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SAVEETHA
INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES
(Recognized by the Government of Tamil Nadu under Section 9 of 1927 Act 1962)



Education Research and Development Association (ERDA)

Sponsored

A TWO DAY INTERNATIONAL CONFERENCE ON INNOVATIONS AND CHALLENGES IN LAW, MANAGEMENT AND SOCIAL SCIENCES

Editors

**Prof. Dr. Asha Sundaram | Dr. S. Thangamayan
Dr. Aswathy Prakash G | Prof. Dr. Reshma Soman N**

22nd & 23rd August 2025

**Organised by
Department of Research and Development,
Saveetha School of Law, SIMATS Chennai - 77 Tamilnadu.**



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Prof. Dr. Asha Sundaram
Principal/Convener

MESSAGE

I am delighted to announce that the Department of Research and Development at Saveetha School of Law, SIMATS, is organizing a **“Two-Day International Conference on Innovation and Challenges in Law, Management and Social Sciences.”** We extend a warm welcome to all experts, delegates, and participants from various colleges and universities across the nation and beyond.

The conference seeks to provide a platform for exchanging ideas and perspectives on the emerging innovations and pressing challenges in the fields of law, management, and social sciences. How can legal frameworks adapt to the rapid changes in society? How can management practices remain effective in a dynamic global environment? How do social sciences contribute to building inclusive and sustainable communities? These questions emphasize the need for interdisciplinary dialogue and collaboration, which this conference seeks to foster.

I extend my heartfelt congratulations to the Organizing Secretary, coordinators, and students of Saveetha School of Law for their dedicated efforts in successfully arranging and managing this International Conference. Our gratitude also goes to our Founder Chancellor and Pro Chancellor, whose constant encouragement and support have empowered us to undertake such academic endeavours.

We are pleased to note the enthusiastic participation of faculty members, researchers, and students in this conference and sincerely value their contributions. We look forward to their continued involvement and encourage them to join us in our future academic engagements on diverse and impactful themes.



FOREWORD

In the current era of rapid technological advancement and digital connectivity, emerging phenomena such as Artificial Intelligence (AI) and Machine Learning (ML) are revolutionizing the fields of law, management, and social sciences. These advancements are reshaping legal frameworks, business strategies, and societal dynamics in unprecedented ways leaving many scopes and opportunities for innovations and discoveries. It is my privilege to write foreword of this Edited Volume, a scholarly outcome of the 2-Day International Conference on Innovation and Challenges in Law, Management, and Social Sciences. This volume represents the intellectual vigor and interdisciplinary synergy that characterized the conference.

This International Conference has been organised by the esteemed Saveetha School of Law, Saveetha Institute of Medical and Technical Sciences (SIMATS), in collaboration with the Education Research and Development Association (ERDA). SIMATS, a pioneer in interdisciplinary education, is globally recognized for its commitment to sustainability, innovation, and social impact. Saveetha School of Law, accredited by the NAAC with A++ rank among India's top institutions, exemplifies excellence in legal research, training, and digital pedagogy. ERDA, with its expansive national and international network, continues to play a vital role in fostering inclusive development and research-driven societal transformation. The ERDA nurture the young minds around the globe for quality and innovative research and inventions.

The central theme of the volume addresses some of the most urgent global challenges, such as cybersecurity, regulatory compliance, cross-border frameworks, and technological integration. These topics are increasingly critical as industries and governments alike adapt to the digital age, making the discussions in this volume not only timely but forward-looking.

This volume brings together perspectives from academia, industry, and policymaking. In line with the University Grants Commission's (UGC) new Curriculum and Credit Framework (CCF), which emphasizes interdisciplinary learning, employability, and practical engagement, the research presented here is both reflective and actionable. It speaks to the evolving needs of learners and society, promoting a holistic educational approach that bridges theory with practice.

I extend my whole-hearted congratulations to the contributors, organizers, and editors for curating this vital resource. I am confident that this volume will certainly inspire ongoing dialogue, critical inquiry, and impactful solutions in these dynamic fields.

A handwritten signature in black ink, appearing to read 'Ram Prahlad Choudhary', with a stylized flourish at the end.

(Prof. Dr. Ram Prahlad Choudhary)
Professor & Director, CUCSE-CEFM,
Department of Commerce, University of Calcutta &
President, Education Research & Development Association (ERDA)



FOREWORD

It is a privilege for the Education Research & Development Association (ERDA) to contribute as a sponsor to the International Conference on “Innovation and Challenges in Law, Management and Social Sciences”, organized by the Department of Research and Development, Saveetha School of Law, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, India. We are delighted to witness the proceedings of this conference being preserved and presented in this edited volume, which will serve as a lasting academic resource for scholars, practitioners, and students alike.

Since its inception in 2015, ERDA has remained steadfast in its mission to advance education and research across diverse disciplines, while fostering inclusive social development. As a membership-based organization with representation from across India and over ten foreign nations, we envision a world where education, innovation, and compassion drive human progress. Guided by our core values - academic integrity, social responsibility, diversity, solidarity, and empathy, we are committed to empowering individuals and communities to create an enlightened, inclusive, and sustainable society.

Publications such as this edited book hold immense value, as they not only document contemporary research but also inspire further inquiry and innovation. By bringing together contributions from varied fields, this volume reflects the very spirit of interdisciplinary collaboration that ERDA seeks to promote. We extend our heartfelt appreciation to the editors, authors, and reviewers for their dedication in ensuring the quality and relevance of the work presented here.

We believe that the insights captured in these pages will stimulate academic dialogue and contribute to meaningful solutions for the challenges of our time. On behalf of ERDA, I extend warm congratulations to the organizing team and best wishes for the continued success of such scholarly endeavors.

Dr. R. K. Mishra

Chairman

Education Research & Development Association (ERDA)



Dr.S.Thangamayan
Organiser/ Associate Professor & Head,
Department of Research and Development
Saveetha School of Law, SIMATS.

FOREWORD

It is with great pleasure and anticipation that I extend a warm welcome to each of you to the **“Two Day International Conference on Innovation and Challenges in Law, Management and Social Sciences”** organized by the Department of Research and Development, Saveetha School of Law, SIMATS, Chennai – 77 on 22nd & 23rd August 2025. As the Organizing Secretary, it is my honour to facilitate this gathering of scholars, practitioners, researchers, and professionals from diverse disciplines to explore the evolving dimensions of law, management, and social sciences.

I sincerely thank the authorities of the University for permitting us to organize this significant conference. I also extend my gratitude to the management and my colleagues for their constant encouragement and wholehearted cooperation in making this event a reality.

My heartfelt appreciation goes to our esteemed speakers and panellists for sharing their insights, as well as to our sponsors and dedicated volunteers whose tireless efforts have been instrumental in bringing this conference to fruition.

I wish all the delegates and participants great success in their academic pursuits and hope this conference will be a fruitful and enriching experience for everyone.



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**Education Research and Development
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Sponsored

**Two Days International Conference on
Innovation and Challenges in
Law, Management and
Social Sciences**

Organised by

**Department of Research and Development,
Saveetha School of Law,
SIMATS Chennai – 77 Tamilnadu.**



**22nd & 23rd
August 2025**



**M.M. Convention Hall,
SIMATS**

About SIMATS

The Saveetha Medical and Educational Trust was established in 1986 with the primary objective of providing medical relief, promoting education, and encouraging research. In 1988, the Trust founded Saveetha Dental College along with an attached General Hospital. Subsequently, the Trust expanded its initiatives by establishing a Nursing College, Physiotherapy College, Occupational Therapy College, Law College, and an Engineering College, in order to comply with our commitment and to serve the people, particularly those residing in rural villages in and around Chennai and the adjoining districts of Tamil Nadu. SIMATS has been accredited by the National Accreditation Board for Hospitals and Healthcare Providers and by the National Accreditation Board for Laboratories for RT-PCR testing for COVID-19. The institution has total student strength of 10,000, supported by 1,500 faculty members and approximately 2,500 non-teaching staff. SIMATS ranks among the top 10 Indian universities and achieved the 395th position globally in the 2020 U1 Green Metric World University Rankings on Sustainability by the University of Indonesia, Jakarta. SIMATS has been recognized as a Social Entrepreneurship, Swachhata & Rural Engagement Cell (SES REC) Institution by the Mahatma Gandhi National Council of Rural Education, Department of Higher Education, Ministry of Education, Government of India. Recognized for its outstanding contributions, SIMATS secured the 11th rank in the university category in the NIRF 2024 rankings and is accredited with a NAAC A++ grade, further cementing its reputation as a premier institution driving intellectual and technological progress.

About the Saveetha School of Law

Saveetha School of Law, Saveetha Institute of Medical and Technical Sciences (SIMATS) established in 2009 aims to strive for Quality Legal Education and maintain higher standards of Legal Research and Training. The SSL is located close to the city in a serene atmosphere. We carry with us the vision of imparting excellence in legal education and our mission is to widen and nurture the intellectual faculty, leadership traits and personal development of young legal minds. Saveetha School of Law has earned widespread recognition for its excellence, ranking 13th in India and 1st in Tamil Nadu for three consecutive years, according to the NIRF 2024 rankings. Accredited by NAAC with an A++ grade, the school is also recognized by the Bar Council of India and approved by the UGC. Saveetha School of Law offers a wide range of undergraduate, postgraduate, and Ph.D. programs to aspiring legal professionals. We offer the CBCS Curriculum with a range of regular and special subjects. Our system is fully digitized with Flipped Classes and e-books made available to students. We also provide sophisticated Air-Conditioned class rooms, smart boards with wi-fi services, experienced faculty, state of the art teaching methodology, library facilities with all the required books, cafeteria, hostel, playground and what not. We are no less in academics, regular tests and assessments, internship programmes on a one to one basis with advocates in High Court, Moot courts with regular sessions were organized. We also conduct moot court competitions and research programmes on a regular basis. Community services to create awareness on legal aspects of the problems of the common man are also our special feature.

About ERDA

Education Research and Development Association (ERDA) is a registered non-profit organization established in 2015 with a dual focus: to advance education and research across diverse disciplines, and to devise and execute strategies for fostering inclusive social development. Operating as a membership-based entity, ERDA boasts a widespread presence, drawing members from nearly all states and union territories within India. Additionally, ERDA proudly includes members hailing from more than ten foreign nations. ERDA envisions a world transformed by education, innovation, and compassion, where knowledge and empathy drive progress and uplift humanity. Its mission is to empower individuals and communities worldwide to create an enlightened, inclusive, and sustainable society through education, research, and philanthropy. ERDA's core principles revolve around fundamental values such as Academic Integrity, Social Responsibility, Diversity, Solidarity, and Empathy. ERDA is committed to the triple bottom line: People, Planet, and Profit. Here, "Profit" does not refer to business ventures but rather our focus on contributing to the eradication of poverty within society. Although we are not yet in a position to fully address this issue, our team is diligently working towards finding constructive solutions to combat unemployment. We are confident that our efforts will lead to meaningful advancements in this area.



About the Conference

Saveetha School of Law proudly invites scholars, students, researchers, and academicians to participate in the Two-Day International Conference on Innovation and Challenges in Law, Management, and Social Sciences. This conference aims to serve as a dynamic platform for interdisciplinary engagement, where participants can explore contemporary issues, emerging trends, and transformative practices in the fields of law, management, and social sciences. The event seeks to foster meaningful academic dialogue, stimulate innovative research, and address real-world challenges through scholarly collaboration. Attendees will have the opportunity to present research papers, engage in thought-provoking panel discussions, and interact with leading experts from around the globe. Special emphasis will be placed on the influence of technology, globalization, and policy reforms on legal frameworks, managerial strategies, and social development. By uniting diverse perspectives, the conference aspires to inspire critical thinking and promote sustainable, inclusive growth. It also provides a valuable forum for networking and future research collaborations.

Aim and Objectives

The Two-Day International Conference on Innovation and Challenges in Law, Management, and Social Sciences aims to foster interdisciplinary dialogue and promote research-driven solutions to contemporary global challenges. The primary objectives are to: provide a platform for scholars, academicians, and professionals to share innovative ideas and research; explore the evolving intersections of law, management, and social sciences; analyze the impact of technology, globalization, and policy shifts; and encourage collaborative academic partnerships. The conference seeks to inspire critical thinking, contribute to policy and institutional development, and support sustainable and inclusive growth through evidence-based discussions and knowledge exchange.

Theme of the Conference

Two-Day International Conference on Innovation and Challenges in Law, Management, and Social Sciences. The conference theme explores legal, managerial, and social dimensions of digital finance, focusing on compliance, cybersecurity, and cross-border regulatory challenges.

Track - I Law and Justice

Sub-Themes

- ☒ Cyber Law and Data Protection
- ☒ Environmental Law and Sustainable Development
- ☒ Gender Justice and Legal Empowerment
- ☒ International Law and Global Governance

Track – II Management and Business Innovation

Sub-Themes

- ☒ Strategic Management in a Digital World
- ☒ Financial Inclusion and Digital Economy
- ☒ Human Resource Management in the AI Era
- ☒ E-Commerce and Consumer Behaviour

Track – III Social Sciences and Humanities

Sub-Themes

- ☒ Media, Culture, and Society in the Digital Age
- ☒ Migration, Urbanization, and Social Transformation
- ☒ Youth, Identity, and Social Media
- ☒ Mental Health, Well-being, and Social Support Systems

Track – IV Cross-Disciplinary and Emerging Themes

Sub-Themes

- ☒ AI, Technology, and Ethical Dilemmas
- ☒ Digital Literacy and Access to Justice
- ☒ Public Policy and Governance Innovation
- ☒ Interdisciplinary Approaches to SDGs

Call for Papers

The Organizing Committee of the Two-Day International Conference on Innovation and Challenges in Law, Management, and Social Sciences (ICICLSSS 2025) invites original research papers on any of the sub-themes listed under the conference scope. Contributions are welcome in the form of full research papers.

Guidelines for Paper Submission

- ◆ The full paper should not exceed 3000 words, with an abstract of 350 words.
- ◆ Papers must follow the Harvard referencing style.
- ◆ The manuscript should be prepared in MS Word, using Times New Roman, 12-point font, with 1.5 line spacing on A4 size paper.
- ◆ Only participants presenting in person at the conference will receive presentation certificates.
- ◆ The soft copy of the paper should be submitted via email to erdasslconference2025@gmail.com by 16 August 2025.
- ◆ All submissions will be screened for plagiarism.

Publication of Papers

All accepted papers will be published in the Conference Proceedings (with ISBN) and selected papers will be published in UGC CARE-listed & Scopus Indexed journals.

Awards

The following awards will be announced and presented during the closing session of the conference:

- ◆ Best Paper Award
- ◆ Best Paper Presentation Award



Selection Criteria for Awards

- ◆ Awards will be conferred to the author(s) of papers presented at the conference, based on evaluation by the Program Committee and Session Chairs.
- ◆ The criteria include both paper quality (as assessed during the review process) and oral presentation quality (evaluated by session chairs).
- ◆ Papers shortlisted for the Best Paper Award will be presented in exclusive sessions scheduled on Day 1 of the conference.
- ◆ To be eligible for the Best Student Paper Award, the paper must be presented solely by a student, although co-authorship with faculty or senior researchers is permitted.

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G.Santhosh Kumar

Important Dates

- ✓ Submission of Abstract & Full Paper August 16, 2025
- ✓ Confirmation of Acceptance August 18, 2025
- ✓ Conference Date: August 22 & 23, 2025.
- ✓ Submit your paper at erdasslconference2025@gmail.com

NB: Please use separate form (Photocopy) for each Registration, Registration Fee includes Conference Kit, Food and Accommodation.



Registration Fees Per Author

◆ UG Students/ PG Students	: ₹ 750/-
◆ Research Scholars	: ₹ 900/-
◆ Academicians	: ₹ 1300/-
◆ Foreign Delegates	: \$ 25 (₹ 2000/-)
◆ Participation Only	: ₹ 1000/-
◆ Publication Processing fee	: Depends on Publications

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Vallimalai



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22nd & 23rd August 2025, Venue: M.M. Convention Hall, SIMATS Chennai

THE BOARD OF MANAGEMENT, FACULTIES AND STUDENTS OF SAVEETHA SCHOOL OF LAW
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Dr. Ashwani Kumar
Vice Chancellor SIMATS.



Prof. Dr. Sheeja S Varghese
Registrar SIMATS.

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Government of Tamil Nadu.*



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*. Commissioner of Income Tax (Appeal),
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Dr. ALM. Ayoobkhan

*Senior Lecturer Director,
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Commissioner of Oaths.
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Dr. Ravala Sumani

*Assistant Professor,
Department of Commerce and Management,
G. Pulla Reddy Degree and PG College,
Hyderabad, Telangana.*



Dr. A.C.M. Hanas

*Senior Lecturer in Economics
Department of Economics and Statistics
South Eastern University of Sri Lanka,
Sri Lanka.*



Dr. MIM. Riyath

*Deputy Director for Training,
Research and Development
Department of Accountancy and Finance,
South Eastern University of Sri Lanka.*



Dr. Umesh U

*Associate Professor
Department of Commerce & Management,
Amal College of Advanced Studies,
Kerala.*



Dr. R. Premalatha
*Assistant Professor,
Department of Economics,
Vels University, Chennai.*



Dr. Shobana Karthikeyan
*Assistant Professor
Department of Economics
Madras Christian College (Autonomous)
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Dr. Suneetha Esampalli
*Assistant Professor & Head
Department of Economics
St. Ann's College for Women Mehdiapatnam,
Hyderabad.*



Dr. V. Thangamayan
*Assistant Professor,
Department of Economics,
Kamaraj College, (Autonomous)
Thoothukudi.*



Dr. R. Rajesh Kanna

*Assistant Professor,
Department of Economics -
School of Law, Vels Institute of Science,
Technology, and Advanced Studies (VISTAS),
Chennai, Tamil Nadu.*



Dr. H.M. Nijam

*Director / Staff
Development Centre Senior
Department of Accountancy & Finance
South Eastern University of Sri Lanka,
Sri Lanka.*



Dr. O. Nethaji

*Assistant Professor,
Kamaraj College, (Autonomous),
Thoothukudi. Tamilnadu.*

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Principal, Saveetha School of Law, SIMATS.

