use of harmful chemicals.

3. Consumer Demand for Sustainability: With heightened awareness of environmental and ethical issues, consumers increasingly prefer custom sustainable fashion. Hence, they are now going green by brands investing in sustainable practices and materials.

4. Technological Advancements in Fabric Production: Bio-fabrication technologies and other innovations like textile recycling and circular design models are changing the fashion industry, allowing less wastage and the production of high-performance fabrics with minimum environmental impact.

5. Challenges to Scaling Eco-Friendly Fashion: Despite the progress, challenges

remain, including the high cost of sustainable materials, lack of widespread infrastructure for recycling, and resistance to change within established fashion systems.

The Path Toward a Sustainable Fashion Future

Even if extremely complicated collaboration in the whole supply chain is important for laying down the road to sustainable future fashion, cooperation among designers, manufacturers, consumers, and policymakers will bring about innovation, raise demand for green textiles, and sustain production and consumption. Along with new technological advancements, circular economy-based efforts, and transparency, the fashion industry can move towards mainstreaming sustainability and striving toward a green norm in the near future.

In other words, the future of fashion rests on adopting eco-friendly textiles or practices that reduce environmental damage, improve social accountability and prove sustainable for the existence of the industry. Thus, continuous research, innovation and collaboration will inevitably bring the world closer to a greener and more ethical fashion industry.

VII. REFERENCES

- [1] Fletcher, K. (2014). *Sustainable Fashion and Textiles: Design Journeys* (2nd ed.). Routledge.
- [2] Gwilt, A. (2020). *Fashion Design for Sustainability*. Routledge.
- [3] Muthu, S. S. (Ed.). (2015). *Handbook of Sustainable Apparel Production*. CRC Press.
- [4] Black, S. (2012). *The Sustainable Fashion Handbook*. Thames & Hudson.
- [5] Allwood, J. M., Laursen, S. E., Russell, S. N., Malvido de Rodriguez, C., & Bocken, N. M. P. (2006). *Well Dressed? The Present and Future Sustainability of Clothing and Textiles in the UK*. University of Cambridge Institute for Manufacturing.
- [6] Niinimäki, K. (2018). *Sustainable Fashion in a Circular Economy*. Bloomsbury Visual Arts.
- [7] McDonough, W., & Braungart, M. (2002). *Cradle to Cradle: Remaking the Way We Make Things*. North Point Press.
- [8] Shen, B., Zheng, J., & Chow, P. S. (2014). Perception of corporate social responsibility and sustainability of textile designers. *Journal of Cleaner Production*, 67, 223–230.
- [9] Chan, T. Y., & Wong, C. W. (2012). The consumption side of sustainable fashion supply chain: Understanding fashion consumer eco-fashion consumption decision. *Journal of Fashion Marketing and Management*, 16(2), 193–215.
- [10] Thomas, S. (2018). The complexity of sustainable fashion: Exploring the intersection of sustainability and fashion. *Fashion Theory*, 22(5), 551–571.
- [11] Gardetti, M. A., & Torres, A. L. (Eds.). (2013). *Sustainability in Fashion and Textiles: Values, Design, Production, and Consumption*. Greenleaf Publishing.

EFFECT OF OXYGEN DEFICIENCY AT HIGH ALTITUDE, PREVENTION AND TREATMENT

Dr. Reetu Pundir¹, Dr. Rahul Arya², Dr. Manoj Kumar Mittal³, Isha Arora⁴

^{1,2,3}Department of Basic Science

⁴Department of Home Science

Shri Ram College, Muzaffarnagar

*reetupundirbio@gmail.com

ABSTRACT

High altitude environments pose a significant physiological challenge to humans due to reduced atmospheric pressure and consequently, lower oxygen availability. This paper delve into the physiological effects of oxygen deficiency at high altitude, exploring the body's compensatory mechanisms, the potential health risks associated with acute and chronic exposure, and the process of acclimatization.

Keywords: Hypoxia, altitude sickness, acute mountain sickness (AMS), hypobaric hypoxia high-altitude pulmonary edema (HAPE), high-altitude cerebral edema (HACE) acclimatization, oxygen supplementation

1. Introduction

As altitude increases, the atmospheric pressure decreases, leading to a lower partial pressure of oxygen in the air. This phenomenon, known as hypobaric hypoxia, can significantly impact human physiology. The body's response to this oxygen deficiency involves a complex interplay of physiological adaptations aimed at maintaining adequate oxygen delivery to tissues.

High-altitude illness (HAI) is a group of syndromes caused by hypoxia, which is the major parameter causing a series of physiological alterations.¹ People are becoming more interested in traveling to high altitudes for a variety of reasons, including leisure, work, or sporting activities. At high altitudes, which are generally accepted to be above 2500 m, travelers experience decreased partial pressure of oxygen along with decreased barometric pressure.¹ The human body adapts to hypobaric hypoxia quite successfully, but it takes time to do so. ² A 27-year-old man from Noida who went on a solo bike trip to Leh died due to oxygen deficiency on August 29, a report said.

Chinmay Sharma, a digital marketing executive, worked with a firm based in Noida. Chinmay left for the trip on 22 August 2024, four days later, on August 26, he informed his father that he was experiencing a headache, Times of India reported. His father advised him to take rest and seek medical attention. Later that day, the 27-year-old told his father that he was facing difficulty in breathing. His father asked the hotel manager in Leh to take his son to the hospital. On 29 August 2024, Chinmay Sharma died during treatment. The percentage of Oxygen at sea level is 20-22 per cent and the barometric pressure is around 750-765 mmHg. As the altitude increases, the surrounding air becomes thinner due to a fall in atmospheric pressure. Meaning, fewer oxygen molecules per breath. The air pressure in Leh, Ladakh is around 669 mmHg, resulting in 65% oxygen molecules per breath. At high altitudes, your breathing becomes shallow and your blood becomes thicker as more Red Blood Cells (RBCs) are produced to carry Oxygen. Breathing becomes fast as the lungs try to keep up with less Oxygen. These are normal responses of the body to cope with the changes in surroundings. When the

body doesn't acclimatize, then it won't be able to react to the changes

2. Physiological Effects of Hypobaric Hypoxia

*** Respiratory System**

a. Increased Ventilation

The body initially responds by increasing the rate and depth of respiration (hyperventilation) to compensate for the reduced oxygen availability. This leads to increased carbon dioxide elimination, resulting in respiratory alkalosis (a decrease in blood pH due to excessive loss of carbon dioxide). [1]

b. Alveolar-Arterial Gradient

The diffusion of oxygen from the alveoli to the blood is impaired at high altitude due to the lower oxygen pressure gradient. This can lead to a widened alveolar-arterial gradient, indicating reduced oxygen uptake. [2]

*** Cardiovascular System**

a. Increased Heart Rate and Cardiac Output

To compensate for reduced oxygen saturation, the heart rate and cardiac output increase to deliver more oxygenated blood to tissues. [3] b- Pulmonary Hypertension: Chronic exposure to hypoxia can lead to pulmonary hypertension, characterized by increased pressure in the pulmonary arteries. This can further impair oxygen exchange and increase the workload on the right ventricle. [4] * Hematological System:

b. Increased Erythrocyte Production

The body stimulates the production of red blood cells (erythropoiesis) to increase oxygen-carrying capacity. This process, mediated by erythropoietin, can lead to an increase in hematocrit and hemoglobin levels. [5]

*** Other Systems**

a. Central Nervous System

Hypoxia can affect brain function, leading to symptoms such as headache, fatigue, cognitive impairment, and in severe cases, cerebral edema. [6]

b. Renal System

The kidneys play a crucial role in regulating fluid and electrolyte balance, which can be disrupted at high altitude due to increased fluid loss and altered hormonal responses. [7]

3. Health Risks Associated with High Altitude

a. Acute Mountain Sickness (AMS)

AMS is a common condition that occurs within hours to days of ascent to high altitude. Symptoms include headache, nausea, vomiting, fatigue, dizziness, and loss of appetite. [8]

b. High Altitude Cerebral Edema (HACE)

HACE is a life-threatening condition characterized by fluid accumulation in the brain. Symptoms include altered mental status, ataxia (loss of coordination), seizures, and coma. [9]

c. High Altitude Pulmonary Edema (HAPE)

HAPE is a condition characterized by fluid accumulation in the lungs. Symptoms include shortness of breath, cough, chest tightness, and cyanosis (bluish discoloration of the skin due to low oxygen levels in the blood). [10]

Prevention of acute mountain sickness and high-altitude cerebral edema

Gradual ascent and pre-acclimatisation

Treatment should not take precedence over preventing HAI. The most effective preventative method for all types of HAI is gradual ascending. Since the absolute change in height and ascent pace are the main risk factors for HAI, a slow ascent allows

enough time to achieve a sufficient level of altitude acclimatization. According to Beidleman et al., staging at 2200 m for six days prior to climbing to 4300 m decreased the incidence and severity of AMS.

B.A. Beidleman, C.S. Fulco, S.R. Muza, et al. Effect of six days of staging on physiologic adjustments and acute mountain sickness during ascent to 4300 meters. Although a 2019 Cochrane review reported that the effect of preacclimatisation strategies on improving the risk of AMS as uncertain, it is still sensible recommending gradual ascent according to the results of the studies and extensive clinical experiences.¹¹

Pharmacologic strategies Prophylactic medications are not recommended for the individuals with low risk (ascending <2500 m and with no known history of HAI) but for the ones with moderate to high risk like known previous history of HACE or HAPE and ascending to sleeping altitude (>500 m/day) above 2500 m or any individual ascending >3000 m.^{1,10} As a general acceptance, recommendations for AMS are also applicable to HACE.

Acetazolamide is the main medical agent for prevention of both AMS and HACE

Ibuprofen

Recent studies showed that ibuprofen may be a good alternative for AMS prevention. Although the study results revealed that ibuprofen was effective when compared to placebo, the result of the ones comparing to acetazolamide are contradictory.^{30, 31, 32, 33} Considering the serious side effects such as gastrointestinal bleeding, it makes sense to use ibuprofen (1800 mg daily) when the individual cannot tolerate both acetazolamide and dexamethasone.

Prevention of high-altitude pulmonary edema

Gradual ascent and pre-acclimatisation

The findings of the Baggish study support the idea of a progressive climb for HAPE prevention, along with

the same guidelines for AMS and HACE prevention. The effects of progressive ascension, which some writers refer to as staged ascent, on pulmonary artery pressure (PAP) were examined. They demonstrated that PAP increased significantly with direct ascent and that this was negatively connected with both SaO₂ and PaO₂ levels. PAP increased slightly after 7 days of staged ascent at a moderate altitude; this effect was unrelated to either SaO₂ or PaO₂.¹² The best preventative strategy for HAPE and all types of HAI appears to be progressive ascent, notwithstanding the poor quality of the evidence.

Pharmacologic strategies

Prophylactic medications are not routinely recommended for prevention of HAPE. The only indication is known previous HAPE history, especially multiple episodes.¹

Nifedipine

The best medicine for preventing HAPE is nifedipine, a calcium channel blocker. By decreasing pulmonary vascular resistance, it lowers pulmonary hypertension.¹³ The effect of vasodilators on pulmonary hemodynamics in high altitude pulmonary edema: a comparison.

Nifedipine effectively lowers pulmonary-artery pressure and prevents HAPE without causing substantial hypotension, according to a randomized, placebo-controlled research.¹⁴ The suggested dose for prophylaxis is 20 mg of a slow-release formulation every 8 hours, and it should begin 24 hours before to ascent.

Tadalafil

Tadalafil seems to be effective in preventing HAPE while it's known that it is not effective for AMS.⁴⁰ Furthermore, tadalafil and sildenafil may exacerbate AMS by an unknown mechanism. 10 mg of tadalafil every 12 h may be alternative when the traveler is intolerant to nifedipine.

Dexamethasone

We lack clinical experience and data to recommend dexamethasone as a first line treatment, even though a randomized placebo-controlled trial found that 8 mg of the drug every 12 hours was effective in preventing HAPE. Dexamethasone is only recommended for HAPE prevention when nifedipine and tadalafil are not available.

4. Treatment

The management does not have enough medical equipment and supplies. Consequently, immediate descent is typically the only and best course of treatment, particularly for HACE and HAPE. Only in cases when immediate descent is not feasible should other medical and pharmacological measures be sought as the first line of treatment.

Treatment of acute mountain sickness

When AMS is suspected or diagnosed, ascent should be stopped immediately. Then, severity of AMS based on the symptoms, whether they are progressive or not, should be assessed by physical examination. The treatment options, after the diagnosis is confirmed, are as follows;

Symptomatic treatment

Resting and symptomatic therapeutic options, such as non-opiate analgesic medications for headaches and antiemetics for gastrointestinal problems, can help the majority of people with mild AMS. Two Randomized controlled trials have shown that ibuprofen (600 mg) and acetaminophen (650–1000 mg) are two different non-opioid drugs that are helpful in AMS. Although controlled research for antiemetics are lacking, experienced writers suggest oral ondansetron tablets (4 mg every 4–6 hours) to treat nausea and vomiting in individuals with AMS.¹⁰

Acetazolamide

Although multiple trials have proved the effectivity of acetazolamide in prevention of AMS, there is only

one small study that evaluated role of acetazolamide as a treatment option.⁴⁰ Dexamethasone is the most studied pharmacological agent and it is shown to be the most effective medication for treatment of AMS.

Supplemental oxygen

No studies assessed the role of supplement oxygen therapy in AMS patients, but it is broadly accepted that oxygen delivered at low flow rates is helpful to reduce symptoms in AMS, on the basis of extensive clinical experience. Therefore, some authors recommend that supplemental oxygen can be given to raise oxygen saturation >90% or to resolve symptoms.¹⁰

Treatment of high-altitude cerebral edema

Supplemental oxygen Despite the lack of research assessing the effectiveness of supplement oxygen therapy in HACE patients, numerous writers suggest that, based on clinical experience, supplemental oxygen can be administered to increase oxygen saturation above 90% or to alleviate symptoms.

Portable hyperbaric chambers

Portable hyperbaric chambers are effective treatment alternatives when descent is impossible or delayed, according to a small number of clinical trials and case reports.^{47, 48, 49} Patients must remain in the chamber for extended periods of time to alleviate symptoms, which can occasionally result in a number of issues, including claustrophobia, vomiting, voiding, and communication difficulties.¹⁰ Rescuers should also be aware that symptoms may return after the hyperbaric treatment is stopped.

Dexamethasone

Although there are several trials focused on the role of dexamethasone in AMS patients, no study is focused on its effects in HACE patients. However, some authors suggest that 8 mg loading dose, followed by 4 mg every 6 h (intravenous or intramuscular) should be added to treatment based on clinical experience.^{1,2}

Other treatment options

Routine administration of diuretics, mannitol, hypertonic saline are not recommended in management of patients with HACE, since there are no studies on this subject. Non-steroidal analgesic agents such as acetaminophen (650–1000 mg) or ibuprofen (600 mg) have no effect on the pathophysiology of HACE, but they can be administered to relieve headache related to high altitude.

Treatment of high-altitude pulmonary edema

The best and most reliable course of therapy for HAPE, like with other types of high-altitude disease, is a fall of at least 1000 meters. However, portable hyperbaric chambers, supplementary oxygen, and pulmonary vasodilator drugs (phosphodiesterase-5 inhibitors and nifedipine) may be useful in treating mild-to-moderate HAPE in fully aware individuals or in situations where descent is not feasible. Note that case series, a few observational studies, and randomized controlled trials form the basis of the majority of therapy options for HAPE patients. Clinical experience and the medicines' compelling physiological impact mechanisms are typically the primary justifications for employing these therapy choices.

5. Acclimatization

The body has to adapt to the decrease in Oxygen at a specific altitude. This process is known as acclimatization and generally takes one to three days at any given altitude. There is no substitute for acclimatization.

Acclimatization involves various physiological changes, including:

- a. Increased red blood cell production
- b. Improved oxygen utilization by tissues
- c. Enhanced pulmonary function
- d. Increased production of nitric oxide, which helps to relax blood vessels and improve blood flow

6 Conclusion

Oxygen deficiency at high altitude poses a significant physiological challenge to humans. Understanding the body's response to hypoxia and the associated health risks is crucial for individuals living or traveling to high altitudes. Proper acclimatization strategies and preventive measures, such as ascending gradually and staying hydrated, can minimize the risks and ensure safe and enjoyable experiences in high-altitude environments.

REFERENCES

1. Roach RC, et al. Respiratory control at high altitude: integrative mechanisms. *Physiol Rev.* 2007;87(2):537-79.
2. West JB. Pulmonary pathophysiology: the essentials. 9th ed. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2012.
3. Swenson ER. Cardiovascular adaptations to high altitude: a review. *J Appl Physiol* (1985). 1989;66(3):978-91.
4. Leon AS, et al. Pulmonary hypertension: a review. *Eur Respir Rev.* 2013;22(127):19-31.
5. Jacobs SS, et al. Erythropoietin and erythropoiesis. *Physiol Rev.* 1996;76(2):573-608.
6. Roach RC, et al. Cerebral edema at high altitude: pathophysiology and prevention. *N Engl J Med.* 2002;347(17):1308-17.
7. Roach RC, et al. Renal function at high altitude. *Physiol Rev.* 2010;90(4):1597-631.
8. Hackett PH, Roach RC. High-altitude illness. *N Engl J Med.* 2001; 345(2):107-14.
9. Roach RC, et al. Cerebral edema at high altitude: pathophysiology and prevention. *N Engl J Med.* 2002;347(17):1308-17.
10. Hackett PH, et al. High-altitude pulmonary edema. *N Engl J Med.* 2006;354(18):1899-909.
11. D. Molano Franco, V.H. Nieto Estrada, A.G. Gonzalez Garay, et al. Interventions for preventing high altitude illness: Part 3. Miscellaneous and non pharmacological interventions *Cochrane Database Syst Rev*, 4 (2019 Apr 23), p. CD013315, 10.1002/14651858.CD013315View in ScopusGoogle Scholar
12. A.L. Baggish, C.S. Fulco, S. Muza, et al. The impact of moderate-altitude staging on pulmonary arterial hemodynamics after ascent to high altitude *High Alt Med Biol*, 11 (2) (2010), pp. 139-145, 10.1089/ham.2009.1073 Summer View in ScopusGoogle Scholar
13. P.H. Hackett, R.C. Roach, G.S. Hartig, et al. The effect of vasodilators on pulmonary hemodynamics in high altitude pulmonary edema: a comparison *Int J Sports Med*, 13 (Suppl 1) (1992), pp. 68-71
14. P. Bartsch, M. Maggiorini, M. Ritter, et al. Prevention of high-altitude pulmonary edema by nifedipine *N Engl J Med*, 325 (18) (1991), pp. 1284-1289 View in ScopusGoogle Scholar
15. M. Maggiorini Prevention and treatment of high-altitude pulmonary edema *Prog Cardiovasc Dis*, 52 (6) (2010 May-Jun), pp. 500-506, 10.1016/j.pcad.2010.03.001 View PDFView articleView in Scopus Google Scholar

EFFECT OF HEAVY METALS ON THYROID GLAND HORMONE TRIIODOTHYRONINE IN LABORATORY RAT

Dr. Reetu pundir¹, Dr. Rahul Arya²

¹Department of Zoology

²Department of Chemistry

Shri Ram College, Muzaffarnagar

Email address- reetupundirbio@gmail.com, arya24015@gmail.com

ABSTRACT

Thyroid gland is an endocrine gland. It secretes thyroid hormone e.g. Thyroxine and Triiodothyronine which acts as important modulators and have an indispensable role in growth and development. Normal thyroid function is prerequisite for the normal development of nervous system. Many agents can affect the binding, distribution and metabolism of thyroid hormones. Heavy metals are also known to affect thyroid gland structure and function. In present investigations an attempt has been made to study the effect of few heavy metals eg

Cadmium, Chromium, Copper, lead, mercury on thyroid hormone Ty. The study shows that Mercury, Copper and chromium drastically inhibited the synthesis of triiodothyronine in rats. However, cadmium and lead were found to be less toxic to thyroid.