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PROGRAMME SCHEDULE

Education Research and Development Association (ERDA)

**SPONSORED A TWO DAY INTERNATIONAL CONFERENCE ON
INNOVATION AND CHALLENGES IN LAW, MANAGEMENT AND SOCIAL SCIENCES**

ORGANIZED BY

**DEPARTMENT OF RESEARCH AND DEVELOPMENT
SAVEETHA SCHOOL OF LAW SIMATS CHENNAI – 77.**

22nd -23rd August 2025

DAY – I

22th August, 2025 FRIDAY

Registration	09.00am - 10.00am
INAUGURAL SESSION 22nd August 2025 10:00-12:30 pm	
Welcome Address	Prof.Dr.Asha Sundaram Principal/Convener Saveetha School of Law, SIMATS Chennai.
Briefing about the Conference	Dr.Ram Prahlad Choudhary Professor, President, ERDA University of Calcutta, Kolkata, West Bengal.
Proceedings of the Conference	Senior.Prof.Dr.AL.Abdul Rauf (Cadre Chair) Senior Professor of Accountancy Department of Accountancy & Finance South Eastern University of Sri Lanka, Sri Lanka.
Guest of Honour	Honourable Thiru. S. M. Nasar Minister of Minorities Welfare of Tamil Nadu, Government of Tamil Nadu.
Felicitation Address	Dr. V. Justin, IRS. Commissioner of Income Tax (Appeal), Chennai. Ministry of Finance, Govt of India.
Keynote Address	Prof. D. Swamikannan Professor Dean (SE), Department of Economics, Central University of Kerala, Kasargod, Kerala.
Special Address	Prof. Dr.A.Jahfer Director / Centre for Quality Assurance , Professor in Commerce, Department of Accountancy & Finance, South Eastern University of Sri Lanka Sri Lanka.
Vote of Thanks	Dr. Aswathy Prakash G Conference Coordinator, Associate professor, Department of Research and Development Saveetha School of Law, SIMATS Chennai.
Lunch	12.30 am - 01.30 pm

PANEL DISCUSSION 22 nd August 2025 01:45 – 03:15 PM		
Chairperson	Prof. Dr.N. Murugeswari, Director (i/c) & Head, Department of Women’s Studies, Bharathidasan University, Tiruchirappalli.	
SPEAKERS:	Dr. A. S. KALYANA KUMAR Associate Professor Institute of Public Enterprise Osmania University Campus Hyderabad, Telangana.	
	Dr.ALM.Ayoobkhan Senior Lecturer, Director /Student Support Services & Welfare Department of Accountancy & Finance South Eastern University of Sri Lanka Sri Lanka.	
	Dr.RAVALA SUMANI Assistant Professor, Department of Commerce and Management, G.Pulla Reddy Degree and PG College, Hyderabad, Telangana.	
	Dr.T.RAVISANKAR Principal, Arulmigu Palaniandavar Polytechnic College, Palani. Tamilnadu.	
	Dr.A.C.M.Hanas Senior Lecturer in Economics Department of Economics and Statistics South Eastern University of Sri Lanka Sri Lanka.	
DAY – II 23 rd August, 2025 SATURDAY TECHNICAL SESSION 08.30: - 10:30am		
Technical Session - 1 Day 1 venue: New Moot Court Hall 01-45 to 03-15 pm	TECHNICAL SESSION	
	SESSION-I	Chair Prof. Dr. AMM. Mustafa Dean & Professor in Business Economics South Eastern University of Sri Lanka Sri Lanka. Co-Chair Dr.O.Nethaji, Assistant Professor, Kamaraj College,(Autonomous), Thoothukudi,Tamilnadu.

Technical Session – II Day 2 venue:New Moot Court Hall 8.30am to 10.30am	SESSION-II	<u>Chair</u> Dr.Suneetha Esampalli Head, Department of Economics St. Ann's College for Women Mehdipatnam, Hyderabad.
		<u>Co - Chair</u> Dr. V. Thangamayan Assistant Professor, Department of Economics, Kamaraj College, Thoothukudi.
Technical Session – III Day 2 venue: Seminar Hall 8.30am to 10.30am	SESSION-III	<u>Chair</u> Dr. H.M. Nijam Director / Staff Development Centre Senior Lecturer in Accountancy Department of Accountancy & Finance South Eastern University of Sri Lanka Sri Lanka.
		<u>Co - Chair</u> Dr.R.Rajesh Kanna Assistant Professor, Department of Economics - School of Law, VISTAS. Chennai, Tamil Nadu.

Tea Break	10:30am - 11:00am

Technical Session – IV Day 2 venue: Seminar Hall 11.00am to 12.30am	SESSION-IV	<u>Chair</u> Dr.J.Mujesh, Past President, Rotary Club of Chennai Nolambur, Additional Director Legal Aids Committee, RI District 3233, Panel Advocate & Commissioner of Oaths. Thiruvallur District.
		<u>Co - Chair</u> Dr.Umesh U Department of Commerce & Management Studies, Amal College of Advanced Studies, Aided by the Government Kerala.
Technical	SESSION-V	<u>Chair</u> Dr.MIM. Riyath Deputy Director for Training, Research and Development Senior Lecturer Department of Accountancy and Finance,

Session – V Day 2 venue: Seminar Hall 11.00am to 12.30am		South Eastern University of Sri Lanka. Co - Chair Dr.R.Premalatha Assistant Professor, Department of Economics, Vels University, Chennai.
Lunch Break		12:30 – 01.30pm
VALEDICTORY SESSION		
01:45 – 03:15pm	Welcome Address	Prof.Dr.Asha Sundaram Principal/Conference Convener Saveetha School of law, SIMATS
	Proceedings of the Conference	Dr. R. K. Mishra Professor and Founder ERDA, Delhi NCR, India.
	Valedictory Address	Honourable Shri P.Wilson Member of Parliament, Rajya Sabha.
	Special Address	Mr. V. Nandakumar IRS Commissioner of Income Tax, Department of Revenue, Ministry of Finance, Government of India.
	Special Address	Senior. Prof. Dr. (Mrs.) FH. Abdul Rauf (Cadre chair) Senior Professor of Management, Director /CEDPL Department of Accountancy & Finance South Eastern University of Sri Lanka Sri Lanka.
	Two Days Conference Report	Prof.Dr.Reshma Soman N Conference Coordinator, Professor, Department of Research and Development Saveetha School of Law, SIMATS Chennai.
	Vote of Thanks	Dr.S.Thangamayan Conference Organiser, Associate Professor and Head Department of Research & Development Saveetha School of Law. SIMATS.
Certificate Distributions		
Feedback from the participants		
National anthem		

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A STUDY ON ONLINE MARKETING AND ITS IMPACT

S. Kannan

Research Scholar

St Peter's Institute of Higher Education and Research

Avadi, Chennai

Dr. A. Manorselvi

Associate Professor

St Peter's Institute of Higher education and Research

Avadi, Chennai

Abstract

Online marketing is leveraging the unique capabilities of new interactive media to create new form of interactions and transaction between consumers and marketers. Also it can be considered as innovative way of marketing in digital marketplace which includes online advertising, online market research, online promotions and online pricing models. To make it successful there are different strategy such as Targeting, Product Strategy, Pricing strategy, Distribution strategy and promotional strategy. This paper tries to identify and analyze the advantages and disadvantages of online marketing over traditional marketing. It also focuses to identify that how companies can be benefited with this. This paper also tries to determine the impact of online marketing on traditional market and society.

Keywords: *Online marketing, E-commerce.*

Introduction

In this era of innovation, almost all the spheres of human life have been touched upon by the applications of ever –growing technology. E-Business is a natural extension of the internet. The concept refers to the transaction of business via an electronic means, usually the internet or any of its mediums. E-business has certain characteristics which include internet, information system for handling its business process, an online selling platform, Business models that work to compile data on various customer and market segments and then make this information available to third parties for a fee and online financial exchange facility.

There are two reasons for building the concept of e-marketing around consumer experiences-

1. This approach forces marketers to adopt the consumer's point of view.
2. It forces managers to pay attention to all aspects of their digital brand's interactions with the consumer, from the design of the product or service to the marketing message, the sales and fulfilment processes, and the after-sales customer service effort.

Any business that aims for development is linked to five basic marketing stages

Market Research

1. Development of the product
2. Distribution
3. Pricing
4. Promotion

Advantages of Online Marketing

These days a lot of customers can way in internet at any place whichever time and companies are constantly updating information regarding their goods or services. Customers know how to visit company's website, examine with reference to the products and make online purchase and afford feedback. Consumers get complete information related to the products or services. They can make comparison with other related products. Online marketing allows 24 hours of service to make purchase for the consumers..

Objectives

- To identify and analyze the advantages and disadvantages of online marketing over traditional marketing.
- To identify how the business can be benefited with online marketing (discuss different strategic issues).
- To determine the impact of online marketing on society.

Advantages of Online Marketing

1. **Global reach:** No geographical bar for E-Marketing. Targeted emails pave the way.
2. **Lower Cost:** Cost incurred in designing, executing, testing, sending and receiving an email is up to 78% less for a run of 5000 over paper based direct mail version.
3. **Interactive:** A business can innovatively initiate campaigns using graphics, video, music, quiz, game.
4. **Personalized:** Emails enable to personalize and greet every person which is to be targeted. It helps in creating a special bond with the prospects.
5. **Faster Response:** The business or a company get the response through e-mail within three days, with maximum responses on day one itself, while a direct mail campaign would take minimum ten to twelve days to generate any response.
6. **Simplest:** Executing an e-mail campaign is simple and can be done sitting at home without any extensive resources.
7. **Targeted marketing:** With the help of prepackaged and custom built lists one could reach only those who might require the services and product, without bothering those who do not. One can select the target customer based on geography, age, income and other parameters.
8. **Measurable Result:** In online marketing one can accurately determine click-through rate, conversion rate, to enable and to assess the success of different e-mail campaigns.
9. E-marketing modules allow organization to deliver highly personalized web offers and dynamic web surveys that are fully synchronized with marketing efforts in traditional channel.
10. Capture and analyze return on investment of marketing activities.
11. Reduction of overheads as the enterprise does not have to invest huge funds in warehousing or high office rents.

Disadvantages of Online Marketing

1. Low penetration of computer technology.
2. Potential for deception.

3. Dependability on technology.
4. Maintenance cost due to constantly evolving environment.
5. Higher transparency of pricing and increased price competition.

Impact of Online Marketing on Society

- In this online world, a simple banner advertisement can be both an advertisement and a direct marketing service. The banner raises the passive consumer's awareness of a product. It also encourages the consumer to pursue action by clicking on it.
- Digital marketers care about the consumer's online experiences for the simple reason that all of them -- good, bad, or indifferent -- influence consumer perceptions of a product or a brand.
- The web offers companies' ownership and control of all interactions with customers and thus creates both the ability and the need to improve their overall experience.

Traditional Marketing VS Online Marketing

1. Online marketing is more measurable than traditional marketing. Internet marketing allows organization to see exactly what and how much they are paying for.
2. Online marketing makes strategic decision based on facts. Traditional organizations will have a difficult time showing real data that leads to achieving the goals.
3. Online marketing is better at reaching target audience.
4. Internet marketing is a constant source as compare to traditional. If we catch an ad in passing and we missed some information we cannot go back and review it in case of traditional whereas online marketing provides a permanent address that can visit anytime.
5. Online marketing provides better word of mouth, feedback and review of the product and services are the good example of it.

Conclusion

Day by day, technology is getting sophisticated and costs are crumbling, making the internet easy and cheap to access. Eventually, even for buying a product from a shop situated near to home, the customer may use the internet to place order, and may get the product delivered immediately. The integration of electronic commerce and marketing will bring a renaissance in marketing function. Using the advantages of both Internet marketing and traditional marketing according to the goals of the company, is considered to be the most effective way of marketing. Comparing the two approaches, Internet seems to be a complementary tool to traditional marketing. There are various marketing strategy issues, which need to be answered before entering into online marketing for successful beneficial marketing.

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A STUDY ON THE EFFECTS OF SOCIAL MEDIA HEALTH INFLUENCERS ON YOUNG PEOPLE'S LIFESTYLE CHOICES

Mrs. Rekha. P

*Ph.D Scholar, Department of Economics
VELS Institute of Science, Technology and Advanced Studies, Chennai
rekhaparayath@gmail.com*

Dr. R. Premalatha

*Assistant Professor, Department of Economics,
VELS Institute of Science, Technology and Advanced Studies, Chennai
premalatha044@gmail.com*

Abstract

This study investigates the influence of health influencers in social media on the lifestyle decisions of the youth in Chennai, India. This study employs a sample of 100 participants aged between 18 and 35 and sophisticated statistical tools that include multiple regressions, factor analysis, cluster analysis, and chi-square estimation to establish the relationships that exist between lifestyle change and involvement of influencers. The results reveal a negligible influence of platform preference on behavior, but on the other hand, the use of social media and the presence or absence of following lifestyle health influences are two important consequences of the behavior that predict the number of modifications made to the lifestyle. Verification behavior and inherent trust are the two major dimensions of perceived credibility established through factor analysis. Cluster analysis based on the respondent's active and changing behavior patterns reveals that, thinking about the three different behavioral profiles, we can make a distinction between Active Adopters, Moderate Followers, and Active Consumers. The hypothesis of non-homogeneity in the lifestyles between non-influencer followers and followers of an influencer was proved right due to statistical significance. The paper will complete an important research gap in India by providing empirical evidence on how digital health can influence the young people, as well as provide recommendations on future studies and programs that the government should implement. These are testament to the fact that the web-based influence should be one that can be trusted in changing lifestyles towards positivity in the era of social media.
Keywords: Health Influencers, Social Media, Lifestyle Decisions, Youth Behavior, Perceived Credibility, Cluster Analysis

Introduction

India has been a major user of social media, and this has really affected the use and perception of health information, especially among the youth. Social media health influencers are a new variety of communicators who emerged due to widespread access to mobile internet and the massive growth of such platforms as Instagram, YouTube, and TikTok. Such individuals, most of whom are virtually untrained (in medicine), reach vast audiences of customers and cure them of lifestyles and provide them with wellness and medical advice in a manner that was previously restricted to certified medical personnel. The critical role of such influencers will be in ensuring that urban Indians learn more about nutrition, exercise, mental health, and overall wellness through taking action on the internet since they are quite prolific in using it. Rehman et al. (2024) [1] describe social media sites as having a strong influence on the health-related

decision-making process of Indian adults, even in those cases when they start losing the levels of belief in traditional health institutions. In the same manner, frequent social media use is linked to better health-promoting behaviors in the case of Indian nursing students (Sahu et al., 2020) [2].

Moreover, there is also a paradigm shift in the Indian health and fitness industry where the magnets are relying on digital forms of intimacy and personalized information to shape the customer's intentions and lifestyle dispositions. Sambyal and Gopal (2025) [3] conducted a study in the health fitness industry whereby the authors indicated that the influence of the endorser of an influencer greatly impacted attitudes about audience trust as well as behavioral intentions. Generation Z is impacted especially since they have a strong connection with digital consumption and online social proof (Kumarasamy & Pushpalatha, 2023) [4]. The influencer economy has led to the blurring between education and entertainment, making people conform to the way of life based on relatability and legitimacy. Word of mouth, particularly in lifestyle products, really matters in such cases to the purchase and health-associated conduct of Gen Z consumers in India, Kadam et al. (2021) [5]. Indians have also embedded social media in their society so that it has not only influenced interaction among people but also contributed to the way they live and make decisions over their well-being and health (Keerthana 2025) [6]. In such a way, the given research endeavour is expected to shed light on the way in which social media health influencers impact the lifestyle choices of young Indian Internet users and offer an empirical insight into a very peculiar and yet globally relevant digital phenomenon.

Objectives of the study

- To find out the relationship between the lifestyle changes among young people and their social media use practices.
- To ascertain chief behavior and demographic motives behind lifestyle changes caused by the health influencers.
- To determine what the respondents think about the reliability and credibility of health influencers.
- To use cluster analysis to categorize users into groups based on their engagement and change pattern of their lifestyle.

Need of the Study

The young people of India are utilizing the platforms on social media to find out more about health and wellness in the digital age. The advent of influencer culture explains the need to understand the effects of these online personalities on behavioral change and decision-making as far as health matters are concerned. The influencer marketing could be a more behavior-oriented intervention of the traditional health initiatives because it involves the delivery of the relevant information available to the young people conveniently. Although such a shift has occurred, there is a scarcity of scholarly work as to the manner in which health influencers on social media have been affecting lifestyle choices such as diet and physical and psychological well-being in the Indian context. This work is crucial in bridging this gap, as it provides a data-informed analysis without necessarily focusing on policymaking, which will allow health communicators and policymakers to learn. To achieve future digital health treatment that is

viable and meaningful in improving health lifestyle approaches among young Indians who are techno-savvy, there has to be an insight into such an impact.

Methodology

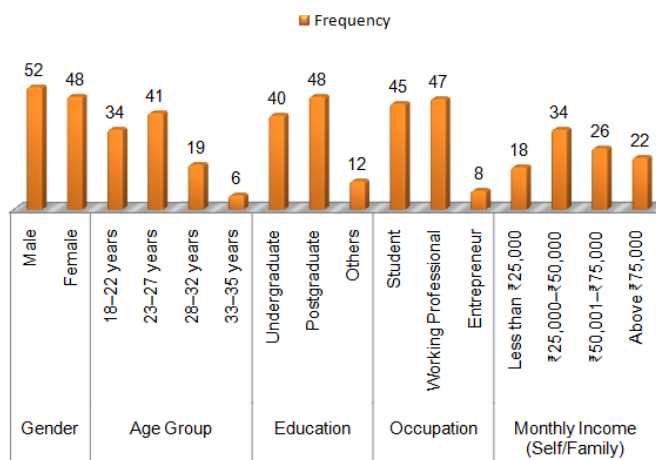
The current research was conducted through a quantitative research method, the structured survey, and examined the influence of social media health-related influencers on lifestyle among the youth in Chennai, India. Sample selection was done by purposive sampling on a group of 100 respondents aged between the ages of 18-35. The survey consisted of close-ended and Likert-scale questions that addressed demographics, the consumption habits of social media, perceived trust in health influencers, and specific lifestyle changes attributed to the influencer content repackaged in them. The analysis of data was conducted in SPSS software. Significant predictors of behavioral adjustment were observed in multiple regression, and since relationships were observed between platform use and lifestyle change, the chi-square tests helped to determine the significance of these associations. Cluster analysis was implemented to group users based on how they displayed their use, and factor analysis was employed in extracting the aspects of trust and verification. In addition, correlation analysis and hypothesis testing supported the studies of relationships between outcomes of lifestyle and participations of influencers. The ethical approval and informed consent were ensured.

Results & Analysis

Results : Overview of Data Collection Process

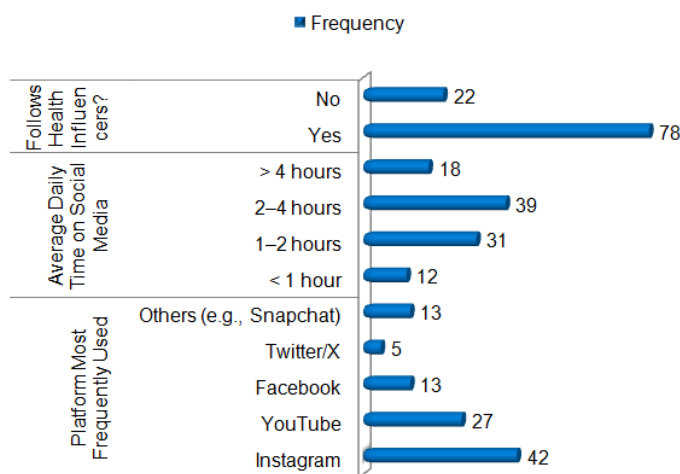
This study was quantitative and descriptive, and to carry out the research task, a purposive sample of 100 young respondents (between the ages of 18 and 35), living in Chennai, India, was used, and the online questionnaires were issued in the form of a structured questionnaire through Google Forms. After conducting a critical review of the research, the questionnaire was designed intelligently in a bid to identify the relevant attributes such as demographics, frequency of using social media, influencer types followed, and perceived credibility, as well as behavioral change established as a result of social media health content.