Keywords: *Thyroid gland, Triiodothyronine, Heavy metals*

Introduction

Several endocrine glands can be affected by drugs and chemicals. Drugs or chemicals can alter glandular internal secretion directly or by modifying trophic hormones secreted by adenohypophysis. Many of the endocrine toxicities occur in adrenal gland, gonad and thyroid gland (Colby, 1988). Some endocrine target organs have specific cell population that appear to be more susceptible to toxic agent than others and may lead to multiple change in hormonal balance.

Human thyroid gland is anatomically situated at the base of the neck and surrounds the trachea. The two large lateral lobes that constitute the majority of the gland lie on either side of trachea connected by thin isthmus. Thyroid cell growth and function regulated by hormones and growth factors that bind to cell surface receptor. Thyroid hormone thyroxine and triiodothyronine play important role in growth and development. There are several agents that

affect the binding, distribution and metabolism of thyroid hormones. Heavy metals are also known to affect thyroid gland structure and function. Therefore, it become important to the interaction of environmentally significant metals on thyroid hormones. In present investigations an attempt has been made to study the effect of few heavy metals eg. Cadmium, Chromium, Copper, Lead, Mercury on thyroid hormone, triiodothyronine.

Materials and Methods

Wistar rat of both sexes, weighing 150-200 gm were used in this study. They were provided with pelleted food obtained from Golden Feeds Pvt. Ltd., Delhi and tap water ad libitum. Each rat was housed in polypropylene cage and maintained under standard laboratory conditions (RH = 60 + 10% and temperature 25 ± 5°C).

Treatment with heavy metals

After brief acclimatization, the rats were divided in twelve groups (six male groups and six female groups) each containing five rats. Rats of group A-L were administered sublethal doses of cadmium, chromium, mercury, lead, copper by gavage, on each alternate day for 30 days. Five rats fed on laboratory chow and tap water served as controls.

Determination of trace elements

Small pieces of liver were digested in concentrated nitric acid and diluted by double distilled water. One gm of the liver sample from each rat of each group was digested in 10ml of concentrated HNO₃ at 80°C for 16hrs. The digests were stored at 4°C. Before analysis, a 2.0 ml aliquot of the digest was used for the analysis of each element Elements like Cd, Cu, Cr and Pb were analysed through atomic absorption spectrophotometry (E. C. Hyderabad). Mercury was analysed using mercury analyser (E. C., Hyderabad).

Estimation of triiodothyronine (T3)

Rats were starved overnight on 31st day and sacrificed by light ether anaesthesia the next morning. Blood samples were collected by direct cardiac puncture and serum was separated by centrifugation. All the samples were stored at -20°C till analyses.

Total triiodothyronine was determined in the serum samples by a microplate enzyme immunoassay method. The kit was procured from **Monobind Incorporated Lake Forest California U.S.A.**

The principle of the method was a competitive enzyme immunoassay. The immobilized antibody, enzyme antigen conjugate and the serum containing the native antigen were mixed. As a result, a competitive reaction occurred between native antigen and enzyme antigen for a limited number insolubilized binding sites T3 values were recorded as n gm/ml (Gharib et al. 1971).

Results and Discussion

Accumulation of different trace elements in

the liver of rat was determined through atomic absorption spectrophotometry using selective electrodes. Different elements at respective sublethal concentrations accumulated at different rate in male and female rats depending upon their selective affinity with the proteins especially those containing sulfahydryl groups. Mercury, copper and chromium drastically inhibited the synthesis of triiodothyronine in rats. However, cadmium and lead were found to be less toxic to thyroid. The sex difference was observed in the effect of metals and T3. In copper and lead treated rats, male rats were more sensitive than the female rats. In cadmium and mercury treated rats female were more sensitive than males.

The secretion of thyroid hormones can be severely affected by ionic imbalance, particularly that of iodine. Some information is available on the effect of heavy metals on thyroid function in man and animals (Zeltser, 1962., Standstead et al. 1969, Robins et al 1983.)

Table: Effect of different metals on triiodothyronine (mg/ml) in the serum of rat

S. No.	Treatment	T3 (mg/ml)	
		Male	Female
1.	Copper	0.646 ± 0.046	4.374 ± 0.385
2.	Cadmium	5.734 ± 0.204	3.711 ± 0.311
3.	Lead	3.059 ± 0.117	6,072 ± 0.051
4.	Mercury	2.292 ± 0.132	0.442 ± 0.017
5.	Chromium	2.523 ± 0.150	2.639 ± 0.103
6.	Control	6.138 ± 0.055	4.762 ± 0.207

Results are expressed as mean ± S.E. (n-5)

Further, it has been reported that percent uptake of iodine is significantly reduced in metal treated rats suggesting that they inhibit the thyroid function.

Present results show that triiodothyronine (T₃) significantly declined after the treatment with copper, chromium and mercury. Sex differences were observed on the effect of toxic metals on thyroid hormones. It might be explained on the basis that hyposecretion of T₃ and T₄ accompanies, hypersecretion of TSH influencing the hypothalamus-hypothyroid feedback mechanism. Another possible reason seems to be the inhibition of the synthesis of various enzymes. Since liver is the first organ to receive these metals, it seems quite possible that they inhibit the activity of 5-thyroxideidionase which is involved in the conversion of T₄-T₃ (Gregus et al. 1988).

Chronic administration of thyroid hormones increased the activities of glucose-6- phosphatase

and NADPH- cytochrome-c-reductase significantly increasing the basal metabolic rate (Tata et al. 1966). Liver and kidney being thyroid responsive organs (Pittman, 1961) would respond to thyroid hormones but in a highly specific manner as observed during present investigations.

Thyroid hormones are subjected to various metabolic reactions in tissues eg deamination, decarboxylation, deiodination, scission of molecule and glucuronidation and each step has its own physiological significance. In summary, the present result suggest that environmentally toxic metals influence the thyroid hormones. The disturbances in their secretion will have wide ranging effects on human health.

REFERENCES

1. Colby, H.D. (1988). Adrenal gland toxicity chemically induced dysfunction. *J. Am. Toxicol* 7 45-69.
2. Gharib, H., Ryan, R.J., Mayberry, W.E. and Hockett, T. (1971). Radioimmunoassay for triiodothyronine (T₃) Affinity and specificity of antibody for T₃. *J Clinical Endocrinol* 33: 509
3. Gregus, Z., White, C., Howell, S., Klaassen, C.D. (1988). Effect of thyroid hormone on myocardial catecholamine content of the guinea pig. *Amer. J. Physiol* 201: 1049-1052
4. Pittman, C.S. Lindsay, R.H. and Barker, B.S. (1961) Specificity of T₄ action on oxygen uptake of kidney slices during prolonged incubation. *Endocrinol* 69: 761-768.
5. Robins, J.M., Cullen, M.R., Connors, B.B., Kayne, R.D. (1983). Depressed thyroid indexes associated with occupational exposure to inorganic lead. *Arch Intern Med.* 143 220-224.
6. Sandstead, H.M., Stant, E.G., Brill, AB, Arias, LL, Terry, R.T., (1969). Lead intoxication and the thyroid. *Arch. Intern. Med.* 123: 632-635
7. Zeltser, M.E. (1962). *Jr. Inst. Kraevoi pathol akad aml lar SSR*; 10: 116-120.

GREEN CHEMISTRY FOR SUSTAINABILITY

Dr. Rahul Arya*, Dr. Manoj Mittal¹, Dr. Reetu Pundir², Rama Median³

*Associate Professor, Department of Chemistry

¹Professor, Department of Physics

²Assistant Professor, Department of Zoology

³Assistant Professor, Department of Botany

Shri Ram College, Muzaffarnagar (U.P.)

Mail id – arya24015@gmail.com

ABSTRACT

Green chemistry is a rapidly evolving field that seeks to design chemical products and processes that minimize or eliminate the use and generation of hazardous substances. By adhering to the 12 Principles of Green Chemistry, researchers and industries can reduce their environmental impact, conserve resources, and promote sustainable development. This abstract explores the fundamental concepts of green chemistry, its applications in various sectors, and the challenges and opportunities that lie ahead in achieving a more sustainable future.

Keywords: Green chemistry, Sustainable chemistry, Environmental impact, Pollution prevention, Resource conservation, Green solvents

Introduction

Green chemistry (or sustainable chemistry) is the field of chemistry that covers the design and optimization of processes and products to reduce, or eliminate entirely, the generation and use of hazardous substances. Green chemistry is not the same as environmental chemistry.

Green chemistry, a relatively new field, focuses on designing chemical products and processes that reduce or eliminate the use and generation of hazardous substances. This paradigm shift in chemical synthesis and engineering has emerged as a crucial strategy to address pressing environmental and health concerns. By adopting greener approaches, industries can minimize their ecological footprint, conserve resources, and promote sustainable development.

The 12 Principles of Green Chemistry

The 12 Principles of Green Chemistry, outlined by Paul Anastas and John Warner, provide a framework

for guiding sustainable chemical practices. These principles include:

- 1. Prevention:** It is better to prevent waste than to treat or clean up waste after it has been created.
- 2. Atom Economy:** Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
- 3. Less Hazardous Chemical Syntheses:** Synthetic methods should be designed to use and generate substances that possess little or no toxicity to human health and the environment.
- 4. Designing Safer Chemicals:** Chemical products should be designed to effect their desired function while minimizing their toxicity.
- 5. Safer Solvents and Reagents:** The use of

auxiliary substances (solvents, separation agents, etc.) should be made unnecessary whenever possible and innocuous when used.

6. **Design for Energy Efficiency:** Energy requirements of chemical processes should be recognized for their environmental and economic impacts and should be minimized.
7. **Use of Renewable Feedstock's:** A raw material feedstock should be renewable rather than depleting whenever technically and economically practicable.
8. **Reduce Derivatives:** Unnecessary derivatization (use of blocking groups, protection/deprotection, temporary modification of physical/chemical processes) should be minimized or avoided if possible, because such steps require additional reagents and can generate waste.
9. **Catalysis:** Catalytic reagents (catalysts, photo initiators, etc.) are superior to stoichiometric reagents.
10. **Design for Degradation:** Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.
11. **Real-Time Analysis for Pollution Prevention:** Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.
12. **Inherently Safer Chemistry for Accident Prevention:** Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.

Applications of Green Chemistry

Green chemistry has found applications in various industries, including:

1. **Pharmaceutical Industry:** Developing greener synthetic routes for drug molecules, reducing waste generation, and improving the environmental profile of pharmaceuticals.
2. **Chemical Industry:** Designing sustainable processes for the production of chemicals, minimizing the use of hazardous solvents and reagents, and promoting energy efficiency.
3. **Materials Science:** Creating eco-friendly materials with reduced environmental impact, such as biodegradable plastics and sustainable building materials.
4. **Energy Sector:** Developing renewable energy technologies, improving energy storage, and reducing greenhouse gas emissions.

Challenges and Future Directions

While green chemistry has made significant strides, several challenges remain:

1. **Economic Considerations:** Implementing green chemistry practices can sometimes involve higher initial costs, which may hinder adoption.
2. **Lack of Awareness:** Many industries and researchers are still unaware of the benefits and potential of green chemistry.
3. **Technical Limitations:** In some cases, green chemistry alternatives may not yet be as efficient or effective as traditional methods.

To address these challenges, continued research and development, government support, and industry collaboration are essential. By fostering innovation, promoting education, and incentivizing sustainable practices, we can accelerate the transition to a greener and more sustainable future.

Conclusion

Green chemistry with its 12 principles when integrated into the development of chemical processes and products allows us to achieve sustainable development with a biological geological cycle, a reduction in waste production and environmental protection. Essentially, it is green chemistry that purifies our planet from harmful, toxic, and dangerous chemicals. So, the ultimate goal of green

chemistry is to eliminate the release of chemicals into the environment. Green chemistry offers a promising pathway toward a more sustainable world. By embracing its principles and applying them to various industries, we can minimize environmental pollution, conserve resources, and improve human health. As we face increasing environmental challenges, green chemistry will play a crucial role in shaping a more sustainable future.

REFERENCES

1. <https://www.cheminst.ca/magazine/article/chemical-green-screen/>
2. <http://books.google.com/books?id=N-vn5a3ipLcC>
3. <http://books.google.com/books?id=d4eJgQvjGpUC>
4. <https://www.drdarrinlew.us/environmental-chemistry/part-iii-toxic-organic-compounds.html>
5. <https://www.scribd.com/document/188457048/greenchem>
6. <https://www.amrita.edu/news/green-chemistry-and-sustainability/>
7. <https://www.ijnrd.org/papers/IJNRD2305288.pdf>

CONSUMER BUYING BEHAVIOUR REGARDING FINANCIAL PRODUCTS

Jatin Singhal¹, Nivedita Chaturvedi², Brijesh³

^{1,2}Assistant Professor

^{1,2}Department of Business Administration, Shri Ram College, Muzaffarnagar

³Assistant Professor

³Department of Commerce, LSLSD Kanya Degree College, Purkazi, Muzaffarnagar

ABSTRACT

For financial institutions looking to market their products successfully and create enduring client connections, it is essential to comprehend consumer purchasing patterns with regard to financial products. The intricate process of customer decision-making in the context of financial products is examined in this review study. The study examines the complex interactions between variables influencing customer preferences and decisions, drawing on a variety of ideas and models from marketing, psychology, and economics. It also talks about certain models that apply to financial products, such as the Technology Acceptance Model, Portfolio Theory, and LifeCycle Hypothesis, emphasizing how important they are for comprehending customer behaviour. The impact of technological developments and the growth of digital financial services on consumer purchasing behavior is also examined in this article. This study gives financial institutions useful advice on how to modify their offerings and business plans to better satisfy their clients by shedding light on the intricacies of consumer behavior and preferences.

Keywords: Consumer buying behaviour, financial products, economic factors, decision-making process, theories and models, technology.

INTRODUCTION

The way that consumers purchase financial goods is a complex process that is impacted by a number of variables, such as the state of the economy, individual financial objectives, risk tolerance, and cultural influences. Due to their complexity and long-term effects, financial products—such as credit instruments, insurance policies, investment funds, and savings accounts—frequently necessitate a greater level of participation and decision-making than consumer items. Customers frequently rely their assessments of financial goods on elements like perceived value, possible returns, related dangers, and the financial institution's reputation. Convenience, accessibility, and digital features are now crucial considerations in the decision-making process due to the substantial

influence that recent technical developments and the expansion of digital financial services have had on customer behavior. Financial companies that want to successfully promote their goods and create enduring client relationships must comprehend these behaviors and preferences.

Background and Significance of the Study

Financial institutions, marketers, and legislators must comprehend consumer purchasing patterns since they influence the creation, promotion, and use of financial goods. The financial landscape has changed significantly in recent years as a result of changes in consumer preferences, technology improvements, and economic upheavals. A dynamic

market environment has been facilitated by the growth of fintech businesses, the expansion of digital banking, and growing consumer awareness of financial wellness. Stakeholders can learn more about what motivates consumers, how they view various financial goods, and the elements influencing their purchasing decisions by examining consumer purchasing behavior with regard to financial products.

Scope and Limitations

A wide variety of financial goods are covered in this overview, such as credit, insurance, savings, and investment options. It provides a thorough grasp of the industry by analyzing customer behavior across various demographic groupings and geographical areas. The scope provides a comprehensive picture of the sector by analyzing both established financial institutions and up-and-coming fintech businesses. This evaluation does have some restrictions, though. First off, the generalizability of the results may be impacted by regional variations in data quality and availability. Second, rapid technical improvements and shifting economic situations have an impact on customer behavior, thus some findings may become old very soon. Finally, because the subject is so intricate and multidimensional, even while the review attempts to be thorough, it might not address every potential aspect impacting customer behavior.

Definition of Consumer Buying Behaviour

The behaviors and choices made by individuals or groups when buying and utilizing goods and services are referred to as consumer buying behavior. It includes the economic, social, and psychological elements that affect people's purchasing choices. Consumer purchasing behavior, as it relates to financial products, encompasses how customers assess, choose, and make use of financial items such credit products, investments, insurance plans, and savings accounts. Financial institutions and marketers may create goods and strategies that satisfy customer wants and preferences by having a better understanding of consumer purchasing behavior.

Factors Influencing Consumer Buying Behaviour

Numerous factors impact the purchasing decisions of consumers with relation to financial items. Financial institutions must comprehend these elements in order to create marketing plans that work and customize goods to match the unique requirements and tastes of their clients. Economic, psychological, social, cultural, and individual influences are among the main contributing elements.

Economic Factors

Consumer purchasing decisions for financial products are greatly influenced by economic variables. Customers' capacity and willingness to buy financial goods are greatly influenced by their income levels and total wealth. Generally speaking, having more money and wealth allows one to invest in a greater variety of financial products, such as comprehensive insurance plans and high-risk ventures. The environment of interest rates affects the choices that consumers make about borrowing and saving. While higher interest rates may stimulate saving and investing in interest-bearing accounts, lower rates may encourage borrowing and spending. The real value of money is impacted by inflation, which influences consumer choices about investing and saving. To beat inflation, consumers may look for investments with better yields during times of high inflation. The forecast and general state of the economy have an impact on consumer confidence. Long-term financial commitments like stock market investing and life insurance are more common among consumers in a stable economy.

Psychological Factors

The mental and emotional states that influence consumer behavior are referred to as psychological factors. Individuals' choices of financial goods are influenced by their differing levels of risk tolerance. While risk-tolerant people may choose equities or mutual funds, risk-averse people prefer safer

investments like government bonds or savings accounts. Customers' perceptions of financial products and the organizations that provide them can have a big impact on what they decide to buy. Brand reputation, perceived product benefits, and trust in a financial institution are all important factors. More financially literate consumers are better able to comprehend and assess complicated financial goods. This information affects their capacity to choose goods that fit their budget and make well-informed selections. Consumers are also driven by a variety of demands and objectives, including retirement planning, financial independence, and financial future security. Their interest in and acquisition of financial products are driven by these factors.

Social Factors

Social variables include how social structures and other people affect how consumers behave. Family and friend perspectives and experiences can have a big influence on financial choices. Consumers are frequently guided in their financial product selection by the recommendations and counsel of reliable people. Financial items can be used as status symbols; for example, some insurance policies or investments are seen as markers of social standing and financial success. People may feel pressured by their peer groups and social circles to adopt particular financial practices, such buying particular insurance plans or investing in well-liked companies.