Fig 1: Demographic Profile of Respondents (n=100)



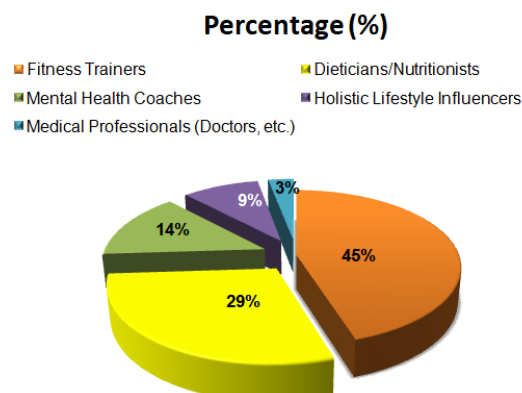
In order to ensure transparency and internal consistency, the questionnaire had undergone a pretest (pilot tested with ten respondents). Any necessary modifications were done as a response to any feedback before the final one was done. To adhere to ethical research standards, the responses were collected during a three-week course of time, ensuring voluntary participation was not imposed and that the names of respondents were anonymous. The data collected has been tabulated into the valuable tables of summary below. The statistical analysis, which shall occur in the other following sections of the article, shall be based on these tables. Fig. 1 adequately displays a balanced gender distribution due to most of the responders being aged 23 to 27 years old. To some extent there are more postgraduates than undergraduates. Occupational categories consist of professionals and students, and income rates vary between 25,000 and 50,000, which indicate that they have modest origins in terms of finance.

Fig 2: Social Media Usage Patterns



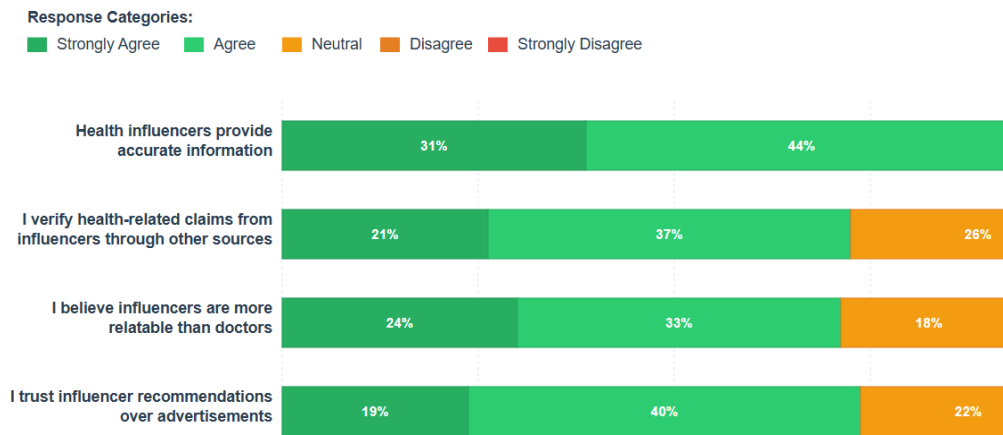
Instagram is the most used one (42 percent), as seen in Fig. 2, and three out of ten people spend two to four hours on social media every day. It is seemingly intriguing that 78 percent of those surveyed stated that they are following health influencers, and it is a telling indicator of the interest in wellness content. The lowest use of any of the sites studied is Twitter/X, whereas in second position in terms of choice is YouTube.

Fig 3: Type of Health Influencer Followed



Fitness instructors are also the most followed health influencers (45%), followed by dietitians and nutritionists (29%), as illustrated in Fig. 3. A moderate level of interest (a figure of 14 percent) in wellness advisors was given to mental health coaches, whereas the content on holistic lifestyle influencers was viewed (9 percent), showing that personal wellness auxiliaries are in greater demand as opposed to medical professionals.

Fig 4: Perceived Credibility and Trustworthiness



Divergent views on the factors that contribute to health are presented in Fig. 4. The problem is that only 58 percent of respondents do check up on even statements independently, yet they still agree that they are reliable sources of information (75 percent of respondents). Whereas 19 percent strongly disagree, more than half tend to accept the idea that influencers are reliable as compared to physicians. The cautious opinion about the digital health communication is captured in the fact that only 59 percent of the population trusts recommendations by the influencers over advertisements.

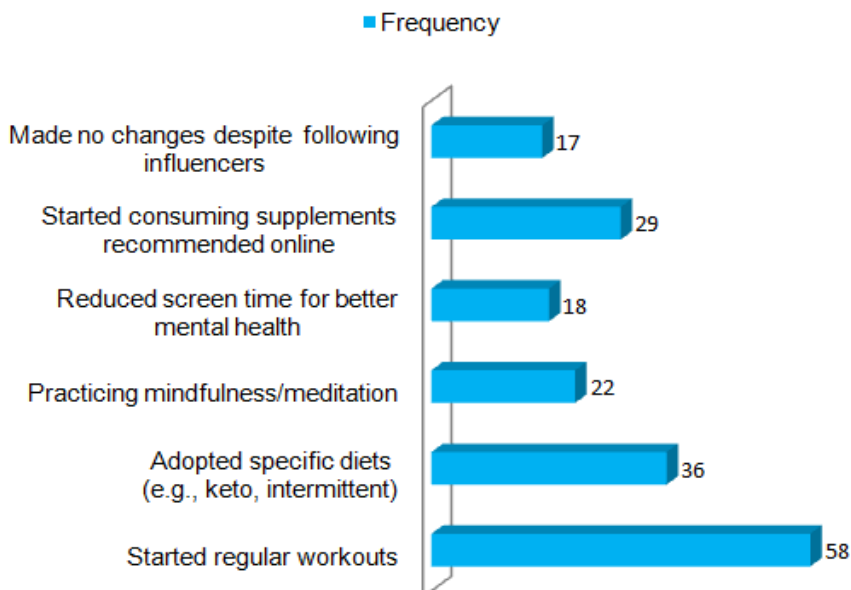


Fig 5: Lifestyle Changes Reported Due to Influencer Content

The most common type of lifestyle change influenced by the factors of health was the use of exercises since 58% of the respondents engaged in regular exercises (Fig. 5). There was also a high rate of uptake when it came to dietary changes (36%), as well as supplement usage (29%). Although there is a great amount of wellness information promoted through social media, 17 percent of people did not make changes, which indicates a different impact.

Statistical Analysis

This comprehensive statistical study is based on the responses received from 100 respondents based in Chennai, India, examines the impact of social media health influencers on the lifestyle decisions of the youth. There are four advanced methodologies of analysis to determine the relevant trends and relationships.

Analysis 1: Chi-Square Test of Independence - Platform Usage vs. Lifestyle Changes

Table 1: Cross-tabulation: Platform vs. Made Lifestyle Changes

Platform	Made Changes	No Changes	Total
Instagram	37	5	42
YouTube	23	4	27
Facebook	10	3	13
Twitter/X	3	2	5
Others	10	3	13
Total	83	17	100

Statistical Results

- **Chi-Square Value (χ^2):** 2.847
- **Degrees of Freedom:** 4
- **Critical Value ($\alpha = 0.05$):** 9.488
- **p-value:** 0.584

The chi-square test ($2.0 = 2.847$, $p = 0.584$) does not suggest any statistically significant dependence between the manner of life change and the favorite social media platform. Equivalent tendencies to adopt or abstain from changing their lifestyles are exhibited by Instagram, YouTube, Facebook, Twitter/X, and other websites. This is an indication that selection of a platform alone does not necessarily result in a behavioral change in health, and exposure to content and broader engagement could change lifestyle choices more than the platform itself.

Analysis 2: Multiple Regression Analysis - Predictors of Lifestyle Changes

Variables

- **Dependent Variable:** Number of lifestyle changes (0-6 scale)
- **Independent Variables:** Age group, Education level, Daily social media time, Follows health influencers

Table 2: Regression Model Results

Predictor	Coefficient (β)	Standard Error	t-value	p-value	Significance
Constant	0.842	0.334	2.521	0.013	*
Age Group	0.156	0.089	1.753	0.083	
Education Level	0.223	0.102	2.186	0.031	*
Daily SM Time	0.445	0.087	5.115	<0.001	***
Follows Health Influencers	1.234	0.198	6.230	<0.001	***

Model Statistics

- **R-squared:** 0.647
- **Adjusted R-squared:** 0.632
- **F-statistic:** 43.21 (p < 0.001)

The number of times using social media per day (0.445) and following health influencers (1.234) were found to be significant predictors with a significant outcome, 64.7 percent of the variation in lifestyle changes as explained by the regression model. The level of education also plays a great role (p = 0.031). The demographic effect of age is not so big. The findings give substance to the thought of how online time and interactions with influencers can have a huge effect on the adoption of healthy habits, particularly in persons with higher education levels or social interaction.

Analysis 3: Factor Analysis - Credibility Perception Dimensions

Kaiser-Meyer-Olkin (KMO) Test

- **KMO Value:** 0.734 (Good sampling adequacy)
- **Bartlett's Test:** $\chi^2 = 89.23$, p < 0.001 (Significant)

Table 3: Rotated Factor Matrix (Varimax Rotation)

Statement	Factor 1: Trust	Factor 2: Verification	Communality
Health influencers provide accurate information	0.823	0.156	0.702
Trust influencer recommendations over ads	0.791	0.089	0.634
Influencers more relatable than doctors	0.745	-0.112	0.567
Verify claims through other sources	0.134	0.856	0.751

Factor Statistics

- **Factor 1 (Trust):** Eigenvalue = 2.341, Variance explained = 58.5%
- **Factor 2 (Verification):** Eigenvalue = 1.013, Variance explained = 25.3%
- **Total Variance Explained:** 83.8%

The factor analysis shows two important aspects of credibility, which are trust and verification, that explain the total variation of 83.8 percent. High factor loadings corresponding to high veracity-related and relatability-related comments indicate emotional trust on the part of the respondents towards influencers. A verification dimension, although, is not hard to track down as evidence of consumers taking some cause of assertions seriously. The high Bartlett test

as well as the high KMO (0.734) shows that extraction is suitable to the factors. The results indicate that users that use online hosts of the health information possess pandemic psychological evaluations of the health content.

Analysis 4: Cluster Analysis - Respondent Segmentation

Table 4: K-Means Clustering Results (k=3)

Cluster	Size	Profile Characteristics
Cluster 1: "Active Adopters"	34	High SM usage (3.2 hrs/day), Follow health influencers (100%), High lifestyle changes (4.1 avg)
Cluster 2: "Moderate Followers"	43	Medium SM usage (2.1 hrs/day), Follow health influencers (79%), Moderate changes (2.3 avg)
Cluster 3: "Passive Consumers"	23	Low SM usage (1.4 hrs/day), Follow health influencers (35%), Minimal changes (0.8 avg)

Cluster Validation

- **Silhouette Score:** 0.642 (Good cluster quality)
- **Within-cluster Sum of Squares:** 127.3
- **Between-cluster Sum of Squares:** 342.7

They identified three different behavior groupings: Active Adopters, Moderate Followers, and Passive Consumers. The increased average lifestyle improvements of the users in Cluster 1 can be attributed to their high daily visits and the number of followers of all the influencers. Cluster 3 is not very active and does not have many changes. Such results exemplify the role of exposure to influencers and digital commitment that stratifies the adoption of health behaviors. It is launched by the comfort of clustering (Silhouette Score = 0.642). Implications of the results are that treatment profiles can rely on use profiles to administer treatments.

Table 5: Cluster Characteristics Summary

Variable	Active Adopters	Moderate Followers	Passive Consumers	F-statistic	p-value
Daily SM Time	3.2 ± 0.8	2.1 ± 0.6	1.4 ± 0.5	89.34	<0.001
Lifestyle Changes	4.1 ± 1.2	2.3 ± 0.9	0.8 ± 0.7	156.78	<0.001
Credibility Score	4.2 ± 0.6	3.4 ± 0.7	2.8 ± 0.8	47.23	<0.001

Statistically, there are many differences in behavior between clusters. Active adopters reveal the highest rates of lifestyle changes (4.1 average), social media use (3.2 hours), and influencer trust (credibility score = 4.2). Passive consumers are always the last in any statistics. This segmentation is confirmed with the help of high F-statistics ($p < 0.001$). These trends indicate that there is a close relation between the change of health habits and the use of the internet. It is profile differentiation that allows narrow-edged health communication strategies to take place with respect to the solitary personalities.

Hypothesis Testing

Hypothesis 1: Null Hypothesis Testing

H₀ (Null): There is significant difference between people who follow health influencers and those who do not.

H₁ (Alternative): There is no significant difference between people who follow health influencers and those who do not.

Table 6: Independent Samples t-Test Results

Group	n	Mean	SD	SE Mean
Follow Health Influencers	78	3.21	1.45	0.164
Don't Follow	22	1.18	1.01	0.215

Test Statistics

- **t-statistic:** 7.89
- **Degrees of Freedom:** 98
- **p-value:** < 0.001 (two-tailed)
- **95% CI for difference:** [1.51, 2.55]
- **Cohen's d:** 1.67 (Large effect size)

Reject H₀ at $\alpha = 0.05$. According to statistically significant data, respondents who follow health influencers alter their lifestyles significantly more often than those who do not.

Followers and non-followers of health influencers are very different, whether they are followers or not, as shown by the t-test ($t = 7.89$, $p < 0.001$, Cohen's $d = 1.67$). The average amount of lifestyle changes stated by the followers is way higher (3.21 compared to 1.18). The confidence interval [1.51, 2.55] justifies the reliability. This disapproves the null hypothesis and offers weight to the concept that the exposure to health influencers is considerably an encouraging agent of lifestyle change practice; thus, these are crucial integrators of communicative messages about general health.

Hypothesis 2: Relationship Hypothesis Testing

H₀: The amount of time spent on social media each day and the number of lifestyle modifications made do not significantly correlate..

H₁: The amount of time spent on social media each day and the number of lifestyle modifications made significantly correlate.

Table 7: Pearson Correlation Analysis

Correlation Coefficient (r)	0.623
R-squared	0.388
Sample Size (n)	100
t-statistic	7.89
p-value	< 0.001
95% CI for r	[0.483, 0.734]

Reject H₀ at $\alpha = 0.05$. Daily social media use and lifestyle modifications are strongly, statistically significantly positively correlated ($r = 0.623$, $p < 0.001$).

The directed correlation of the count of lifestyle changes with the number of minutes spent on social media per day shows a positive correlation therewith ($r = 0.623$, $p < 0.001$). This evidence of online time increase is associated with adaptation of behavior, which is worth 38.8 percent of the variation. The association is strong in spite of the different values of the sample size ($n = 100$) and confidence interval boundaries. This is useful in supporting strategic health treatments through increased media interaction through social media by offering to emphasize the behavioral effect of long exposure to the digital platforms.

Discussion

The statistical analysis in this study gives fascinating explanations on how youths in Chennai, India, alter their lifestyles to adapt to the influence that social media brings with regard to health. Interestingly, the results of the multiple regression indicated that the two most significant factors of lifestyle modifications, exceeding 64.7 percent of the variance, were the use of social media and following the health celebrities. These findings are in line with other research results that indicate that being exposed to the material by influencers on YouTube and Instagram may lead to the development of behavioral changes, particularly in health, food, and physical activities (Ramlan et al., 2022) [13]. The results of the t-test ($p < 0.001$) further authenticate the behavior that the influencers of health affect health choices by supporting an actual difference in the change of lifestyle among the followers and the non-followers of health influencers. This is in line with research models that show that influencers can be used as amicable figures bringing a balance between a peer-centric way of motivating people and professional health advice (Sercu, 2024) [14].

It is quite intriguing to mention that between the two factors that the factor analysis identified as essential during credibility perception, there is the issue of inherent trust and verification. Although the majority of the respondents stated that they believed what they read from influencers, most of them also verified the claims through other means. In this sense people act both with trust and skepticism, which could be ascribed to one of the patterns that was also found in a group of other qualitative studies that saw people approach health content in a critical manner even when they have some emotional bond with the messengers (Dailah, 2021) [8]. It was further illustrated that the highest level of engagement with a corresponding high behavioral outcome was portrayed among the so called Active Adopters. The same tendency was observed in other groups, with more people leading healthy lifestyles being engaged within the network of influencers (Sokolova et al., 2024) [15]. These findings are supported by studies indicating that frequent exposure to influencer-generated content, especially when they use their content through triggers of emotions and visual experience in the form of emotionally moving narratives, increases self-efficacy and perceived behavioral control, which are known key promoters of behavior change based on the Self-Determination Theory (Pourarian et al., 2025) [12].

The key issue identified in the research is the complex nature of selecting a platform, and this aspect was not found as a statistically significant one according to the results of the chi-square test. What this means is that the platform, in itself, does not actually encourage behavior change, but instead, it is both the quality of the information and the credibility of the source that do. It corroborates the findings of studies that indicated that the effectiveness of health communication in social media depends on the factors of relatability, authenticity, and framing

the message, but not the media (Truman, 2022) [16]. Also, peer reinforcement and vicarious learning can be offered through social media, which is essential in the adoption of lifestyle, particularly in youth who prefer to be involved in experience and pictorial stories (Younis, 2024) [17].

These changes in behavior are closely linked through a social and psychological process called networked peer influence, which relates directly to the fact that an adult may hear a message that sounds different, significantly, just because close people said it. Earlier studies have shown that emotional resonance of peers and social norm enforcement influence both health behaviors, such as diet and exercise, and the spreading of information (Centola, 2013) [7]. Our findings support this to the extent that when people are surrounded in thick influencer-follower social networks, it is their members who experience the greatest changes. This can be seen through the clustering of behavior change; the greater the involvement, the greater the effect on changing lifestyle. New evaluations showing the effectiveness of influencers in exercise-promoting, mindfulness-promoting, and nutritional change-promoting programs also confirm their role in facilitating the normalization of health-conscious behavior and the development of positive health attitudes (Kurşun & Gorgun, 2022) [10].