Cultural Factors

Consumer behavior is influenced by cultural influences, which include a society's common values, beliefs, and customs. Consumer behavior is influenced by cultural perspectives on money, investing, saving, and spending. For instance, whilst some cultures place more value on saving and financial stability, others can place more value on lifestyle and consumption. The appropriateness of particular financial items and acceptable financial behaviors can be determined by one's ethnic heritage and religious convictions. Islamic finance, for example, complies

with Sharia law, which forbids interest-bearing securities. Consumer behavior may be influenced by the dominant social standards surrounding prudent and responsible money management. Customers who prioritize insurance and savings are likely to be found in societies that place a high value on financial prudence.

Personal Factors

Personal variables are individual traits that influence how customers behave. Age and life stage have an impact on consumers' financial demands and preferences. While older people may concentrate on retirement planning and wealth preservation, young folks may place a higher priority on saving for college or purchasing a home. Financial decisions can be influenced by an individual's employment status and job type. Long-term investments may be encouraged by stable employment, but more cautious financial decisions may result from uncertainty. The interests, pastimes, and general way of life of consumers influence the financial products they select.

Types of Financial Products

A wide range of tools that satisfy different customer needs and preferences are included in financial products. These products serve different financial objectives and purposes and can be divided into investment, savings, insurance, and credit products.

Stocks, bonds, and mutual funds are examples of investment goods. In addition to offering the possibility of dividends and capital growth, stocks also symbolize ownership in a business. Bonds are debt instruments that provide a more reliable source of income by paying interest on a regular basis and returning the principal when they mature. Mutual funds, which are overseen by qualified fund managers, combine the capital of several individuals to invest in a diverse portfolio of stocks, bonds, and other securities. Usually, individuals who want to increase their wealth and reach long-term financial objectives use these products.

The purpose of savings products is to earn interest while assisting customers in protecting and saving money. For instance, savings accounts have the advantage of collecting interest—albeit at a slower rate than investment products—as well as a safe location to keep money. Higher interest rates are offered by certificates of deposit (CDs) in return for holding the funds for a predetermined amount of time. For those who want to preserve liquidity and earn a moderate return on their investments with little risk, these products are perfect.

Financial protection against a range of risks and uncertainties is provided by insurance products. In the event of the policyholder's passing, life insurance offers beneficiaries a death benefit, providing loved ones with financial stability. By covering medical bills, health insurance lessens the financial strain associated with healthcare expenditures. Other insurance plans, including home and auto insurance, offer protection against particular dangers related to property and automobiles. These goods are crucial for controlling risk and guaranteeing monetary stability in the face of unanticipated circumstances.

Credit products give customers the ability to borrow money for a number of uses, such as managing everyday expenses or buying a home. Loans that provide lump sum sums that are paid back over time with interest include mortgages, vehicle loans, and personal loans. With the option of making minimal payments or paying the entire amount due each month, credit cards provide a revolving line of credit that can be utilized for regular expenditures. These goods are essential for controlling cash flow and funding large purchases.

Types of Consumers Buying Behaviour in Reference to Financial Products

There are various sorts of consumer purchasing behavior when it comes to financial products, and each is impacted by the product's complexity, the degree of user involvement, and the decision-making process. Financial institutions can better

satisfy customer needs by customizing their product offerings and marketing methods by having a deeper understanding of these categories.

Routine Response Behaviour

When consumers purchase financial goods that require little decision-making work, they are engaging in routine response behavior. These goods are usually simple, low-risk, and often used. Renewing an existing insurance policy or creating a basic savings account are two examples. Customers make snap decisions about what to buy based on their prior experiences and ingrained behaviors.

Limited Decision-Making Behaviour

Moderate consumer involvement and information searching are characteristics of limited decision-making behavior. Although they don't conduct in-depth research, consumers do spend some time weighing their options and comparing various financial products. Choosing a short-term investing strategy or a new credit card are two examples. A number of factors, including interest rates, fees, and promotional offers, have a big impact on choices.

Extensive Decision-Making Behaviour

High levels of participation and extensive information searching are characteristics of extensive decision-making behavior. This kind of behavior is common for intricate and risky financial products that affect customers' financial security over the long run. Purchasing a home, choosing a mortgage, and funding retirement plans are a few examples. Customers carefully weigh their alternatives, consult experts, and take into account a number of variables, including risks, interest rates, repayment terms, and possible returns.

Impulsive Buying Behaviour

Buying financial products on the spur of the moment and without planning is known as impulsive buying behavior. Because of the usually high stakes, this kind of behavior is less prevalent in the financial

industry. Nonetheless, it can happen when customers are swayed by peer pressure, limited-time deals, or effective marketing. Buying a financial product during a promotional event without giving it careful thought could be one example.

Loyalty-Based Buying Behaviour

When customers consistently acquire financial products from the same company because of their established trust, contentment, and favorable experiences, this is known as loyalty-based buying behavior. Strong client relationships, individualized services, and loyalty programs all support this kind of behavior. Examples include buying more insurance goods from a reliable supplier or extending a savings plan with the same bank.

Financial institutions may improve customer happiness and retention by creating customized products, enhancing client interaction, and designing focused marketing tactics based on their understanding of these consumer buying patterns.

Challenges and Opportunities

Understanding consumer behavior, which is impacted by economic, psychological, social, cultural, and individual aspects, is a challenge for the financial services industry. Financial institutions find it challenging to effectively anticipate and address customer needs as a result of this complexity. Additionally, developing a strategy may be hampered by a lack of thorough data on consumer behavior.

Significant obstacles are also presented by regulatory and compliance concerns. The regulatory environment that financial institutions must operate in is complicated, dynamic, and region-specific. Although compliance can be resource-intensive and restrict the flexibility of product creation and marketing, it is crucial for protecting consumers and upholding confidence.

There are many of chances for creativity in spite of these obstacles. Fintech and technological advancements have created new opportunities for

financial services and products. Customers now have more convenience in managing and accessing financial products thanks to digital platforms and mobile applications. Financial organizations may better understand consumer behavior through the use of big data and analytics, which leads to more successful product and marketing strategies.

By boosting security, boosting customer support, and developing new goods, innovations like blockchain, machine learning, and artificial intelligence are revolutionizing the sector. Peer-to-peer lending, roboadvisors, and digital wallets are just a few examples of the traditional financial services that fintech businesses are at the forefront of creating solutions to fill. Financial institutions may operate more effectively and reach underserved populations thanks to these innovations, which also enhance the customer experience.

LITERATURE REVIEWS

Sahney (2016) investigates the performance and consumer preference of mutual fund services and products in India, looking at them from a financial and marketing perspective. In order to analyze consumer behavior and identify performance differences between various mutual funds, the study will employ a variety of research tools and techniques in addition to financial analysis. The results of the survey show that mutual funds are becoming more and more well-known over time, as seen by investors' expanding awareness and the market's growth of different plans. Furthermore, the dynamic nature of the industry within the Indian financial landscape is highlighted by the enormous influence of stakeholders, including agents, family members, and individual investors, on mutual fund investors' investment decisions.

Finding the most well-liked mutual funds among buyers in the Secunderabad metropolitan area is the main goal of Mysa's (2020) study, which also focuses on guaranteeing a high return with low risk—a crucial requirement for any mutual fund investment. The study used the chi-square test and descriptive statistics to examine information obtained from a

standardized questionnaire. Remarkably, the study's conclusions highlight a significant feature of investor behavior in the area: customers' general hesitancy to put their money into modern investment vehicles like mutual funds.

According to Monirul's (2016) research, asset management companies (AMCs) must understand investor behavior with regard to fund or scheme switching in order to customize solutions that meet clients' changing financial demands as they move through various life stages. In order to find out what factors retail investors consider most important when choosing a fund or plan, a poll of 200 mutual fund investors in Dehradun was carried out. The article presents the survey's findings in an effort to offer insightful information that might guide AMCs' advertising and product development plans. Mutual funds compete with other financial products that provide comparable economic benefits, albeit under different classifications, in today's cutthroat market. This study aims to determine the most popular investments among consumers and clarify the underlying variables influencing their preferences by analyzing survey data.

In today's dynamic business environment, Joshi and Mandaviyaana (2018) stress how crucial it is for enterprises to investigate and understand the always changing customer behavior in order to successfully launch and run firms. They draw attention to how important cultural, social, emotional, and psychological elements are in determining what customers ultimately do. 150 respondents in Surat city were given a structured questionnaire by the researchers, who used a descriptive study technique and a non-probability sample approach. The purpose of the questionnaire was to learn more about consumers' investment habits, particularly with regard to mutual funds, and to investigate how variables like the investor's income and occupation affected their choice. The results of the study show that, especially when using a systematic investment mode, investors generally choose the growth option in mutual funds. Additionally, banks and brokers have

a significant impact on the entire investment process. Investors give top priority to aspects like safety and diversity when choosing mutual funds, highlighting the complex nature of their selection criteria.

The declared objective of Vymětal et al. (2013) is to offer a fresh approach to business transaction simulation by incorporating client activities into the trading procedures of a fictitious organization. Using agent-based modeling and simulation techniques, a multi-agent system is created to serve as a simulation framework. In order to research and predict the chosen business metrics of an organization, we are motivated to use the framework as the cornerstone of a management system that works as an integrated part of a real system implemented inside that organization (such as an ERP system). Having such a framework in place facilitates management decision-making for the company. The article starts by summarizing some of the most recent theories regarding consumer behavior and the various factors that influence it. Second, the essay explains the decision-making process, the different agents that are a part of the multi-agent model of trade used by the virtual corporation, and the agents themselves. The decision-making process is used to calculate the product price during negotiations. The simulation results, a comparison to real data, and an analysis of the simulation model's verification potential round out the description. It will be demonstrated how well the recommended approach to simulating customer behavior in an agent-based simulation model can support better decision-making.

The goal of Riyazahmedk & Saravanaraj (2016) was to analyze the factors influencing individual investors' decisions in the Indian stock market. The nature of the relationship between these factors and return on investment is also examined. The research begins by summarizing existing behavioral theories in order to propose a hypothesis.

Following that, surveys are given to various individual investors in the Salem district in order to test these beliefs. To analyze the collected data, we

employ statistical software such as SPSS. Interviewing investment bankers and brokers in a semi-structured manner is the next stage in learning more about investor behavior. According to the study, stock investors' buying decisions are influenced by five behavioral traits: herding, prospecting, market, overconfidence, and anchoring. Four behavioral factors—prospecting, herding, the market, and the market itself—have a significant impact on individual investors in the Indian stock market. Several elements, such as market, herding, and potential, are said to have a major influence on investing decisions.

According to Praveen et al. (2009), consumer behavior research can help better understand and forecast not only the topic of purchases but also the frequency and causes behind them.

When it comes to financial services, a number of factors influence Mumbaikars' decisions to buy, such as the type of services offered, the standard of living in the city, the presence of e-marketing, the amount of competition, the educational ratio in the city, and many more. Consumer behavior research is highly valued in the financial services industry since it sheds light on what drives consumers to make purchases and how to retain existing ones.

Thus, the goal of Praveen et al. (2009)'s research is to find out what factors influence consumer behavior with regard to various financial services.

According to Prasad (2014), when it comes to financial things, consumers are more inclined to change their purchasing behaviors. Financial institutions are therefore less certain that their customers will stick with them or that the traditional relationship between bankers and customers will benefit them

when they attempt to cross-sell worthwhile ancillary products. In a time when customer retention and the ability to cross-sell products to existing clients are critical factors in determining profitability, banks must strategically respond to these trends. This study report provides insight into the changing online shopping patterns of consumers.

CONCLUSION

In conclusion, financial institutions must comprehend consumer purchasing patterns for financial products in order to successfully satisfy client demands and preferences in the fast-paced market of today. The intricate process of consumer decision-making has been examined in this review study, taking into account elements including prevailing economic situations, psychological effects, social and cultural standards, and technology developments. We have learned more about the intricate interactions between variables influencing customer preferences and decisions by utilizing a variety of theories and models from the fields of psychology, economics, and marketing. Additionally, the influence of technological developments and the emergence of digital financial services on consumer purchasing patterns has been examined. Financial institutions can better satisfy the changing requirements of their clients and increase client satisfaction and loyalty by acknowledging the significance of these aspects and integrating them into product design and marketing strategies. In order to keep ahead of shifting consumer tastes and market dynamics and help financial institutions stay successful and competitive in the constantly changing financial landscape, more research and analysis in this area will be essential going forward.

REFERENCES

1. S. Gautam and G. M. Matta, "Indian Consumer Buying Behaviour in Financial Services," no. May 2013, 2013, [Online]. Available: <https://www.researchgate.net/publication/27917470> 1.
2. M. Kotteeswari, "A Study on Consumer Behavior in Selection of Personal Care Products Based on Their Financial Status," *Int. J. Creat. Res. Thoughts*, vol. 9, no. 4, pp. 5240–5249, 2021, [Online]. Available: www.ijcrt.org.
3. S. Bhuvanam and R. Sivarethina Mohan, "A Study on Customers Behavioral Intentions Towards Online Trading System in Tiruchirappalli City," *Int. J. Manag.*, vol. 6, pp. 19–34, 2015, [Online]. Available: www.jifactor.com.
4. Yue, Shuying, Yu, Tuoxin, Li, Jin, and Yan, Qiang, "The Consumer Buying Behavior and Its Relationship to Financial Management of a Purchasing Company," *J. Bus. Manag. Stud.*, vol. 6, no. 1, pp. 97–109, 2024, doi: 10.32996/jbms.2024.6.1.5.
5. M. Mohammad, "A Study Of Consumer Behaviour for Religious in financial product," vol. 6, no. 1, pp. 175–183, 2018.

AGRO-TEXTILES: A NOVEL APPLICATION OF TEXTILES IN AGRICULTURE

Isha Arora¹, Dr Reetu Pundir², Aaysha Gaur³

¹Assistant Professor, ²Assistant Professor, ³Assistant Professor

¹Department of Home Science, ²Department of Basic Science, ³Department of Home Science

Shri Ram College, Muzaffarnagar

ABSTRACT

Innovative textile solutions known as agro-textiles were developed to address a variety of agricultural problems. These specialist fabrics increase crop yields and preserve vital resources while protecting against environmental stressors including pests, weeds, and extreme weather. They are utilized in shade nets, mulching cloths, crop covers, and anti-hail nets, all of which are made to satisfy specific agricultural needs.

Agro-textiles have shown great potential in India for raising agricultural output, particularly in regions with severe weather. The creation of durable and cost-effective agro-textile goods that satisfy local demands has been substantially facilitated by Indian businesses and researchers. For instance, by decreasing evaporation, improving soil moisture retention, and preventing weed development, mulching fabrics have raised agricultural yields. This study looks at the types and applications of agro-textiles and provides case studies that demonstrate how they support India's sustainable farming practices. By using agro-textiles in their agricultural operations, farmers can reduce their need on chemical inputs while simultaneously improving crop protection and resource management. Innovations in agro-textile technology are crucial to modern, sustainable agriculture since they continuously generate fresh approaches to global agricultural issues.

Keywords: Agro-textiles, Agriculture, Sustainable Farming, Crop Protection, Resource Conservation.

1. Introduction

The foundation of human civilization, agriculture, is facing mounting strain to satisfy the needs of a world population that is expanding. These issues are made worse by resource constraint, limited arable land, and climate change. Agro-textiles and other cutting-edge technology are revolutionizing conventional farming methods in response.



Figure 1

This picture illustrates how contemporary agro-textile technologies and traditional farming methods

may coexist in India, showcasing creative and sustainable agricultural solutions.

Specialized textiles used in horticulture, forestry, and agriculture are known as agro-textiles. They are intended to conserve soil and water, increase crop output, and guard against pests and harsh weather conditions. These materials have a wide range of uses that meet the demands of contemporary agriculture, from shade nets to geotextiles. The development and use of agro-textiles have advanced significantly in India, an agrarian nation, thanks to its distinct climatic circumstances and agricultural needs. This study looks

at how agro-textiles might help solve problems in agriculture and how they could completely transform the Indian agricultural industry.

2. Types and Functions of Agro-Textiles

Agro-textiles can be categorized based on their specific applications:

- i. **Shade Nets:** Regulate humidity, temperature, and light intensity to provide the ideal growing conditions for plants. used extensively in India to grow spices, vegetables, and flowers.



Figure 2: Shade Nets

- ii. **Mulch Mats:** Inhibit the growth of weeds, hold onto soil moisture, and control soil temperature. In India, jute mulch mats are becoming more and more popular since they decompose naturally.
- iii. **Crop Covers:** Protect crops against severe rains, frost, and pests. widely used for fruits like strawberries and grapes in Indian agriculture.
- iv. **Ground Covers:** Enhance water infiltration and stop soil erosion. In India, geotextiles are used to stabilize soil in hilly areas.
- v. **Geotextiles:** In terraced farms, stabilize the soil to avoid waterlogging. Geotextiles made of coir are an environmentally friendly alternative that was created in India.
- vi. **Anti-Hail Nets:** Protect crops from harm caused by hail. placed in areas like Himachal

Pradesh and Uttarakhand that are vulnerable to severe weather.



Figure 3: Mulch Mats



Figure 4: Crop Covers



Figure 5: Ground Covers

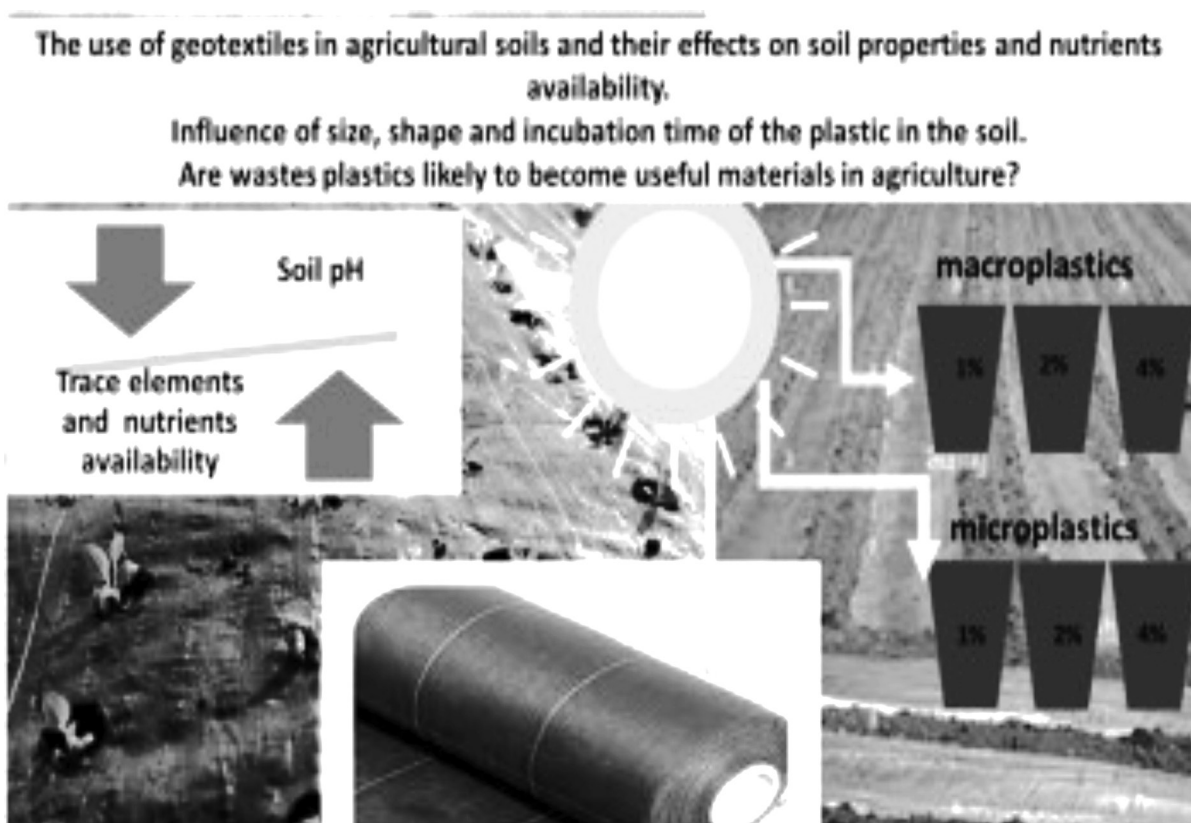


Figure 6: Geotextiles



Figure 7: Anti-Hail Nets

Every kind of agro-textile has a specific purpose and helps to increase agricultural productivity and sustainability.