Moreover, the studies of global health communication demonstrate that influencer content oriented toward the area of health communication is more persuasive than the regular health promotion advertising in the case of basing it on the personal accounts or some empirical data (Ikpi & Undelikwo, 2019) [9]. It was the same trend among our sample respondents who stated that it is more apparent that they would consider suggestions by the influencers rather than just generic advertisements. Their studies on misinformation risks, however, are relatively reserved, as they indicate the necessity of regulatory systems that will monitor the quality of the materials provided by the influencers (Park et al., 2019) [11]. Severe mental activities, which may be long-lasting due to frequent exposure to unverified information, especially to vulnerable groups, should be easily investigated in the future, though this research was focused on the positive aspects of behavior-shaping attributes.

Research Gap

Even though the existing research on the effects of social media on behaviors relevant to health is plenty in the world, very little empirical research is done on the topic, particularly in the study of youth in tier-1 cities in India such as Chennai. Most of the existing studies overlook the sophisticated health influencer role by focusing on the all-inclusive social media use or behavior in online purchases. More than that, few studies employ advanced statistical data to identify credibility aspects or the determinants of behavior. Also, not much research has been done on the way to categorize young people based on the usage patterns of social media and level of trust. This research aims to fill this gap by not only presenting a concise analysis, which looks at the correlations, but also drawing out patterns, predictors, and psychological factors that motivate change in behavior that health influencers instigate on digital platforms.

Future Recommendations

Future studies on this idea must endeavor to obtain a larger, more diverse sample across different cities and socioeconomic statuses in order to increase its generalizability. The national implications of health behavior as driven by influencers could be more concise to be understood

when rural and semi-urban populations are considered. Rather than only being reliant on self-reported data, it is recommended to conduct a longitudinal study to establish the sustainability of such lifestyle changes [18]. To gain a deeper insight into the emotional and cognitive processes behind the confidence in health advocates, it will prove beneficial to include qualitative interviews. Also, the psychological impact of disinformation on vulnerable users should be examined, especially when it comes to unfounded health information [19]. It might also be interesting to see in the future the degree of ethical responsibilities of influencers in health communication and the influence of platform algorithms on exposure to health content.

Study Limitations

Although the given research gives meaningful information, several limitations should be pointed out. To begin with, there were only 100 Chennai respondents in the poll, which could not be representative enough of the wider ethnic diversity in India. Consequently, it cannot generalize the findings to include the people in rural settings or any other cities. Second, the purposive sampling that would tend to attract engaged respondents on social media only would be biased and thus overestimate the effects. Thirdly, all the data was self-reported, which poses threats of recollection or social desirability. Also, the study utilized cross-sectional data whereby, only one instance of time was recorded by the study and not changes that span a long time in lifestyle. Also, despite the use of the statistical tools to analyze links and patterns, it is not possible to prove causation. In this research, the quality of influencer material used, which is determinant of the behavioral outcomes, was not considered. In addition to this, there was no coordination of the influence of other factors such as friends, family, and other health programs that are offline. Not the least, conducting the sort leaves little room for helping develop a bigger picture in regard to understanding the psychological drivers or emotion triggers, which could be quite crucial in aiding changes in behavior and trust. To address these limitations, future research will need to have a broader treatment and a mixed method to better it.

Conclusion

This study is important to understand the new knowledge about the impact of social media health influencers on the lifestyle choices of the young adults of Chennai. Findings indicate that day-to-day interaction and whether or not an individual follows health influencers are direct influences on behavioral change, which suggests that platform choice is not. These behavioral profiles proved to be very valuable in predicting aspects of dieting, physical activity, and thoughts. There are dual dimensions of trust and verification determined by the factor analysis that shows a rather conscious audience that used to appreciate authenticity and relatability. Moreover, the results of clustering analysis offered health communication provision hints in terms of helping to perceive distinctive user groups, such as active adopters, moderate followers, and passive consumers. Statistical data proves the idea that social media influencers are important to the global health problem nowadays, especially among young people who actively use the technologies. The study also points out the importance of authenticity of influencer content and how the latter can serve as a bridge between the masses and health professionals. All this is of particular relevance to India, where healthcare delivery organizations have been grappling with access, and digital consumption is increasing exponentially. Combined with the growing body of data that point to the transformative impact

of digital influence on the present and future of health behavior, the data provide additional support to the revolutionary outcome of digital influence on modern health behavior.

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A STUDY ON THE MASS MEDIA IS BENEFICIAL OR DISADVANTAGEOUS TO THE ECONOMY

Anto Iraianbu A R

*Final Year, BA.LLB.,(Hons),
Saveetha School of Law, Simats, Chennai
antoaro68@gmail.com*

Abstract

The fast development in innovation and online entertainment explicitly the use of person to person communication among the web clients is becoming unsuitable by making their lives a computerized book. The aggregate of online correspondence channels that are devoted to local area based input, cooperation, content-sharing and joint effort is the straightforward meaning of virtual entertainment. Implying that long range informal communication locales like Facebook, Twitter, Myspace, LinkedIn, YouTube, Skype, Hangout, Snapchat, google+ as well as interpersonal interaction applications like WhatsApp, Viber, BBM, Tango, WeChat, etc permit a client to find and interface with about anybody seething from colleagues, companions to collaborators for various purposes which incorporate sharing of information. Moreover, the data clients give on their person to person communication account (profile) is a window into their lives, and as a matter of fact by and large, even their cherished once, and that implies it tends to be utilized against them for Psychological fighting, influence or different purposes. Protection in online entertainment is a main pressing issue of the two clients and the specialists in the field. This exploration paper frames and talks about a portion of the significant impacts of web-based entertainment on youth and financial turn of events and furthermore proposes ways of diminishing or dealing with the security issues. Virtual Entertainment is the most impressive weapon which we can use to impact the world. This paper extricates Social Media's part in Economic Development. This Paper gives more data about the financial and social improvement of virtual entertainment. This paper distinguishes the hole and advances the monetary improvement association through virtual entertainment, and addends benefits and detriments of online entertainment in the financial turn of events. This is the ideal opportunity to examine the Effective Communicate of virtual entertainment in Economic turn of events; it will positively advance the financial improvement in our country.

Keywords : social, media, development, economy, benefit

Introduction

Presentation Since late 90s web-based entertainment have turned into a dependable method for correspondence inside companions and colleagues improving on interchange processes and the expense in question. Figure 1. shows the insights of Facebook clients across 12 years. Taking a gander at the insights, the utilization of web-based entertainment continues to rise particularly among the young and teens, it is almost difficult to go over a teen with a cell phone who doesn't have something like one virtual entertainment account. Most would agree youngsters have the higher level of virtual entertainment utilization. Knowing the upside of web-based entertainment, and understanding its significance to the general public, particularly in sharing information across local areas as well as people. Additionally web-based entertainment is an incredible spot for similar individuals to meet and examine their thoughts and callings. Moreover, businesses that disapprove of individuals can likewise exploit web-based entertainment to advance their business and administration to a bigger local area by promoting their items. Over the beginning of person to person communication destinations,

essentially pointed toward making contacts and imparting data to individuals and to fabricate an organization of solid relationship in the general public. In any case, presently it appears to be virtual entertainment, likewise offering cybercriminals an extraordinary road to target casualties. Clients find long range interpersonal communication locales more straightforward and practical to share data and pass messages through announcement than the conventional call or instant messages. At a moment, government organizations, for example, National Population Commission, National Identity Management Commission, etc attempts to gather individual bio information of the overall population however many individuals are reluctant or hesitant to give the public authority such, yet presently utilizing online entertainment individuals liberally volunteer their data and will keep on doing as such as long as they utilize these administrations. Considering the upsides of virtual entertainment, it will be imprudent not to examine the adverse consequence/difficulties of web-based entertainment on youth advancement as well as financial improvement since online entertainment is presently been practice the ways for which it might have not been initially expected. Cybercrime, monetary extortion and so forth, every one of these are because of the data clients give on the web, certain individuals snap a photo of their bid for employment letter or advancement letter and transfer it with all the detail of their procuring just so their companions will remark them on unparalleled piece of handiwork, then again digital hoodlums gain admittance to a similar data and skill to exploit that recklessness. Considering these difficulties influence youth and monetary turn of events, this paper endeavours to resolve these issues.

Objectives

- To study what kind of mass media creas impact,
- To know the digital transaction through mass media in rural areas,
- To study the effects of mass media.

Review of Literature

Warren (2014) The author had used secondary data for his analysis. The author analysed the Researchers common struggle and have long perceived the significance of state strength in the concealment of beginning rebellions. Notwithstanding, past exact examinations have commonly centered around the material and coercive components of state power, darkening the basic pretended by the age of far reaching intentional were the findings of the paper.

Austin (2022) The author had used primary data for his analysis. The author The change in the business world's essential worry from one of more prominent modern extensions to the current race in buyer inspiration and accompanying advertising processes has raised broad communications to new significance in antitrust examination. The creator battles that the Supreme Court is moving very leisurely in accommodating Is discussed in this paper.

Jonathan (2018) The author had used secondary data for his analysis. the author analysed politicized worldview that has generally informed talks on African film has been truly tested, and, since the new intercession of transnational organizations into the creation and dissemination of Nigerian media, the model of the African well known expressions is as yet fundamental however presently not adequate for outlining were discussed.

Mercille (2013) The author had used primary data for his analysis. This study investigates how neighborhood authorities endure and utilize mass activation to remove strategy concessions from a higher place. Neighborhood authorities decisively endure mass activation when the requests of the majority are compatible with components of their own plan that they are generally incapable to seek after we're discussed in this paper.

Hayes (2010) The author had used secondary data for his analysis. This study analysed the 2001 Argentina defaulted on its obligations and afterward cheapened its cash by leaving the peso-dollar stake. The economy bounced back and has developed moderately emphatically from that point forward. This paper utilizes a basic political economy way to deal with first show that the Argentinian system finds support in the writing looking at the impacts found in this paper.

HOU (2019) The author used primary data for his analysis. The broad communications portrayal of mission talk impacts whether citizens have the chance to examine the applicants' issue needs and strategy proposition. Yet, it isn't certain if applicant and media issue accentuations are pretty much comparable at a political race's most significant minutes — when it is serious we're discussed.

Zehra (2016) The author had used secondary data for his analysis. A passage in the metropolitan coastline is planned as a two-way eight-path with a range of almost 20 meters. The layer is a flat layered rock mass and a three-level encompassing stone. To accomplish fast development of enormous range burrows, joined with designing foundation, level layered rocks were discussed.

Diana (2001) The author had used primary data for his analysis. The Information sharing becomes vital to achieve advanced citizenship. Virtual entertainment devices become famous to share and diffuse the information in the digitalization. This virtual entertainment learning and information sharing stages gives openness to the administrations inside social orders particularly for handicapped residents were discussed.

Englemen (1987) The author had used secondary data for his analysis. We utilize public review information to inspect the degree to which different wellsprings of political data open individuals to divergent political perspectives. We conjecture that the singular's capacity and want to practice particular openness is a vital consider deciding if a given source produces openness to different perspectives.

Mark (2017) The author had used primary data for his analysis. The author analysed the paper with primary data. The quickly increasing expense of medical services has carried expanding thoughtfulness regarding the capability of preventive measures as particular from healing ones. Cigarette smoking is the main preventable reason for horribleness and mortality in the UK. It is critical thusly that the adequacy of the various strategies were the major findings of the paper.

Pedersen (2013) The author had used secondary data for his analysis. This article considers the situation with laborers in the "new economy," characterized as the sharing economy (e.g., Uber, Lyft) and the on-request economy. The last option alludes to the broad and developing utilization of staffing organizations by laid out organizations in a wide range of enterprises to give all or a piece of their labor force were discussed.

Boas (2016) The author had used primary data for his analysis. On 14 June 2013, the Japanese Cabinet supported the purported "third bolt" of Abenomics, a development system proclaimed by the occupant Shinzo Abe Administration as the essential means to resuscitate Japan's stale

economy. In an impromptu video message delivered on YouTube, the head of the state broadcasted were discussed.

Shelankshi (2006) The author had used secondary data for his analysis. Toward the finish of 2013, the Israeli armed force radio broadcast Galei Zahal chose to change the organization of The University on Air, a radio program that had filled in as a novel gathering for the scholarly community and the media in Israel for very nearly forty years. Sent off in 1977, and with more than 6,000 broadcasted addresses, the program, with its long history, is a telling case were mentioned in this paper.

Stoddart (2011) The author had used primary data for his analysis. The author had used secondary data for his analysis. Two particular perspectives on the "public interest" goals of American correspondences strategy underlie the discussion over liberation of media possession in the United States. Promoters of liberation ordinarily view the public interest through an effectiveness arranged model. In that model the strategy objective is to advance contest were discussed.

Sonwalkar (2001) The author had used secondary data for his analysis. Ecological developments rely upon broad communications to arrive at general society and shape political navigation. Without media access, social developments experience political periphery. In this paper, we look at whether the web is a more open space than conventional media for activists to talk for the benefit of nature were discussed in this paper..

Chan (2013) The author had used primary data for his analysis. Beginning around 1991, India's pursuing of unfamiliar speculation has been joined by protectionist posing in delicate areas like protection and the media. The strains in making the shift from a blended economy to a generally open and market-situated economy were clear when the public authority were discussed.

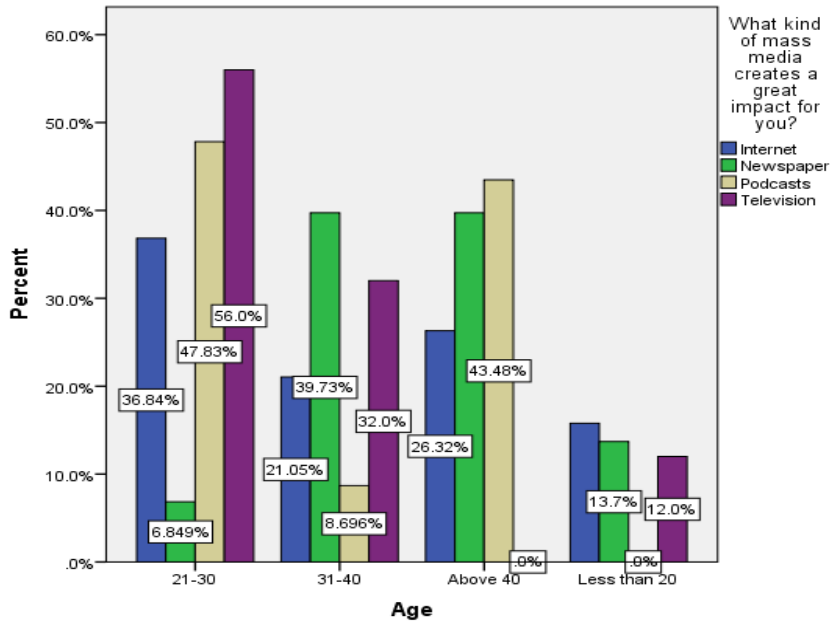
Graham (2002) The author had used secondary data for his analysis. The quantity of Internet news sources has soar lately. We examine the impacts of media multiplication on electing results expecting electors might pick news that is excessively hardliner, according to an enlightening point of view, i.e., participate in sectarian particular openness. We view that as in the event that electors who lean toward exceptionally sectarian were discussed.

Tanner (2013) The author had used primary data for his analysis. Utilizing models from contemporary strategy and business talks, and excellent verifiable messages managing the thought of significant worth, I set forward a contention with respect to why a basic grant that draws on media history, language examination, reasoning and political economy is important to comprehend the elements were discussed.

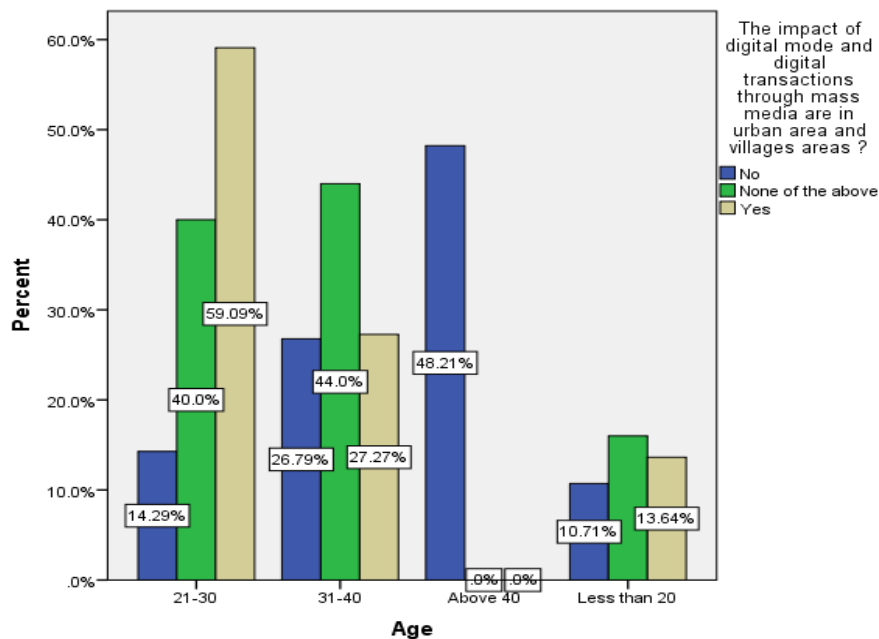
Antony (2017) The author had used secondary data for his analysis. In light of a contextual analysis on the transformation of a confidential security organization answerable for the security of oil wells during the Yugoslav Serbo — Croat struggle that turned into a furnished band — the Scorpions — we show that this kind of association takes shape commonly valuable games that work out between a focal power were discussed.

Collins (2013) The author had used primary data for his analysis. This paper fosters an endogenous development model with useful pioneering exercises and lease chasing. Our motivation is to connect commitments to the innovative and the endogenous development writing. We manage complementarity between useful business venture and unsafe lease looking for exercises driving were discussed.