3. Benefits of Agro-Textiles

The adoption of agro-textiles offers numerous advantages:

Here is a schematic representation highlighting the benefits of agro-textiles, visually organizing the key advantages for agriculture in a clear and engaging format.

- i. **Enhanced Crop Protection:** Safeguard crops from adverse weather conditions, pests, and diseases.
- ii. **Resource Conservation:** Reduce water usage and minimize soil erosion. Drip irrigation

systems combined with agro-textiles are highly effective in water-scarce regions of India.

- iii. **Increased Productivity:** Create favourable microclimates that boost crop yield and quality.
- iv. **Eco-Friendly Practices:** Support sustainable farming by reducing reliance on chemical pesticides and fertilizers. Biodegradable agro-textiles such as coir and jute products are environmentally friendly solutions.
- v. **Economic Benefits:** Lower operational costs and increase farmers' profitability through improved efficiency. Agro-textiles have been instrumental in doubling farmers' incomes in certain regions of India.

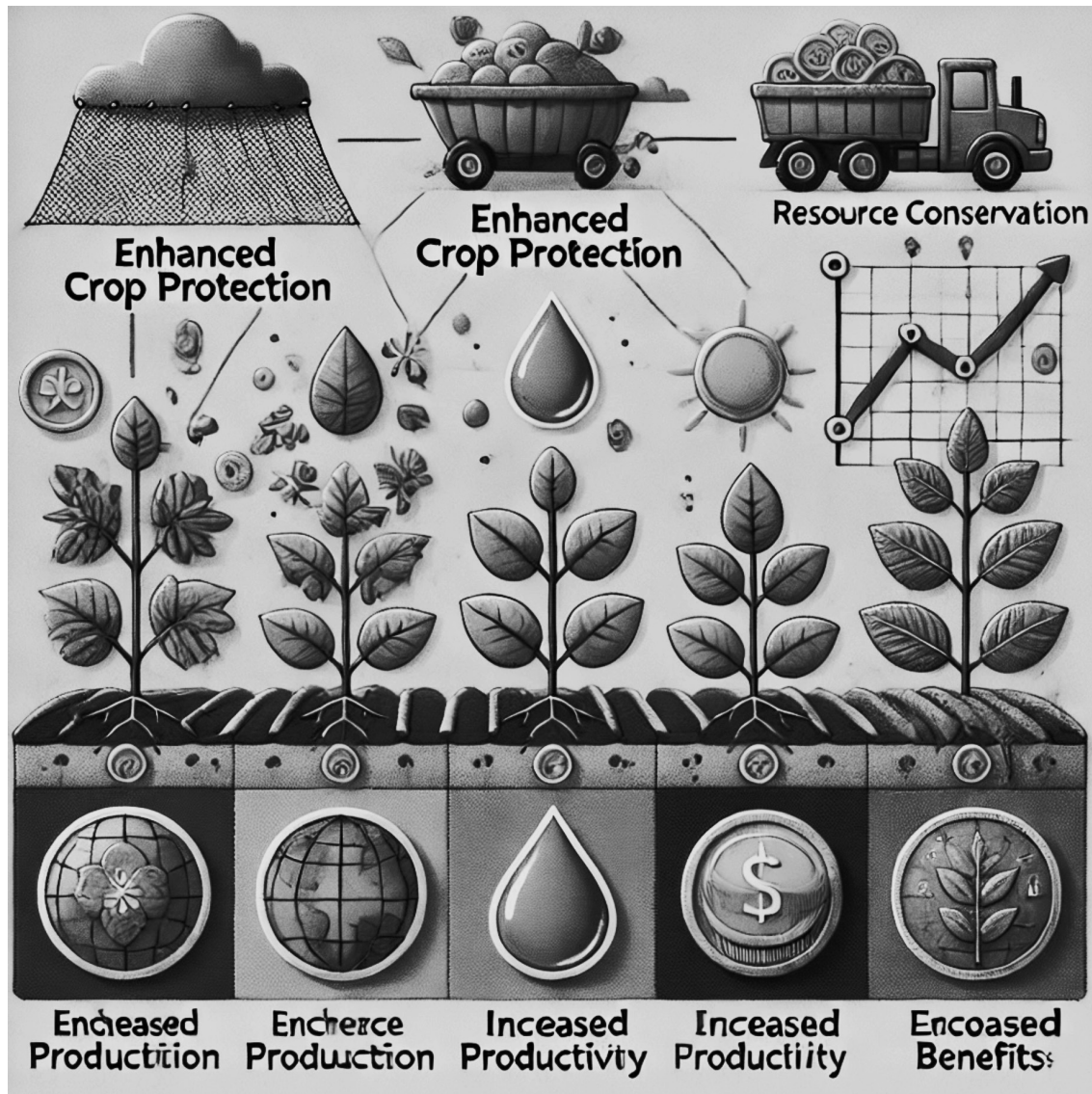


Figure 8

4. Case Studies and Innovations

- i. **Shade Nets in Maharashtra:** Farmers in Maharashtra have reported a 30% increase in vegetable yield and a 40% reduction in water consumption by using shade nets.
- ii. **Coir Geotextiles in Kerala:** Coir geotextiles are extensively used in Kerala for soil conservation in riverbanks and slopes, promoting sustainable land management.
- iii. **Mulch Mats in Punjab:** The use of jute mulch mats has reduced weed growth by 70% and enhanced soil moisture retention in wheat and paddy fields.
- iv. **Smart Agro-Textiles:** The Indian Institute of Technology (IIT) Delhi has developed smart textiles embedded with sensors to monitor soil moisture and temperature, enabling precision agriculture.
- v. **Biodegradable Agro-Textiles:** Research by the Indian Council of Agricultural Research (ICAR) focuses on developing cost-effective biodegradable agro-textiles using natural Fibers like banana and coconut.

Here is a graph showcasing case studies and innovations in agro-textiles. It highlights the quantitative benefits such as yield increases and water

reductions, along with qualitative descriptions for other innovations.

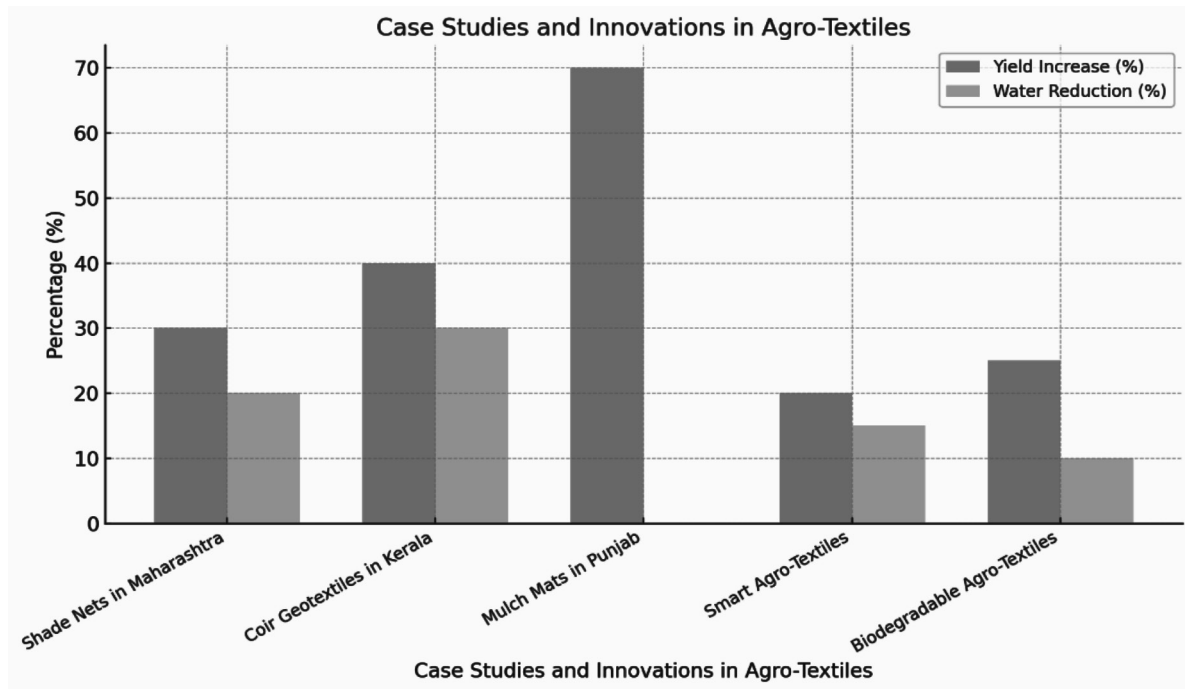


Figure 9

5. Environmental and Economic Implications

Agro-textiles contribute to environmental sustainability by reducing water wastage, controlling soil degradation, and minimizing the ecological footprint of agriculture. In India, the adoption of coir and jute-based agro-textiles supports the local economy while reducing dependency on synthetic materials. Economically, agro-textiles improve

cost-efficiency for farmers by reducing losses and enhancing productivity. Government initiatives such as subsidies and training programs have made agro-textiles more accessible to small and marginal farmers in India.