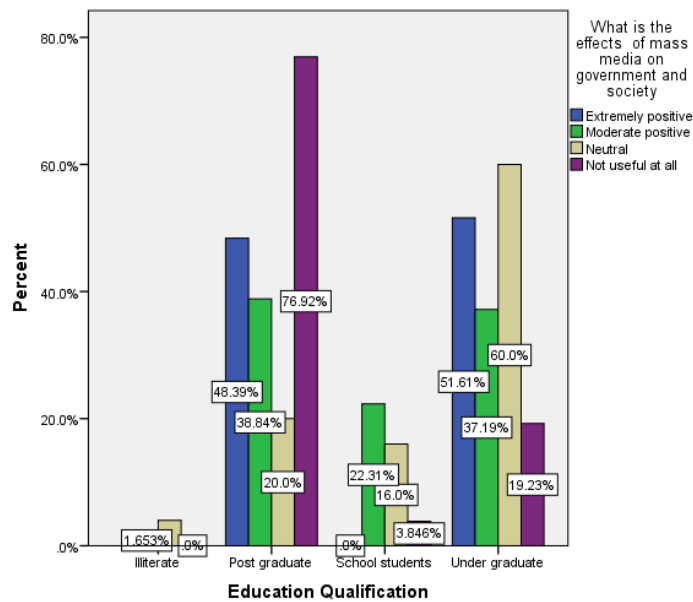
Data Analysis and Interpretation



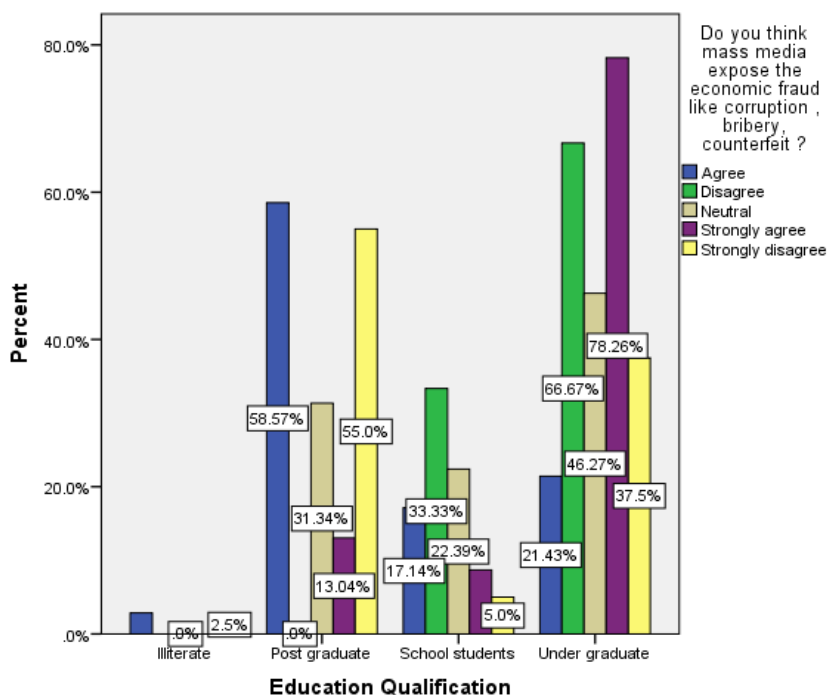
Legend Fig 1: The Above Graph Shows the age Distribution and the Kind of Mass Media Creates A Great Impact for you



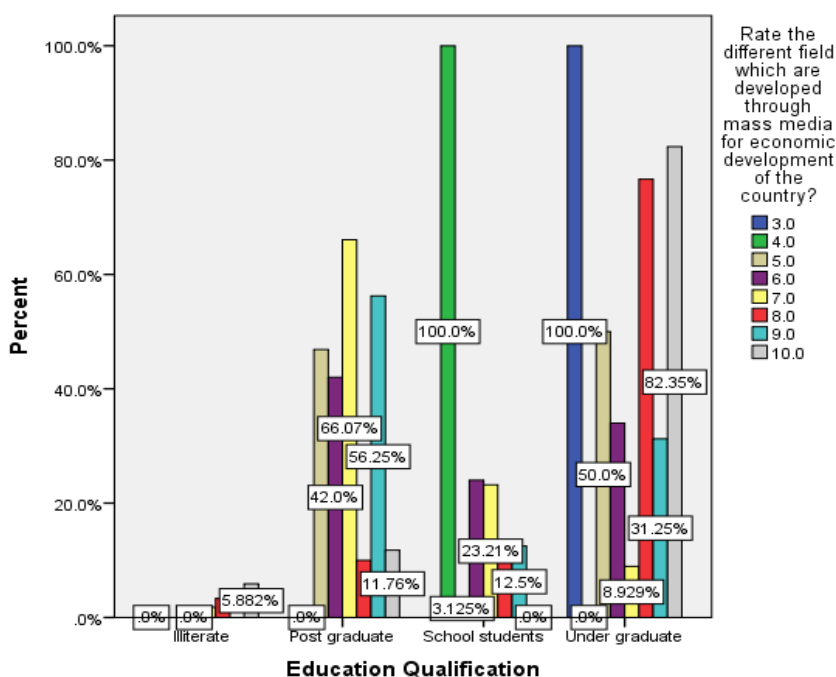
Legend Fig 2: The above Graph Shows the age Distribution and the Impact of Digital Mode and Digital Transactions Through Mass Media are in Urban Area and Villages



Legend Fig 3: The Above Graph Shows the Educational Qualification Distribution and the Effects of Mass Media on Government and Society



Legend Fig 4: The Above Graph Shows the Educational Qualification Distribution and the People Opinion on the Mass Media Expose Fraud like Corruption Bribery Counterfeit



Legend Fig 5: The Above Graph Shows the Education Qualification Distribution and the People Rate the Different Field Which are Developed Through Mass Media for Economic Development of the Country

Results

From figure 1 the age group of less than 20, 13.7% has said that the newspaper is the kind of mass media that creates a great impact on us. The age group of 31 to 40, 39.73% has said that newspaper was there kind of mass media which creates a great impact while the age group of above 40 has said that broadcast was there mass media which created a greater impact while the age group of 21 to 30 has said that elevation is the kind of mass media which creates a great impact on them. From the figure 2 The age group of less than 20 has said that the impact of digital mode and digital transactions through mass media in urban areas and villages areas a true while the age group of 40 and above, 48.21% has said that no while the age group of 31 to 40 44.0% have said that there is no impact by the digital transactions while the age group of 21 to 30 has said that yes there is an impact of digital mode and digital transactions through mass media in urban and village areas. From figure 3 the UG student 60% has said that they were neutral on the statement, the school students 22.31% has said that there was a moderate positive on the statement. The school students 33.3% disagreed with the statement while the PG students 55.0% strongly disagreed with the statement. the illiterate people 58.57% and read the above statement. From the figure 5 the UG students have rated 8 out of 10 for the above statement. The school's hundred people have rated 4 out of 10 while the PG student 66.0% has rated 7 out of 10 while the illiterate people have rated 10 out of 10 for the above statement.

Discussion

From the figure 1 age group of less than 23.7% has said that the newspaper was the mass media which created great impact on them, this could be because in their age and experience they said that the newspaper is the mass media which created the great impact for them. The age group of above 40 has said that broadcast was that mass media which created a great impact on them. This could be because they think that the broadcast was their largest and greatest mass media in their opinion. While its group of 31 to 40 message that newspaper was the mass media which created great impact on them this could be because they could have experienced the value of the newspaper and experience in life while its group of 21 to 30 has said that television was the biggest media. This could be because television was the biggest Mass media in their opinion. From the figure 2 page group of less than 20 has said that there was no impact on digital media transactions through mass media in rural and urban areas this could be because the age group of less than 20 does not have any experience in the society and does not have much knowledge about the current prevailing situations in the society while the age group of 21 to 30 has said that there was an impact on the villages and urban areas through their digital media this could be because they could have experience they impact in their lives while the age group of 31 to 40 has said that there was no mass media impact on the rural and urban areas while the age group of above party has said that there was no impact on the villages this could be because of the experience or else I could have experience in life. From the figure 3 the UG student 60% said that they were neutral on the effects of mass media on government and society this could be because they does not have any knowledge about the government of the society while the school students have said that there will be an Montreat positive effects of mass media for the government in the society this could be because they could have such an awareness about the mass media with relation to the government while the PG students have said that not at all useful, this could be because they could have and such a knowledge about the particular field and the effects of mass media on government in the society while illiterate people or neutral this could be because they does not have any proper education and it does not have such a knowledge about the effects of mass media with relation to the government in the society. From figure 4 the UG students 78.26% strongly agree that the mass media exposed economic fraud like corruption etc. The PG students has said that they agreed that statement that mass media exposes fraud like corruption this could be because they could have experienced in their day to day life while the illiterate people also agreed that the above statement while the school students said that they decided that statement this could be because it was not have any experience in the society and proper knowledge about the mass media exposure sent about the information about corruption. From the figure 5 the UG students has rated 8 out of 10 for the statement which are developed through mass media for economic development of the country this could be because they could have studied in their schooling or in the UG and have exposed to it while the school students has rated 4 out of 10 this could be because the school students does not have knowledge about the business and the prevailing situations in the society – this could not be taken for the interpretation while the PG student 66% has rated 7 out of 10 for the statement the mass media which helps the economy to be grown. The illiterate people has rated 8 out of 10 for the above statement that it cannot be taken for the interpretation because they do not have proper knowledge about the economic conditions in the country and they let's not have a proper knowledge about the particular field as it is concluded that it is helpful.

Suggestion

- Promote economic growth through innovation.
- Strategic immigration reform.
- End the war on drugs.
- Require unemployed workers to volunteer.
- Cut health care costs.
- Remove unnecessary and unclear laws.

Conclusion

Virtual entertainment has opened this age to most recent data by connecting them to the data grade day in and day out, the sort of data one goes through days some of the time even a long time prior to approaching it, presently you get it right away on your cell phone. Likewise, clients don't have to make a trip abroad to meet with individuals; there is simply a question of companion demand. We get to meet an assortment of individuals from various nations and foundations all while behind a PC screen. Every one of these are benefits of utilizing web-based entertainment, regardless, any framework has it burden, and for this situation there are a great deal of them particularly on the young. Taking all realities in to account, educators can assume a fundamental part in turning away cyberbullying from occurring or going crazy in any case particularly in the school. They can address understudies in study halls about cyberbullying and lead courses about web-based wellbeing issues all the more roughly with an end goal to deter them from taking part in perilous collaborations. As educators they can likewise address guardians, so they can be illuminating and appropriately answer in the event that their youngster is involved. The security issues in online entertainment is a significant result confronting the clients as their photos recordings and other individual data can without much of a stretch be accessed by the stalkers, menaces, character hoodlums, expected spotters as well as specialists. As of now the security strategy by the merchants isn't sufficient to safeguard the clients' rights and their data. The sellers should provide a simple method for understanding protection strategy that will better instruct the clients about the risks encompassing the posting of data via web-based entertainment and keep on expanding security to safeguard client's data. It's a given security accompaniment value, clients ought to commit time to seeing that they control what data they post via online entertainment and what data their friends and family present about them to diminish the aftermath, ensuring they go through the protection strategy completely. Unquestionably, web-based entertainment stages are the vital method for affecting your objective clients, build brand mindfulness and reach with the enormous networks, notwithstanding, to stay away from the adverse consequences of virtual entertainment on organizations, one need to know how to expertly deal with it. Some business utilizes web-based entertainment counsel to manage all kind of bad exposure that might emerge to keep away from brand harming and guide the directors on presenting delicate issues on their clients

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IMPACT OF MOBILE BANKING ADOPTION AMONG STATE UNIVERSITY EMPLOYEES IN SRI LANKA

Dr. ALM Ayoobkhan

Department of Accountancy and Finance,
Faculty of Management and Commerce,
South Eastern University of Sri Lanka
ayoob@seua.c.lk

Abstract

Financial transactions have been significantly transformed by the widespread use of mobile banking, which provides convenience, efficiency, and accessibility. This study aims to identify the factors influencing the adoption of mobile banking among commercial banks in Sri Lanka. Data were collected through the distribution of 384 online questionnaires among employees of a state university in Sri Lanka. An analytical model was developed using theories such as the Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of Innovation (DOI), and Technology Acceptance Model (TAM). The analysis showed that the adjusted R^2 of the fitted model was 0.297, and the regression was significant at 0.001, indicating that the independent factors explain 29.7% of the variance in mobile banking adoption. The study found that key determinants such as perceived usefulness, social influence, technological readiness, and perceived security positively affect mobile banking adoption among the state university employees. The study concludes that stakeholders can develop targeted strategies to effectively promote mobile banking adoption, thereby supporting financial inclusion and digital empowerment in the country by recognizing and addressing people's convenience preferences.

Keywords: Mobile banking, Digital banking, Mobile banking adoption, Mobile banking impact, University staff.

Introduction

Mobile banking has become an integral part of financial services, enabling users to conduct transactions anytime and anywhere. With the spread of smartphones and digital banking services, mobile banking has gained traction among various demographics, including university staff. These professionals require seamless banking solutions to manage their salaries, payments, and savings efficiently. Today, bank consumers can receive banking services through a variety of models. For instance, telebanking, online banking, mobile banking, and automated teller machines (ATMs) and customers of banks can now quickly and conveniently connect to banking services via a mobile device, no matter where they are and at any time. The central bank of Sri Lanka reports that there are 25 commercial banks operating throughout the nation, both state and non-state, with 2,984 branches, and that almost all of them offer mobile banking applications. A total of 36.18 million cellular mobile connections were active in Sri Lanka in early 2023, with this figure equivalent to 165.5 percent of the total population. There are 14.58 million internet users in Sri Lanka at the start of 2023, when internet penetration stood at 66.7 percent. Sri Lanka was home to 7.20 million social media users in January 2023, equating to 32.9 percent of the total population. A national survey found that consumers have continued to embrace digital banking services over the past 12 months, with 55% of bank customers using apps on phones or other mobile devices as their preferred option for managing their bank account, and 22% using online banking via a laptop or computer.

Background of the Study

Several studies have revealed that mobile banking is a convenient way to access banking and financial services on mobile telecommunication devices such as smartphones or tablets. Unlike internet banking, mobile banking uses software, commonly known as an app, to provide these services. Its primary aim is to make customers happy by enabling them to carry out transactions anywhere and at any time without the need to wait in queues (Kumar, 2022; Jegatheesparan, 2020 Kumari, 2015). According to Kumar (2022), mobile banking is an extension of internet banking. Customers can use mobile banking to do both financial and non-financial activities online without having to deal with bank staff directly. Menikdiwela et al. (2022) claim that the adoption of mobile banking services was made possible by the rise of elements such as growing smartphone usage, expanding internet usage, and the authority of regulatory agencies.

When it comes to mobile banking technology, smartphones are the most widely used device, while PDAs, cell phones, and smartphones can all be used (Perera, 2020). It was impossible to ignore the expansion of the digital world, and banks and other financial organizations took advantage of this chance to adjust and profit from these new developments. (Divya, 2021). Additionally, Yapabandara and Nagendrakumar (2022) assert that the degree to which clients of banks are aware of their digital banking services and their level of technological proficiency impact the adoption of mobile banking. The benefits of mobile banking services in Sri Lanka include cost savings, improved customer behavior, and increased operational efficiency. While the use of traditional banking channels such as bank branches and ATMs has declined in recent decades, one reason for this can be attributed to today's tech-savvy consumers' preference for modern banking methods that provide easy access to information and financial products (Gihan, 2024). According to Ravichandran (2016), evaluating a mobile banking service's performance involves picturing the customer's perspective and attitude in order to pinpoint areas that require improvement. This will assist in determining the choices consumers make, the patterns of behavior they employ, and the elements that affect their acceptance and trust.

Additionally, by assessing customer satisfaction and taking prompt action to address any unhappiness, bankers can achieve their goals of the shifting trend toward more mobile banking products that can be tailored for their clients' future demands (Jaride, 2021). Considering the above facts stated by scholars, this study examines the adoption of mobile banking in Sri Lanka, paying special attention to the factors influencing this adoption among university staff.

Problem Statement

The emergence of smartphones as a "must have" item in our lives due to digital transformation means that banks must wake up since they have a real chance to regain the demand of Sri Lankan consumers (Gihan, 2024). According to Kyei et al. (2023), there are still some Sri Lankan bank clients who prefer the more traditional methods of banking, which only lead them to rush to the mobile banking channels. This discrepancy shows that the accessibility of technology is not the only factor influencing the adoption rate of a given technology, as it also indicates that the situation requires further study and analysis. Notably, the phenomena that has had the biggest influence on the country's adoption of mobile banking is the low uptake of mobile banking in comparison to offline or traditional banking services (Nayanajith et al, 2022). Customers are still being prevented from using mobile banking by some regulatory obstacles

and technical difficulties, even if there are still some regulatory sites in Sri Lanka that prepared the ground for the development of mobile banking security (Kyei et al, 2023). Furthermore, banking consumers are more concerned with aspects like data security, privacy, and platform dependability when determining whether to use mobile banking services (Gihan, 2024). In an attempt to reduce branch visits, most Sri Lankan banks are struggling to increase their mobile banking customer base (Sulistiyowati et al, 2021). This suggests that from a bank's perspective, there is a lack of knowledge on the factors that influence bank customers' adoption of mobile banking. Additionally, given the recent technological developments in the banking sector in Sri Lanka, there is a research gap as no study has been conducted to assess the factors that influence bank consumer adoption of mobile banking. The aim of this study is to identify solutions to the aforementioned shortcomings from the perspective of banks and bank consumers. The previous studies indicate that, as a result of technological advancements, there is a research gap in the literature about the factors influencing adoption of mobile banking in Sri Lanka. The aspect of recent improvements or the problems associated with the expansion of mobile banking services among banks have been the subject of some prior studies. By addressing the aforementioned experience gaps, this study explores how university staff adopt mobile banking and the challenges they face in improving banking services for this sector, which are of paramount importance.

Research Objectives and Research Questions

This study aims to:

- Examine the extent of mobile banking adoption among university staff
- Identify the perceptions of banking customer on mobile banking in Sri Lanka
- Identify challenges faced by university staff in using mobile banking services
- Provide recommendations for improving mobile banking adoption among university staff

The following research questions are addressed in this study:

- How widely is mobile banking adopted among university staff?
- What benefits do university staff gain from mobile banking?
- What are the challenges associated with mobile banking adoption?
- What strategies can enhance mobile banking usage among university staff?

Literature Review

Introduction

The performance of the banking sector has improved significantly in recent years due to the growing use of technology. It is among the most inventive sectors, always using new technologies to offer clients cutting-edge and effective services. Numerous academics use models to determine consumer behavior and technological acceptability in the extensive literature that examines the innovation of the banking sector and the benefits and opportunities it offers. The Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), and Theory of Planned Behavior (TPB) are some of the most frequently mentioned models that describe how consumers in the banking sector embrace IT-based services. These guidance focuses on the critical factors of perceived usefulness, ease of

use, social influence, and fostering the enabling conditions which play an integral role in shaping people's intention to use mobile banking.

Impact of mobile banking to the operations of banking system

Through the literature search in the context of internet banking, four vital factors such as perceived usefulness, perceived ease of use, perceived security and awareness were hypothesized as influencing the intention of adopting internet banking. According to the study's findings, e-banking has made money transfers easier, increased bank profitability, and increased customer pleasure, but it has also had an impact on employees' job security. Changes in risk management techniques and, consequently, bank performance have been accelerated by mobility banking (Rajapaksha, 2021). Banks will be able to implement safe methods like multi-factor authentication, biometric authentication, and encryption processes that will best protect the data of their clients by using mobile technology (Gihan, 2024). Additionally, mobile banking platforms provide real-time end-to-end transaction monitoring, which helps institutions spot suspicious activity and put fraud detection algorithms in place to combat the threat of cyber-attacks and financial fraud (Kyei et al. (2023). Furthermore, strategic planning and resource allocation decisions for investments in technology infrastructure, hiring new employees, and entering new markets can be influenced by mobile banking data (Rani, 2018). Therefore, banks will be in a good position to leverage mobile banking data in their strategies to outperform market trends, predict what customers will go for, and provide appropriate quality service in an emerging market.

Factors impacted by the use of mobile banking

According to Yapabandara and Nagendrakumar (2022), mobile banking adoption is determined by the technology knowledge of the banking customers and how banks make the awareness of their digital banking services to their customers. One of the primary drivers of mobile banking adoption is customers' perceptions of mobile banking as an innovation that makes banking simple and good for them (Gihan, 20243). Without being restricted by branch locations or working hours, mobile banking allows customers to do banking operations such as bill payments, deposits, and more even from the comfort of their own homes or mobile phones at any time and from any location (Sanjeewa et al, 2021). For end users, who are primarily motivated by the desire to have greater control over their financial circumstances, the ability to monitor balances, transfer funds, pay bills, and deposit checks via a smartphone becomes a significant benefit (Rajapaksha, 2021). When considering mobile banking, security concerns are prevalent and exclude other factors. These components, which include biometric recognition, data cryptography, and cybersecurity, greatly enhance the trust and confidence built on mobile banking platforms. If customers don't feel that their devices are reliable and secure, they won't even bother using mobile banking (Sanjeewa et al, 2021). Through the literature search in the context of mobile banking, four vital factors such as Perceived Usefulness, Social Influence, Technology Readiness and Perceived Security were hypothesized as influencing the intention of adopting mobile banking. These factors are discussed below.

Perceived Usefulness

The research finding indicated that perceived usefulness and perceived ease of use are major factors affecting mobile banking adoption. The acceptability of mobile banking services will increase if a sense of beneficial accessibility is created. The flexibility to conduct financial transactions instantly through smartphones at any location has become a buzzword and popular among current users (Gihan, 2024; Nayanajit et al., 2021). Convenience is a confluence of time-saving, accessibility, and comfort in terms of simplicity. Mobile banking is now accessible and saves time, eliminating the need to travel to bank branches to speak with banking assistants in person (Divya et al, 2021). Furthermore, product solutions like fund transfers and mobile check capture simplify and add less complicated duties. Therefore, numerous studies show that consumers are more inclined to accept mobile banking services if they believe the service to be easier to use.

Social Influence

One of the key elements affecting people's decisions to use mobile banking is social influence. Social influence, which can change when people have to work or act alone or in collaboration with others, is related to the social aspect. It also addresses how one should behave when performing, as well as how culture and surroundings affect the performance. According to Nayanajit et al., (2021), perception and behavior are influenced by peer recommendations, social and cultural norms, and other social factors. One of the most powerful reasons that can convince someone to utilize mobile banking is the positive word-of-mouth recommendations from friends, family, or opinion leaders. Humans' inclination to adopt mobile banking solutions is also influenced by the attitudes and perceptions that a large portion of society and the general public form toward technology and money (Sanjeewa et al, 2021). There is a chance that more people from various social groups will utilize mobile banking apps if social influence is taken into account as a crucial component of new marketing methods. According to a number of studies, customers are therefore more likely to embrace mobile banking services if they think that social influence has an effect on the user's mobile banking experience.

Technology Readiness

Technology readiness has four underlying dimensions: optimism, a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency. Innovativeness, the tendency to be a technology pioneer and thought leader. The evolution of design and technology in mobile banking apps has significantly contributed to this trend, integrating functionalities such as peer-to-peer lending, international money transfer, voice banking, biometric authentication, and blockchain technology. The speed at which people adopt mobile banking is directly influenced by their readiness and capacity to adjust to technology advancements (Gihan, 2024; Rajapaksha, 2021). Piumali (2020), states that customer adoption intentions for mobile banking applications in Sri Lanka are positively impacted by technology readiness, and that bankers have the opportunity to learn more about customers' readiness to accept new technologies in the context of mobile banking adoption. Previous studies have identified optimism as a driver of new technology adoption. In a qualitative study conducted by Parasuraman and Colby (2015), consumers indicated that they are optimistic about a new technology that allows them to tailor-make things to fit their individual needs.

Perceived Security

Perceived security is defined as the customer's perceptions and subjective valuations on a system security, and how well they are protected against potential risks. To protect your online banking and financial information, it's important to take some key precautions, like changing passwords regularly, continually monitoring your accounts for any suspicious activity and using two-factor authentication whenever possible. One important factor in the use of mobile banking for online and mobile financial transactions is the perception of its dangers and security. Users' perceptions of online banking, mobile banking, and internet banking in general have been the subject of numerous research (Obaid, 2021; Kumar & Yukita, 2021). Regarding the security risks associated with mobile banking, these research have provided a range of findings and analyses. As a result, even though mobile banking makes handling money easier, individuals are always concerned about their safety. In terms of security, this comprehensive view of trust encompasses fraud prevention measures, platform dependability, and user data protection (Rajapaksha, 2021). The reputation of a secure mobile bank encourages the use of digital channels for financial transactions by fostering trust between the user and the system (Divya et al, 2021; Rajapaksha, 2021). Although issues related to trust, security, and risk in mobile banking have been extensively studied, especially in developed countries, they have failed to examine how individual differences and characteristics moderate the effects of perceived security, risk, and trust.

Research Hypotheses

Thorough literature review on the factors impacting the adoption of mobile banking, it has been determined that Perceived usefulness, Social influence, Technology readiness, and Perceived security are significant elements that could affect this research study. Consequently, the following hypotheses are developed for further research.

H1: Perceived usefulness has an effect on Sri Lankan university employees' adoption of mobile banking.

H2: Social influence has an effect on Sri Lankan university employees' adoption of mobile banking.

H3: Technology readiness has an effect on Sri Lankan university employees' adoption of mobile banking.

H4: Perceived security has an effect on Sri Lankan university employees' adoption of mobile banking.

Conceptual Framework and Research Methodology

Conceptual Framework for Mobile Banking Adoption in Sri Lanka

Below conceptual framework shows how different factors are connected to the main outcome of study. It helps explain which factors are being tested to see how they impact the outcome. A theoretical model with four important factors has been proposed and established for further study as shown in Figure 1 below.

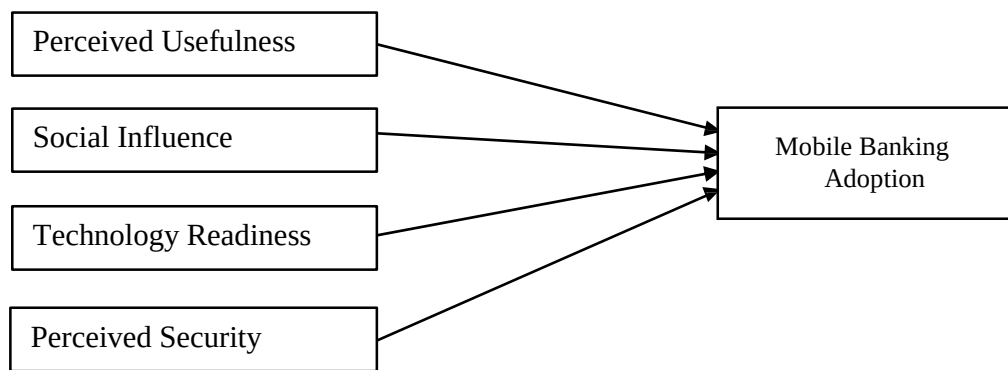


Figure 1: Conceptual Framework

Research Methodology

This study on the adoption of mobile banking among university staff in Sri Lanka demonstrates a strategic approach to data collection using various research methods to successfully accomplish the research objectives. As part of the mobile banking research on the banking system in Sri Lanka, sampling and population factors are key determinant of research objectivity and reliability of the findings to the population. According to Central Bank Annual Research, 2022, there are more than 200,000 mobile banking users in Sri Lanka. Krejcie and Morgan (1970) state that the sample size for the study should be 384 because the research population is over 75,000. Hence, the researcher selected non-probability sampling method with convenience sampling technique to collect data from 384 respondents by distributing online questionnaires. Respondents were assured that their participation would remain voluntary, confidential, and anonymous.

Data Analysis and Discussions of the findings

Reliability testing

The internal consistency of the 384 items using Cronbach's alpha is 0.837. This suggests that there is a high correlation between the constriction component that measures perceived usefulness and other parameters, allowing for the assured verification of the data's trustworthiness.

Validity testing

In order to ensure that the measurement tools are capable of measuring the relevant constructs, research tool validation is essential in all types of investigations. Additional validity test analysis, such as the KMO value of the sampling adequacy test and Bartlett's one-way analysis of variance, gives us even more important information about whether the data is suitable for additional study. The KMO value for this study is 0.740, which is greater than 0.700, suggesting that the sample size is sufficient for data analysis to assess the correlation between the independent and dependent variables.

Demographic data analysis

The following section present the demographic characteristics of the respondents.

Table 1: Demographic characteristic of the respondents

Description	Frequency	Percentage
Gender		
Male	295	77%
Female	89	23%
Age		
18 - 25	43	11%
26 - 35	69	18%
Above 36	272	71%
IT experience		
1 – 2 years	69	18%
3 – 5 years	106	28%
Above 6 years	209	54%

Source: (Survey Data, 2025)

Table 1 above describes the demographic characteristic of the respondents participated in this survey. Gender is concerned, Most of the participants are Males, it is around 295 (77%) and Female participants are 89 (23%). It is important to consider age groups of participants in this study. The majority of the respondents are from the age group of Above 36 (71%). When it comes to information technology (IT), the majority of responders have more than two years of experience. In order to access and use mobile banking, this would be regarded as a preliminary pass.

Correlation Analysis

Table 2: Summary of Correlation Analysis

Relationship	Pearson Correlation	P-Value
Perceived Usefulness	.236**	0.001
Social Influence	.389**	0.000
Technology Readiness	.263**	0.014
Perceived Security	.105*	0.000

Source: (Survey Data, 2025)

According to table 2, the correlation analysis done on the provided data, there is a significant positive relationship between the adoption of mobile banking and perceived usefulness. The significance threshold is at the 0.01 level, and the correlation is 0.236. Adoption of mobile banking and perceived usefulness utility have a somewhat positive linear relationship. The high correlation coefficient suggests that the adoption of mobile banking and perceived usefulness were not coincidental. Instead, it indicates that in the population that the sample was drawn from, these two factors have a substantial association. Thus, the findings suggest that among other factors, perceived usefulness has a significant role in influencing the process of mobile banking adoption in Sri Lanka.

Table 2 shows a favorable correlation between Social influence and the adoption of mobile banking, as indicated by the Pearson coefficients and their significant values ($p < 0.05$). The Pearson correlation coefficient between Social influence and mobile banking adoption is 0.389. Thus, the findings suggest that among other factors, Social influence has a significant role in influencing the process of mobile banking adoption in Sri Lanka.

Technology readiness and the process of mobile banking adoption among university staff are positively correlated, according to the correlation analysis performed on the provided data. Technology readiness and the use of mobile banking have a Pearson correlation coefficient of 0.263. According to the correlation analysis carried out on the presented data in table 2, technological readiness and the process of adopting the mobile banking system among university employees have positive correlations. The positive correlation between technology readiness and mobile banking usage is consistent with both theoretical prospects and practical research findings.

The relationship between Perceived Security and Mobile Banking Adoption was found to be positive, indicating a significant outcome for mobile banking adoption. The Pearson correlation coefficient between Perceived Security and mobile banking adoption is 0.105, and it is statistically significant at the 0.05. Since the positive sign of a coefficient status means that mobile banking adoption increases when the sense of security increases.

Multiple Regression Analysis

Since this study uses four dimensions for the independent variable of mobile banking adoption among university staff, the researcher employed multiple regression analysis to realize the regression coefficient. Any value between 0 and 1 can be represented if the regression coefficient is deputized using R-Square. Multiple regression analysis allows to investigate how numerous predictors interact with a dependent variable at the same time. As shown in Table 3, the coefficient of determination (R-squared) is 0.297, representing 29.7%. This indicates that mobile banking adoption at university staff can be explained by a combination of Perceived usefulness, Social influence, Technology readiness, and Perceived Security. This refers to moderate-level explanations that demonstrate a meaningful relationship between the predictors and the dependent variable.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.498a	.297	.267	.45613

a. Predictors: (Constant), Perceived_Usefulness, Technology_Readiness, Social_Influence, Perceived_Security

Table 4: Summary of ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	28.014	4	6.823	32.165	.000b
Residual	89.098	376	.279		
Total	117.123	383			

The ANOVA table 4 tests the global significance of the regression model. The F-statistic is 32.165, with a p-value of less than 0.001, therefore, the presented regression model is statistically significant. This signifies that the combination of predictors significantly predicts mobile banking adoption.

Hypothesis testing

Table 4: Coefficient Table

Model	B(coefficient)	Sig.
Constant	0.439	0.002
Perceived Usefulness	.236**	0.001
Social Influence	.389**	0.000
Technology readiness	.263**	0.014
Perceived Security	.105*	0.000

Source: (Survey data, 2025)

The multiple regression analysis reveals that Perceived usefulness, Social influence, Technology readiness and Perceived security are the main factors in this research study that determine the use of mobile banking adoption in Sri Lanka. The degree to which a particular independent variable can influence the dependent variable while other independent factors stay constant is indicated by the B value in Table 5. Each independent variable's p value can be used to test hypotheses. The 95% confidence interval for accepting the hypothesis is reached when the P value is equal to or less than 0.05. Hence, to encourage the use of mobile banking more effectively, financial institutions and governments can use these insights to create outcome-oriented policies that are suited to these metrics.

Table 5: Summary of the Hypothesis Testing

Hypothesis	B(coefficient)	Significant Value	Outcome
H1: Perceived Usefulness has a significant influence on mobile banking adoption.	0.236	0.001	Supported
H2: Social Influence has a significant influence on mobile banking adoption.	0.389	0.000	Supported
H3: Technology readiness has a significant influence on mobile banking adoption.	0.263	0.014	Supported
H4: Perceived Security has a significant influence on mobile banking adoption.	0.105	0.000	Supported

The hypothesis testing of this research is done based on the interpretations of the regression analysis which is clearly stated in Table 5. The results of the hypothesis testing show that the independent variables have a significant impact on the adoption of mobile banking system in Sri Lanka, especially among the employees of the South Eastern University of Sri Lanka.

Discussion, Conclusion, and Recommendation

Discussion of the finding

This study provides an in-depth and thorough examination of four main factors, namely perceived usefulness, social influence, technological readiness, and perceived security, which are thought to be important predictors of mobile banking adoption in Sri Lanka. The primary objective was to determine the effects of university employees' adoption of mobile banking. Thus, the researcher has explained the findings summary in table 5 in accordance with the objectives of the study. The section that follows provides a comprehensive discussion of the primary factors that are examined in this research study.

Relationship between Perceived Usefulness and Mobile Banking Adoption

The correlation analysis found a strong positive relationship between perceived usefulness and mobile banking adoption. This suggests that people in Sri Lanka are more inclined to use mobile banking services if they believe they are convenient and user-friendly. The regression study confirmed this relationship, revealed that perceived usefulness, along with other factors such as social influence, technology readiness, and perceived security, had a significant positive impact on mobile banking adoption which is consistent with Kyei et al. (2023) and Gihan (2024). Furthermore, the multiple regression analysis revealed that perceived usefulness, together with social influence, technical readiness, and perceived security, account for around 23.7% of the variation in mobile banking adoption in Sri Lanka. Although usefulness is a significant predictor of mobile banking adoption, this indicates that other factors also play an important role in shaping individuals' adoption decisions. Therefore, research findings emphasize the importance of perceived usefulness in the adoption of mobile banking in Sri Lanka (Divya et al, 2021).

Relationship between Social Influence and Mobile Banking Adoption

Social influence plays a significant role in mobile banking adoption, with studies showing that positive social influence, along with factors like perceived usefulness, technology readiness and perceived security, can predict and positively impact the adoption of mobile banking services. The correlation analysis revealed a significant positive correlation between social influence and mobile banking adoption. This indicates that mobile bank in Sri Lanka is often affected by social factors, for example, recommendations of peers, family, friends or advertising (Gihan (2024). As a result, these findings have significant implications for stakeholders involved in the promotion of mobile banking adoption in Sri Lanka (Menikdiwela et al, 2022). The financial sector and policymakers can use social media and community outreach activities to promote mobile banking. According to Sulistyowati et al. (2021), designing ergonomic interfaces, implementing effective security measures, and launching high-tech training programs can put more users in a position to accept technology at various levels. Therefore, the results show that social influence plays a significant role in Sri Lanka's acceptance rate of mobile banking. Stakeholders will be able to effectively encourage the adoption of mobile banking by leveraging social influence through social networks and community-based strategies, hence promoting financial inclusion and digital empowerment in the nation.

Relationship between Technology Readiness and Mobile Banking Adoption

Technology readiness was first proposed by Parasuraman (2000) as a way to measure people's readiness to adopt new technological developments. The intrinsic challenges people have when adjusting to and adopting new innovations also apply to the area of technology readiness (Roy & Moorthi, 2017). With a focus on user acceptance, technology readiness has gained popularity and been thoroughly investigated as a metric to assess people's preparedness for technology adoption (Sripalawat et al., 2011). According to Parasuraman and Colby (2015), the most recent version of the technological readiness framework is the Technological Readiness 2 model. This model identifies two fundamental drivers of technology readiness: threat factors, which include emotions of unease and insecurity, and incentive elements, which include optimism and inventiveness. The results of the study on the relationship between technology readiness and mobile banking usage in Sri Lanka would be crucial in shedding light on the variables influencing people's choices to use mobile banking services. Reliability statistics, correlation coefficients, and regression analysis results were among the characteristics of this relationship that were discussed (Venkatesh, 2012). Technology readiness and the adoption of mobile banking were found to be positively and significantly correlated by the correlation study. This suggests that people in Sri Lanka are more likely to use mobile banking services if they consider themselves to be the most technologically savvy. The study found that perceived usefulness, social influence, technological readiness and perceived security, all have a beneficial impact on Sri Lankans' adoption of mobile banking, which is consistent with earlier research. Therefore, identifying and addressing stakeholders' technological competencies support in the development of focused strategies for the successful adoption of mobile banking, which advances digital solutions and financial inclusion in the nation.

Relationship between Perceived Security and Mobile Banking Adoption

The results of a study on the relationship between security perception and adoption in Sri Lanka provide valuable insight into what influences individuals to use mobile banking services. The researcher discusses a number of facets of this relationship in the study, including reliability statistics, correlation coefficients, and regression analysis results. According to Karki et al. (2024), the regression analysis used revealed a statistically significant positive correlation between the use of mobile banking and perceived security. According to the findings of this study, Sri Lankan customers will prefer to use mobile banking services if they believe they are reliable and secure as a result of technological advancements. The research indicated that the impression of security is a significant element, alongside perceived convenience, technological readiness, and social impact. The results of the multiple regression analysis revealed that perceived security, together with perceived convenience, technology preparedness, and social impact, accounted for around 23% of the variance. Based on the analysis in this study, 9% of the difference in Sri Lanka was explained by the usage of mobile banking. Despite the fact that perceived security is a major component in the adoption of mobile banking, other factors also play some equally significant private roles in determining whether or not an individual will use mobile banking. As a result, the general findings of this study are consistent with other research studies conducted in this setting.