Here is a diagram representing the environmental and economic implications of agro-textiles, highlighting their role in sustainability and economic growth in Indian agriculture.

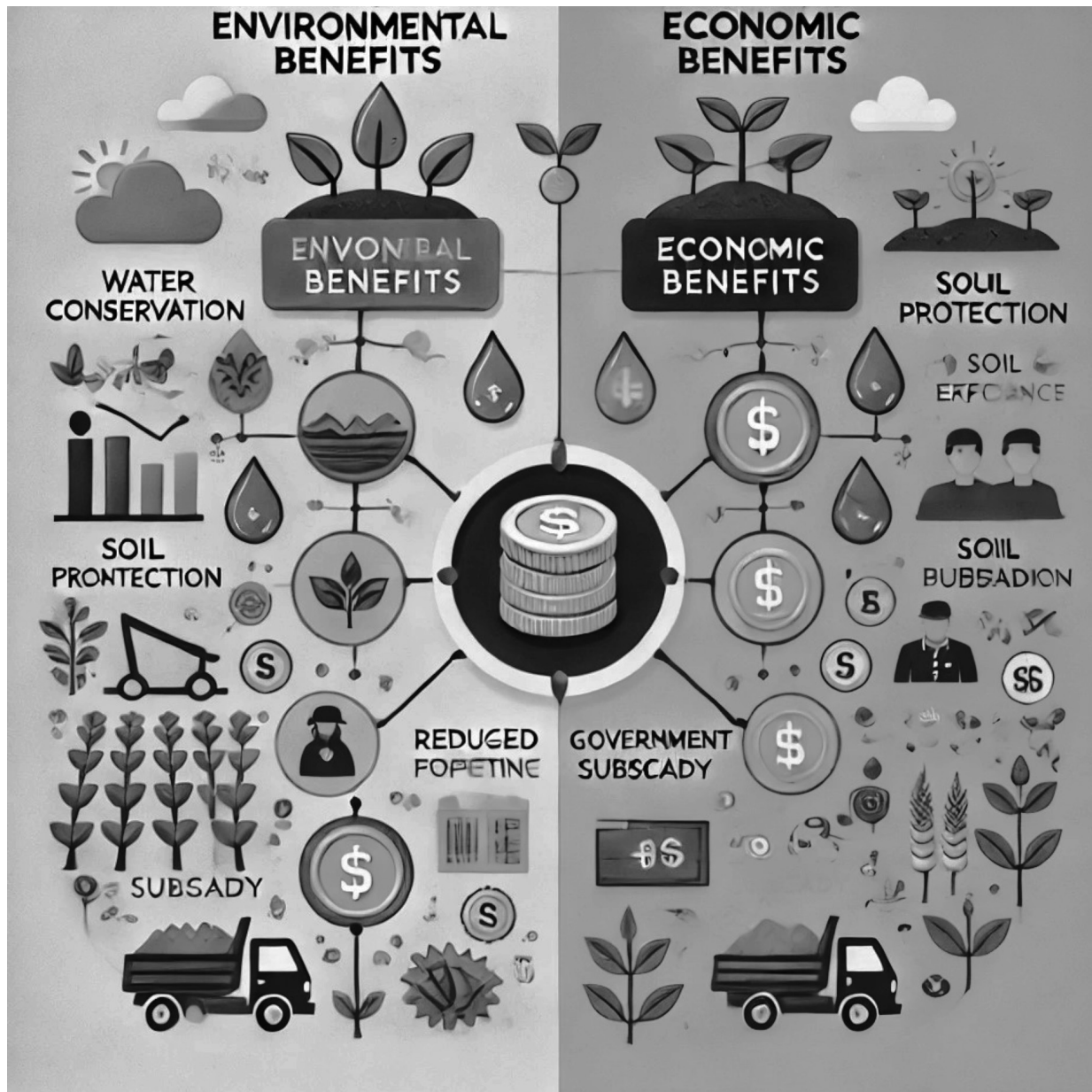


Figure 10

6. Challenges and Future Prospects

Despite their benefits, the widespread adoption of agro-textiles in India faces hurdles such as high initial costs, lack of awareness, and limited infrastructure for distribution. However, with increasing support from the government and ongoing research into cost-effective and sustainable solutions, the future of agro-textiles in India looks promising. Collaborative

efforts between research institutions and industries will be crucial in scaling up their adoption.

Here's an illustration that visually represents the challenges and future prospects of agro-textiles in India. It highlights the obstacles on one side and the hopeful advancements on the other, reflecting the balance between current issues and promising developments.



Figure 11

7. Summary & Conclusion

Agro-textiles are a promising innovation for modern agriculture, offering solutions to some of the most pressing challenges faced by the sector. Their ability to improve productivity, conserve resources, and support sustainable farming practices underscores their potential to shape the future of agriculture in India. Continued research and development, coupled with supportive policies and education, will be crucial in unlocking their full potential.

The paper explores the innovative application of agro-textiles, specialized fabrics used in agriculture, to address challenges like climate change, resource limitations, and the need for sustainable practices. Agro-textiles such as shade nets, mulch mats, crop covers, and geotextiles offer solutions for enhancing crop yields, conserving resources, and protecting crops from environmental stressors.

Key highlights include:

- i. **Types and Applications:** Various agro-textiles serve specific roles, including regulating

temperature, reducing evaporation, and preventing pests or extreme weather damage.

- ii. **Benefits:** Agro-textiles promote crop protection, resource conservation, and eco-friendly farming while improving economic returns for farmers.
- iii. **Innovations and Case Studies:** Examples like coir geotextiles in Kerala and shade nets in Maharashtra demonstrate their effectiveness in increasing yields and conserving water.
- iv. **Challenges and Future Prospects:** High initial costs, lack of awareness, and limited infrastructure hinder widespread adoption. However, government support and ongoing research are paving the way for broader usage.

Agro-textiles represent a significant advancement in modern agriculture, fostering sustainability and economic efficiency in Indian farming practices.

8. REFERENCES

Journal & Web Resources

1. Indian Council of Agricultural Research (ICAR). (2022). "Innovative Agro-Textiles for Sustainable Farming in India." Retrieved from www.icar.org.in.
2. Coir Board of India. (2021). "Applications of Coir Geotextiles in Indian Agriculture." Retrieved from www.coirboard.gov.in.
3. Ministry of Textiles, Government of India. (2023). "Agro-Textiles: Enhancing Agricultural Productivity and Sustainability." Retrieved from www.texmin.nic.in.
4. Sharma, R., & Gupta, S. (2020). "Impact of Shade Nets on Vegetable Cultivation in Maharashtra." *Indian Journal of Agricultural Research*, 54(2), 112-118.
5. Kumar, A., & Singh, P. (2021). "Development of Biodegradable Agro-Textiles for Indian Farmers." *Journal of Natural Fibers*, 18(5), 550-561.

Book References

1. "Agrotextiles and Agriculture"
Authors: Dr. S. Rajesh Babu, Dr. G. Thilagavathi, Publisher: Woodhead Publishing India
This book provides an in-depth discussion on agrotextile applications, their production, and future prospects.
2. "Textiles in Agriculture: Sustainable Development and Applications"
Authors: Subramanian Senthilkannan Muthu, Miguel Angel Gardetti, Publisher: Springer
Focuses on sustainable agricultural practices enabled by textile innovations, including case studies and environmental implications.
3. "Handbook of Technical Textiles"
Editors: A. R. Horrocks, S. C. Anand, Publisher: Woodhead Publishing
Contains detailed chapters on agro-textiles, including their design, functions, and benefits in agriculture.
4. "Agro-Textiles for Crop Protection"
Author: K. L. Gokhale, Publisher: NIPA
Highlights the use of various agro-textiles in improving crop protection and resource management.

● ● ●



Transform your DREAMS into REALITY @

Shri Ram Group of Colleges

App by UGC, AICTE, COA, NCTE, PCI, BCI; Aff to AKTU and BTEUP, Lucknow, CCSU, Meerut & SCERT, Lucknow

SRC A⁺⁺ Grade NAAC Accredited College

Scholarships
more than **₹3 Crore**

Call @ Engg. 9927079966, 7351335577 Arch. 9917111139, Poly. 9837755504, 9917116655, Mgmt. 9917160786
Law. 9927227744, HSc. 8077494405, Fine Arts. 9719402220, Pharmacy. 9919966070, Other Courses. 9358348700

BTech & Polytechnic

AKTU Code
695

Civil Engineering
Mechanical Engg
Electronics Comm Engg
Electrical Engg
Computer Science Engg

BTE Codes
1501, 1602

BArch

AKTU Code
695

MBA

AKTU Codes
249, 695

MCA

AKTU Code
249

BPharm

AKTU Code
1026

DPharm

BTE Codes
1008, 1009

ITI

- Electrician
- Fitter
- Turner
- Machinist
- Welder

MSc

- Biotechnology
- Microbiology
- Computer Science
- Home Science
 - › Food & Nutrition
 - › Clothing & Textile
 - › Home Management

BSc

(Agriculture)

BSc

- Phy, Chem, Maths
- Chem, Bot, Zool
- Biotechnology
- Microbiology
- Home Science

MCom

BCom

MFA

Fashion Design

BFA

- Applied Art
- Textile Design

BEd

MEd

DEEd (BTC)

BCA

BBA

MPed

BPed

BPES

BVoc Yoga

MJMC

BJMC

LLB

BALLB

BComLLB

Campuses : Parikarma Marg/ Circular Road/ Roorkee Road, Muzaffarnagar

log on : www.srgcmzn.com

e-mail : src_mzn@rediffmail.com