Conclusion

The study on the relationship between perceived usefulness, social influence, technology readiness, and perceived security on mobile banking adoption in Sri Lanka provided a thorough understanding of the factors that influence individual's decisions to use mobile banking services, particularly among university staff. Through discussions on correlation analysis, regression analysis, and reliability statistics and validity testing, the researcher has attempted to gain immense insights into the peculiarities of mobile banking adoption in Sri Lanka. The conclusions section summarizes the results and provides valuable findings to these stakeholders and policymakers so that they can make informed decisions (Gihan (2024)).

Based on this study, Sri Lankan financial institutions and policymakers can work to improve the usability of mobile banking applications. This includes creating user-friendly interfaces, simplifying transaction processes, and providing easy access to banking services via multiple digital channels. This comprises use of findings from research in guiding the design of customer-friendly mobile banking platforms, adoption of focused interventions to boost both technology readiness and social influence, and consistent program monitoring and evaluation with the objective of catering emerging trends, challenges, and opportunities. Through the promotion of mobile banking comprehensively, stakeholders will be able to realize the full potential of digital financial services in Sri Lanka, thereby increasing access to financial services, empowering individuals, and promoting economic growth and development across the country.

Recommendations

With the potential to provide simple and safe banking services, mobile banking is a promising instrument that can empower everyone in Sri Lanka and promote financial inclusion. However, the primary obstacle in this regard is figuring out how to encourage the use of mobile banking, beginning with its convenience and security. By enhancing the understanding of the crucial elements, this study develops a comprehensive strategy that includes evidence-based solutions to optimise Sri Lanka's adoption of mobile banking. Create mobile banking applications where the user comes first, making them simple, intuitive, and easy to use. Features like one-click transactions, instant access to banking features, and a personalised dashboard to improve speed and convenience can all help make a user experience more usable. Establish the prerequisites for mobile banking apps to seamlessly integrate with the platforms and systems that are currently in place. Rather than using a one-size-fits-all approach, this might make mobile banking apps more accessible by offering tailored functionality. To accommodate a variety of users, this entails offering text-to-speech, audio instructions, numerous languages, and adjustable font sizes. Reduce fees, delays, and wait times by streamlining transactions. For increased efficiency, use automatic bill payments, real-time tracking, and rapid transfers.

Future research

Research is now needed to identify the emerging trends in the field of mobile banking, which has already become a vital component of the financial system, as well as to examine the benefits and drawbacks of this technology. Based on the results of previous studies and the introduction of new knowledge possibilities, this article offers a concise overview of potential future research subjects for examining the adoption of mobile banking in Sri Lanka. Additional study focusses on examining the impact of cutting-edge technologies like artificial intelligence (AI), blockchain,

and the Internet of Things (IoT) that propel the uptake of mobile banking, or m-banking, in Sri Lanka. Considering the fact, that those technologies make great verse in things as user experience, security, and accessibility of online banking, it is important to find out reasons why people don't adopt them. Future studies will concentrate on the role that mobile banking plays in expanding access to and the availability of financial services, particularly in Sri Lanka's most distant areas.

Determine whether Sri Lanka's adoption and innovation of mobile banking are hampered by the legal framework and policies surrounding it. Furthermore, researchers, policymakers, and industry stakeholders may advance financial inclusion, advance sustainable development, and contribute to the body of knowledge in Sri Lanka's evolving digital economy by investigating these areas.

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CONSUMER BEHAVIOURAL TRENDS IN THE ERA OF DIGITAL MARKETING: A STUDY FOCUSED ON CHENNAI CITY

Dr. P. Selvaraju

*PG Teacher in Economics
Govt. Hr Sec School, Palayanoor
Sivagangai*

Abstract

The rapid advancement of digital technologies has revolutionized the marketing landscape, fundamentally altering how businesses engage with consumers. This study examines the impact of digital marketing on consumer behaviour, with a specific focus on Chennai City. The primary objective is to understand how digital marketing strategies influence consumer decision-making processes, preferences, and purchasing behaviours in an urban Indian context.

Digital marketing encompasses a wide range of online activities, including social media marketing, search engine optimization (SEO), content marketing, email marketing, and pay-per-click (PPC) advertising. The proliferation of internet access and the widespread use of smartphones have further accelerated the adoption of these strategies. This study employs a mixed-method approach, combining quantitative surveys and qualitative interviews to gather comprehensive data from a diverse demographic within Chennai.

The quantitative aspect of the study involves a survey of 500 consumers, aimed at identifying patterns in online behaviour, frequency of digital media usage, and responsiveness to various digital marketing tactics. The survey results indicate a strong correlation between targeted digital marketing efforts and increased consumer engagement. Social media platforms, particularly Facebook, Instagram, and YouTube, emerge as significant influencers in shaping consumer perceptions and driving purchase decisions. SEO and content marketing also play critical roles, enhancing brand visibility and credibility. Complementing the survey, in-depth qualitative interviews with 30 marketing professionals and business owners provide insights into the strategic implementation of digital marketing campaigns and their perceived effectiveness. These interviews reveal that personalized and interactive content, combined with data-driven strategies, significantly enhances consumer trust and loyalty. Moreover, the ability to track and analyze consumer behavior through digital analytics allows businesses to tailor their approaches more effectively, leading to higher conversion rates. The study also explores the challenges faced by businesses in Chennai, such as digital literacy disparities and the need for continuous adaptation to evolving technologies. Despite these challenges, the overall findings suggest that digital marketing is a powerful tool for influencing consumer behaviour, offering substantial opportunities for businesses to connect with their target audiences more efficiently.

Keywords: *Digital Marketing, Impact, Consumer, Chennai City.*

Introduction

The concept of digital marketing progress way backs from the 1970s as electronic commerce begins. The need for electronic commerce shoots from the demand of businesses and governments to make better use of figuring out and to apply computer technology to improve customer interaction, business processes, and information exchange.

During the 1970s, the introduction for electronic fund transfer (EFT) among banks over secure private networks has changed financial markets. Electronic fund transfer optimized the payments electronically and gave remittance/payment information. Today, there are lot of EFT

options, including the use of debit cards that is becoming ever-present at points of sales (POS) in grocery stores, retail outlets, and direct deposits to bank accounts etc. Each day, over \$4 trillion change hands via EFT over the computer networks concerning banks, automated clearinghouses, and companies.

During late 1970s and early 1980s, electronic commerce became extensive within companies in the appearance of electronic messaging technologies: electronic data interchange (EDI) and electronic mail.

In the mid-1980s, an entirely various type of electronic commerce technology spread between consumers of online services to provide a new form of social interaction like as chat rooms and inter-relay chat and knowledge sharing. For instance, news groups and file transfer programs. Social interaction created a sense of virtual community and give rise to the concept of a "global village". In the 1990s, the establishment of World Wide Web (WWW) over the internet represents a turning point in electronic commerce by providing easy-to-use technology solution to the problem of information publishing and dissemination. The conception of digital marketing appears steadily from the launch of World Wide Web. In 1990, Tim Berners-Lee produced the very first World Wide Web server and its browser. It released as commercial use in 1991. In 1994 other progresses have taken place, like online banking etc.

In 1994-1995, internet explosion took off. Henceforth, over 150 million people comprehensively have turn out to be internet users (Hanson, 2000).The large amount of information available about the goods and services over the internet induces consumer for internet shopping.

The coming of internet truly transformed the way business was being done, predominantly in the marketing field. The internet compromises the marketer lots of benefit by means of new communication and distribution channels. The advancement of Internet has strongly impacted the worldwide marketing environment. In 1995, Amazon launched its first ever online shopping site, and in 1996, e-Bay had appeared. The word 'digital marketing' was first employ in the period of 1990s. Among 2000s to 2010s, digital marketing turn out to be more refined as an operational way to construct a relationship with the consumers that has seriousness and significance. The term 'digital marketing' perhaps not ought to be used till the 1990s.

According to the Institute of Digital Marketing, Digital Marketing is the practice of digital networks to promote or market products or services to businesses and consumers. Digital marketing is a broader term for the measurable, targeted and interactivity in marketing of products or services by means of digital technologies to attain and transform leads into customers and preserve them. The significant goal is to promote brands, construct preference, engage with customers and enhance sales over numerous digital marketing techniques. It exemplified by an widespread range of service, product, and brand marketing devices, that primarily use Internet as a key promotional medium, along with mobile and traditional TV and radio.

Digital marketing comprises those marketing efforts that send a message from a source (company) to a receiver (customer) from end to end using digital platforms and the internet. Online marketing and retailing are expeditiously progressing as to a greater extent where shoppers are no longer just move to the nearby store, but relatively, take hold of nearby digital device. Technology is enabling up a world of opportunities to both marketers and consumers. Today, brands are utilizing digital touch points as channels in marketing communications

process, and shoppers are by means of them to their advantage along the entire pathway to purchase.

Objectives of the Study

1. To identify the most effective digital marketing channels for influencing consumer decisions.
2. To understand the consumer's perception and attitude towards digital marketing.
3. To analyse the purchasing patterns influenced by digital marketing strategies.

Research Methodology

Methodology is an essential aspect of any research or investigation. It enables the investigator to look at the problem in a systematic meaningful and orderly way. The study is based on both primary and secondary data. The primary data has been collected from Chennai on simple random sampling. Through this technique 340 respondents are selected from various industries. Questionnaire method is used to collect primary data from the respondents. Secondary data is collected from Magazines, Journals, and Websites etc. Statistical method is used to analyze the collected data are Chi-square, percentage analysis and Multiple regression analysis (Loheswari, 2015).

Research Method

This chapter will explain the research methods and research design used in this study, which is a combination of qualitative and quantitative research methods or mixed research method.

Sampling procedure

In the quantitative research study, the field survey i.e. face-to-face survey has been conducted with the list of questionnaire. The eligibility of the respondents has been filtered through screening questions. The size of sample is 340 respondents Chennai city of the Tamilnadu State in India.

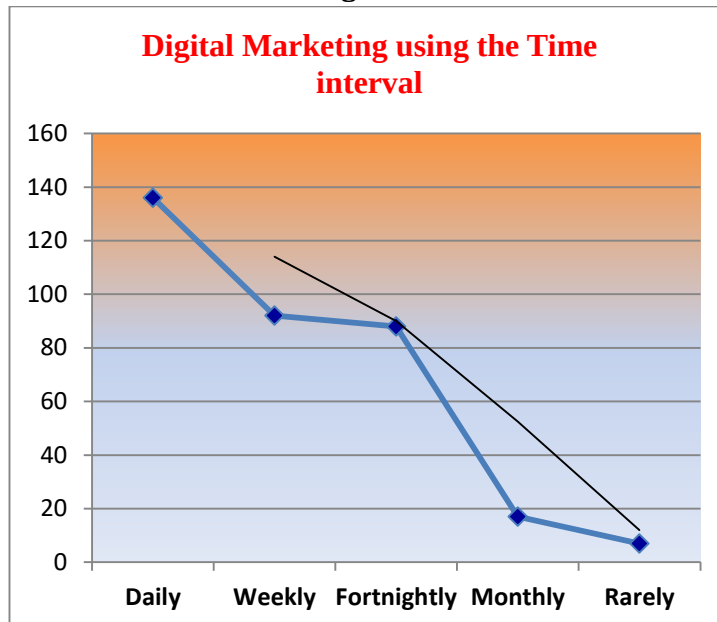
Table 1 Digital Marketing using the Time Interval

S.No	Time interval	No. of Respondents	Percentage
1.	Daily	136	40.00
2.	Weekly	92	27.05
3.	Fortnightly	88	25.88
4.	Monthly	17	5.00
5.	Rarely	07	2.02
	Total	340	100.00

Source: Primary Data.

About frequency in using 40% are use online shopping daily, 27% are use online shopping as weekly once, 25.88 % are use online shopping fortnightly, 5% are use online shopping monthly and remaining 2% are use online shopping as rarely.

Figure 1



Hypothesis 1: There is no significant relationship between income and buying behavior.

Table 2 Impact of Buying Behaviour and Income

Income (Rs)	Consumer Behavior					Total
	Highly Agree	Agree	Unbiased	Disagree	Highly Disagree	
Below Rs.10,000	17	0	5	0	0	22
Rs.10,001 – Rs.20,000	7	14	41	24	24	110
Rs.20,0001- Rs.30,000	27	14	14	34	27	116
Rs.30,001 – Rs.40,000	10	24	11	14	10	69
Above Rs.40,000	7	10	3	0	3	23
Total	68	62	74	72	64	340

Source: Primary Data

Table 3 CHI - Square Test Income and Buying Behaviour

Factors	Value	Degrees of Freedom	p- Value
Income	69.462	16	0.000*

*p<0.01

Source: Calculated Value

It is well-known that the p-value is less than the 0.05, and therefore the null hypothesis is rejected and results are significant at 1 percent level. Hence it is concluded that "There is a relationship between income and buying behaviour." The null hypothesis is rejected.

Hypothesis 2: There is no significant relationship between experience and buying behavior

Table – 4 Impact of Buying Behaviour and Experience

Buying Behaviour Scale	Work Experience			Total
	Less than 3 years	3-5 Years	More than 5 Years	
Highly Agree	27	31	10	68
Agree	10	10	41	61
Neutral	14	44	17	75
Disagree	27	27	17	71
Highly Disagree	17	31	17	65
Total	95	143	102	340

Source: Primary Data

Table – 5 CHI - Square Test Income and Buying Behaviour

Factors	Value	Degrees of Freedom	p- Value
Working Experience	36.468	8	0.000*

*p<0.01

Source: Calculated Value

It is identified that the p-value is less than the 0.05, and hence the null hypothesis is rejected and results are significant at 1 percent level. Hence, the hypothesis "There is no significant relationship between experience and buying behavior" is rejected. This shows that there is relationship between work experience and overall impact of buying behavior.

Hypothesis 3: There is no significant relationship between educational qualification and buying behavior.

Table – 6 Impact of Buying Behaviour and Educational Qualification

Buying Behaviour Scale	Educational Qualification				Total
	Diploma	Graduate	Post Graduate	Doctorate	
Highly Agree	14	14	27	14	69
Agree	0	30	20	27	77
Neutral	0	51	17	20	88
Disagree	0	24	14	17	55
Highly Disagree	3	14	03	31	51
Total	17	133	81	109	340

Source: Primary Data

Table 7 CHI - Square Test Educational Qualification and Buying Behaviour

Factors	Value	Degrees of Freedom	p- Value
Educational Qualification	105.869	16	0.000*

*p<0.01

Source: Calculated Value

It is identified that the p-value is less than 0.05, and hence the null hypothesis is rejected and results are significant at 1 percent level. Hence, the hypothesis "there is no relationship between qualification and buying behaviour" is disproved. This shows that there is relationship between educational qualifications.

Hypothesis 4: There is no significant relationship between frequency of using online shopping on and buying behaviour.

Table – 8 Impact of Buying Behaviour and Frequency of using Online Shopping

Buying Behaviour Scale	Frequency of online shopping					Total
	Daily	Weekly	Fortnightly	Monthly	Rarely	
Highly Agree	3	17	17	17	14	68
Agree	0	0	10	20	31	61
Neutral	0	0	17	10	48	75
Disagree	0	0	27	20	24	71
Highly Disagree	3	0	17	24	21	65
Total	6	17	88	91	138	340

Source : Primary Data

Table – 9 CHI - Square Test Buying Behaviour And Frequency Of Using Online Shopping

Factors	Value	Degrees of Freedom	p- Value
Frequency of using Online shopping	78.869	16	0.000*

*p<0.01

Source: Calculated Value

It is identified that the p-value is less than 0.05, and hence the null hypothesis is rejected and results are significant at 1 percent level. Hence, the hypothesis "there is no relationship between frequency of using online shopping and buying behaviour" is rejected. This shows that there is relationship between frequencies of using online shopping.

Table -10 Analysis of Respondents Answer for Factor "Money Saving"

Responses	Observed % No. of Responses	Expected % No. of Responses	(O-E)	(O-E) ²	$\frac{(O-E)^2}{E}$
Highly Agree	38	20	18	324	16.2
Agree	29	20	9	81	4.05
Unbiased	13	20	-7	49	2.45
Disagree	12	20	-8	64	3.2
Highly Disagree	8	20	-12	144	7.2
Total	100.00	100			33.10

Source: Calculated Value

According to the results, consumers/respondents believe that internet shopping saves money since it offers lower-priced items and there are no transportation charges for customers. The respondent's replies were determined using a Likert scale (five point agree-disagree). It

was shown that 62 percent of respondents totally agreed that internet buying saves money. According to the table, the chi square value at 4 degrees of freedom was 33.10

Table 11 Opinion for Online Shopping is "Time Saving"

Factor of Variable	Reponses	Per cent
"Time Saving"	Highly Agree	34
	Agree	33
	Unbiased	14
	Disagree	16
	Highly Disagree	3
	Total	100.00

Source: Calculated Value

Table - 12 Opinion for Online Shopping is "Standard Quality Products"

Factor of Variable	Reponses	Per cent
"standard Quality Products "	Highly Agree	17
	Agree	15
	Unbiased	12
	Disagree	34
	Highly Disagree	22
	Total	100.00

Source: Calculated Value

Figure 2



Table 14 Opinion for Online Shopping is "Endorsement and Promotion"

Factor of Variable	Reponses	Per cent
"Endorsement and Promotion "	Highly Agree	67
	Agree	23
	Unbiased	7
	Disagree	2
	Highly Disagree	1
	Total	100.00

Source: Calculated Value

Figure 3



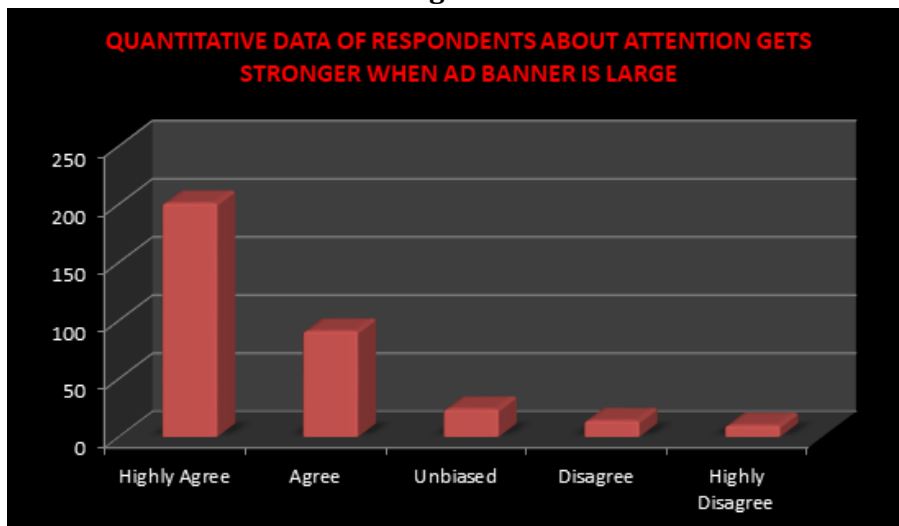
Table 16 Quantitative Data of Respondents about Attention Gets Stronger when Public Notice is Large

Response	No. of Respondents	Percentage
Highly Agree	201	59.04
Agree	91	26.91
Unbiased	24	7.03
Disagree	14	4.02
Highly Disagree	10	3.01
Total	340	100.00

Source: Primary Data

The respondents have been asked that the attention gets stronger when the Public Notices large. From the above table about 59.04% of the respondents highly agree that their attention gets stronger when the Public Notice is large where as 26.91% of the respondents have answers agree on the question. About 4% of the respondents have answer that they disagree on the statement the attention gets stronger when the Public Notice is large, only 3.01% of the respondents have answer that they highly disagree on the statement. And, about 7.02% of the respondents have answer not sure.

Figure 4



The size of the Public Notice creates a chasm between the online advertising. Many of research explained that various characteristics linked to the stimulus, such as size, motion, and contrasts, as well as the backdrop, are likely to draw greater attention. As per recent study by a renowned private research firm, the size of the banner improves spontaneous, assisted awareness, and buys intent. Indeed, as the banner size grows, so does the file size (and therefore the download time). This viewpoint contradicts the findings of the other researchers, who believe that a tiny banner has a negative influence on engagement and, as a result, a low click rate. Public Notices with big sizes frequently lead visitors to be hesitant to click on them. As a result, the size of the Public Notice has a significant impact on the users' intent to click. In the above figures, it is clearly giving the evidence that most of the respondents do agree that the size of the Public Notice plays a significant role in getting the attention towards it. It is therefore legitimate to explain the effectiveness of Public Notice that appears in larger size. Here the marketers can optimize by utilizing large Public Notice which could get attraction from user that may lead to impulse purchase.

Analysis of ANOVA Test

An analysis looks at the effect of awareness on customer behaviour when it comes to digital marketing. The poll investigated many elements of customer purchasing behaviour through internet shopping. For hypothesis testing, ANOVA (Analysis of Variance) was employed. If there are significant differences between two or more groups of an independent variable, one-way ANOVA was employed to examine the data. The data was examined using statistical metrics such as mean, standard deviation, t-values, and f-values. The purpose of this study was to determine the influence of e-marketing (digital media) on customer online purchasing behaviour. The statistical measures and values were used to analyse the research investigation.

Hypothesis 6:

H0: There "is no significant relationship among advertisement and consumer awareness"

Our "initial hypothesis was to investigate the connection between ads and consumer awareness. As a source of information, advertisement raises awareness in the minds of customers and is beneficial in presenting new products.

Table 17 Descriptive Statistics

Particulars	Mean	S.D	N
Advertisement	3.04	0.63	340
Consumer Awareness	3.10	0.64	340

Source calculated value

Table 18 Correlation Analyses

Particulars	Test	Advertisement	Consumer Awareness
Advertisement	Pearson Correlation	1	.171*
	Sig. (2-tailed)		0.015
	Sum of Squares and Cross-products	81.243	13.125
	Covariance	.402	0.067
	N	340	340
Consumer Awareness	Pearson Correlation	.171*	1
	Sig. (2-tailed)	0.015	
	Sum of Squares and Cross-products	13.115	83.027
	Covariance	0.066	.401
	N	340	340

Source calculated value

-*Correlation Significant at the 0.05 Level (2 tailed test)-

In the above hypothesis, we used SPSS to do a correlation test on our 498-sample size. The findings reveal that the significance level of the test is 0.015, which is less than 0.05; indicating that our null hypothesis (H0- There is no significant relationship between Advertisement and Consumer Awareness) will be rejected. Based on our findings, we may infer that there is a link between ads and consumer awareness. The Pearson correlation value demonstrates that both variables have a positive connection with one another. Although the Pearson correlation value is low, indicating that the link between these two variables is not as strong, there is still a positive relationship between them.

Hypothesis 7:

H0: "There is no significant impact of digital advertising than traditional advertising."

In our hypothesis 7, "we attempted to determine the impact of digital and conventional advertising on client purchasing behavior. In our study, we used the test on the replies of 340 respondents, and the findings are presented below.

Table 18 Descriptive Statistics

Particulars	Mean	S.D	N
Consumer Buying Behaviour	2.345	0.77	340
Digital Advertisement	2.215	0.67	340
Traditional Advertisement	2.146	0.65	340

Source calculated value

Table 19 Correlation Analysis

Test	Particulars	Consumer Buying Behaviour	Digital Advertisement	Traditional Advertisement
Pearson Correlation	Consumer Buying Behaviour	1.000	0.392	0.584
	Digital Advertisement	0.392	1.000	0.279
	Traditional Advertisement	0.584	0.279	1.000
Sig (2 tailed)	Consumer Buying Behaviour	-	.000	.000
	Digital Advertisement	.000	-	.000
	Traditional Advertisement	.000	.000	-
N	Consumer Buying Behaviour	340	340	340
	Digital Advertisement	340	340	340
	Traditional Advertisement	340	340	340

-*Correlation Significant at the 0.05 Level (2 tailed test)-

Pearson correlation values for everyone are presented in the preceding table. We may analyse the influence of one variable on other variables using this table. For example, a 1 value digital advertisement produces a 0.389 rise in the value of purchasing behaviour.

Hypothesis 8:

H0: "There is no significant relationship among digital advertisement and consumer perception for their buying."

Table 20 Descriptive Statistics

Particulars	Mean	S.D	N
Advertisement	4.462	0.631	340
Consumer perception	2.220	0.658	340

Source calculated value

Table 21 Correlation Analyses

Particulars	Test	Advertisement	Consumer Awareness
Advertisement	Pearson Correlation	1	-0.34
	Sig. (2-tailed)		0.299
	Sum of Squares and Cross-products	81.324	-2.157
	Covariance	0.398	-.012
	N	340	340

Consumer Perception	Pearson Correlation	-0.34	1
	Sig. (2-tailed)	0.299	
	Sum of Squares and Cross-products	-2.157	86.601
	Covariance	-0.12	0.427
	N	340	340

-*Correlation Significant at the 0.05 Level (2 tailed test)-

This test's significance level is 0.299, which is considerably greater than 0.05, indicating that we failed to reject the null hypothesis (H0), which was that there is no link between ads and customer perception and H1 (There is no significant relationship between digital advertisement and consumer perception for their buying) is accepted. People do not depend just on ads to form their impressions; instead, they rely more on product trials. People, on the other hand, listen to their peers and friends and form opinions.

As a result, while there are many other possibilities for forming client views, ads are not one of them. Human people do not form good or negative perceptions by simply seeing a thing; they will try to utilize that object at least once before forming any perception in their minds. Because experience is the most important factor in shaping impressions, most cosmetics firms utilize sales promotion tools in addition to ads in which they provide free trial or sample products to clients. The goal of these sales campaigns is to offer clients with an experience that will help them create a positive opinion of their product.

Findings

1. Demographics of Respondents

- Age Group: Majority of the respondents fall within the 18-35 age range.
- Gender: A balanced representation of both male and female consumers.
- Income Level: A significant portion of respondents belong to the middle-income bracket.

2. Awareness and Usage of Digital Marketing

- High Awareness: Most respondents are aware of digital marketing and its various forms (social media ads, email marketing, search engine marketing, etc.).
- Usage: A large percentage of consumers actively engage with digital marketing through social media platforms like Facebook, Instagram, and YouTube.

3. Consumer Preferences and Behaviour

- Preference for Online Shopping: A notable shift towards online shopping due to convenience, variety, and competitive pricing.
- Brand Engagement: Consumers are more likely to engage with brands that have a strong online presence and provide interactive content.
- Influence of Reviews and Ratings: Customer reviews and ratings significantly influence purchasing decisions.

4. Effectiveness of Different Digital Marketing Channels

- Social Media: Most effective in reaching and engaging consumers.
- Search Engine Optimization (SEO) and Search Engine Marketing (SEM): Critical for driving website traffic and conversions.
- Email Marketing: Effective for personalized communication and customer retention.

5. Factors Influencing Digital Marketing Effectiveness

- Content Quality: High-quality, relevant, and engaging content is crucial.
- Personalization: Tailored marketing messages and offers lead to higher consumer engagement and loyalty.
- Technological Advancements: Use of AI, machine learning, and data analytics enhances the precision and impact of digital marketing efforts.

6. Challenges Faced

- Privacy Concerns: Growing concerns over data privacy and security among consumers.
- Digital Divide: Variability in digital literacy and internet access impacts the reach of digital marketing.

7. Impact on Consumer Behaviour

- Decision-Making Process: Digital marketing significantly influences the awareness, consideration, and decision stages of the consumer journey.
- Brand Loyalty: Consumers are more likely to develop brand loyalty towards companies that effectively use digital marketing to engage and provide value.

Conclusion

Digital marketing channels, particularly social media, SEO, and SEM, are highly effective in engaging consumers and driving conversions. Consumers in Chennai are increasingly using digital platforms to make informed purchasing decisions, relying heavily on online reviews, ratings, and peer recommendations. Brands that invest in personalized marketing strategies see higher engagement and loyalty. Tailored content and offers resonate more with consumers, leading to better marketing outcomes. High-quality, relevant content is crucial for capturing consumer attention and driving engagement. Consumers prefer brands that provide valuable and informative content. To maintain consumer trust, brands need to address privacy concerns by ensuring robust data security measures and transparent data usage policies. Efforts to increase digital literacy and internet accessibility can expand the reach and effectiveness of digital marketing. The study emphasizes that digital marketing is a vital tool for influencing consumer behaviour in Chennai City. Brands that leverage digital marketing effectively, focusing on quality content, personalization, and addressing consumer concerns, are likely to see significant benefits in terms of consumer engagement, loyalty, and conversion rates.

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ROLE OF EMOTIONAL INTELLIGENCE IN MEDIATING THE EFFECTIVENESS OF TEAM-BUILDING FOR CONFLICT RESOLUTION

Ms. M. Jeena Verghese

*Ph.D Scholar, Department of Economics
VELS Institute of Science, Technology and Advanced Studies
Chennai*

Dr. R. Premalatha

*Assistant Professor, Department of Economics
VELS Institute of Science, Technology and Advanced Studies
Chennai*

Abstract

This study aims the crucial role of teamwork in conflict resolution and its impact on improving organizational productivity. In contemporary organizations, conflicts are inevitable due to diverse workforces, varying perspectives, and high-stress environments and the effective teamwork can transform these conflicts into opportunities for growth and innovation rather than allowing them to disrupt productivity. The research explores how collaborative efforts among team members can address and resolve conflicts constructively, leading to enhanced communication, trust, and overall efficiency.

The study is grounded in a comprehensive review of literature on conflict resolution strategies, emphasizing the importance of a team-oriented approach. Data was collected through surveys from various industries, focusing on their experiences with conflict within teams and the outcomes of those conflicts on productivity. The research highlights specific teamwork techniques, such as mediation, collaborative negotiation, and consensus-building, that are instrumental in mitigating conflicts. These techniques encourage team members to view conflicts as a shared challenge rather than a personal battle, promoting a culture of collaboration rather than competition. The study also identifies potential barriers to successful teamwork in conflict resolution, including power dynamics, lack of trust, and insufficient training in conflict management.

Keywords: *Teamwork, Conflict Resolution, Organizational Productivity, Management.*

Introduction

In today's dynamic and competitive business environment, organizations are increasingly recognizing the importance of teamwork as a cornerstone for achieving success. As businesses grow and diversify, the complexity of tasks and the interdependence among employees intensify, making effective teamwork more critical than ever. However, with this increased interaction comes a higher likelihood of conflicts arising within teams. These conflicts, if not managed properly, can lead to decreased productivity, low employee morale, and even turnover, posing significant challenges to organizational efficiency and effectiveness.

Conflict in organizations is almost inevitable due to various factors such as differences in personality, communication styles, cultural backgrounds, and work ethics. When individuals with diverse perspectives and skills come together to achieve common goals, disagreements are bound to occur. These conflicts, while often seen as negative, can also serve as opportunities for growth and innovation if handled constructively. This is where the role of teamwork in conflict resolution becomes vital. Teamwork involves the collective effort of a group of individuals

working towards a common objective. Effective teamwork not only requires a shared vision and goals but also hinges on the ability to manage and resolve conflicts in a way that strengthens relationships and fosters a collaborative work environment. When team members are equipped with the skills and tools to address conflicts constructively, they can transform potentially disruptive situations into opportunities for learning and improvement, thereby enhancing organizational productivity. This study aims to explore the role of teamwork in conflict resolution and how it contributes to improving organizational productivity. The research is guided by the hypothesis that effective teamwork, characterized by open communication, mutual respect, and a collaborative approach to problem-solving, plays a crucial role in resolving conflicts and, as a result, leads to higher levels of productivity within organizations. The study will examine various conflict resolution strategies that are employed within teams and assess their effectiveness in different organizational contexts. Moreover, the study will delve into the challenges that teams face in conflict resolution, such as power imbalances, lack of trust, and inadequate conflict management training. Understanding these barriers will provide insights into how organizations can better support their teams in developing the skills necessary for effective conflict resolution.

Objectives of the Study

1. To Analyse the Impact of Teamwork on Conflict Resolution within Organizations
2. To Assess the Effect of Conflict Resolution on Organizational Productivity
3. To Identify the Key Factors and Challenges Affecting Teamwork in Conflict Resolution

Statement of the Problem

In the modern organizational landscape, the ability to resolve conflicts effectively is crucial for maintaining productivity and fostering a positive work environment. Conflicts are inevitable in any organization due to diverse workforces, differing opinions, and the high-pressure demands of contemporary business operations. When not managed properly, these conflicts can lead to disruptions in workflow, decreased employee morale, and ultimately, a decline in organizational productivity. Traditional approaches to conflict resolution often focus on individual mediation or hierarchical intervention, which may not always address the underlying issues or leverage the potential benefits of collaborative problem-solving. Despite the recognition of teamwork as a valuable asset in achieving organizational goals, there is often a gap in understanding how teamwork can be strategically employed to resolve conflicts and enhance productivity. Many organizations struggle to integrate effective conflict resolution mechanisms within their teams, leading to prolonged disputes, reduced collaboration, and inefficiencies that hinder overall performance. This issue is further exacerbated by challenges such as power imbalances, communication breakdowns, and a lack of training in conflict management skills.

The problem, therefore, is twofold: first, organizations need to understand how teamwork can be optimized to resolve conflicts effectively; second, there is a need to identify and overcome the barriers that prevent teams from successfully managing conflicts. Without addressing these issues, organizations risk allowing conflicts to erode team cohesion and productivity, ultimately impacting their competitiveness and success. This study seeks to address this problem by exploring the role of teamwork in conflict resolution and its impact on organizational productivity.

Methodology

Sources of Data

The primary data for the study was collected from the selected class categories of employees in 7 major departments.

Hypothesis

1. There is no significant correlation between the classification of OD interventions and the categorisation of impacts of OD interventions.
2. There is no significant association among the eight aspects of the impacts of OD interventions. •
3. There is no significant mean difference between the classification of OD intervention and the personal variables.

Research Design

This study employed descriptive research design to garner empirical details with the help of a structured questionnaire to analyse the levels.

Sampling Techniques

Stratified Proportionate Simple Random Sampling was employed in the selection of the samples. The number of employees in each class (class I, class II, class III & class IV) was considered as 'strata' and proportionately the samples were selected from each class of 4 class categories.

Analysis and Interpretation Data

The collected and collated data were codified, fed into the computer and analysed. The Statistical Package for Social Sciences was used for data feeding and analysis. The analysed tables and statistical tests were presented with suitable interpretation. Frequency distribution, correlations, ANOVA, T-test were administered and presented.

Gender of the Respondents Vs Departments of the Respondents

Table 1 illustrates the gender of the respondents corresponding to the department of the respondents. Nearly nine-tenth of the respondents was males. Just one-tenth of the respondents were females.

**Table - 1 Gender of the Respondents corresponding to the
Department of the Respondents**

Department	Gender		Total
	Male	Female	
Administration	13 (43.3%) 4.9%	17 (56.7%) 53.1%	30 (100.0%) 10.0%
Civil Engineering	34 (89.5%) 12.7%	4 (10.5%) 12.5%	38 (100.0%) 12.7%

Finance	10 (55.6%) 3.7%	8 (44.4%) 25.0%	18 (100.0%) 6.0%
Maintenance & Conservation	75 (100.0%) 28.0%	0 (.0%) .0%	75 (100.0%) 25.0%
Marine	44 (100.0%) 16.4%	0 (.0%) .0%	44 (100.0%) 14.7%
Mechanical Engineering	51 (100.0%) 19.0%	0 (.0%) .0%	51 (100.0%) 17.0%
Traffic	41 (93.2%) 15.3%	3 (6.8%) 9.4%	44 (100.0%) 14.7%
Total	268 (89.3%) 100.0%	32 (10.7%) 100.0%	300 (100.0%) 100.0%

The data with the parentheses show the row percentage and the data without the parentheses display the column percentage.

Table – 2 Age of the Respondents verses Class Category of the Respondents

Age	Class Category				Total
	Class I	Class II	Class III	Class IV	
Below 25 years	0 (.0%) .0%	0 (.0%) .0%	8 (100.0%) 4.6%	0 (.0%) .0%	8 (100.0%) 2.7%
25-35years	1 (1.0%) 5.9%	0 (.0%) .0%	62 (59.6%) 35.6%	41 (39.4%) 42.7%	104 (100.0%) 34.7%
35-45 years	0 (.0%) .0%	0 (.0%) .0%	54 (58.7%) 31.0%	38 (41.3%) 39.6%	92 (100.0%) 30.7%
45-55 years	8 (22.2%) 47.1%	8 (22.2%) 61.5%	16 (44.4%) 9.2%	4 (11.1%) 4.2%	36 (100.0%) 12.0%
Above 55 years	8 (13.3%) 47.1%	5 (8.3%) 38.5%	34 (56.7%) 19.5%	13 (21.7%) 13.5%	60 (100.0%) 20.0%
Total	17 (5.7%) 100.0%	13 (4.3%) 100.0%	174 (58.0%) 100.0%	96 (32.0%) 100.0%	300 (100.0%) 100.0%

The data with the parentheses show the row percentage and the data without the parentheses display the column percentage.

Of the total respondents, a substantial proportion of them (34.7%) were in the age range of 25 to 35 years and of who around three-fifth of them were positioned in the Class III category. Among the age categories, the least number of the respondents (2.7%) were observed in the age below 25 years. Absolutely, all these youth respondents were in the Class III categories. The analyzed data discloses the fact a good proportion of the employees are in the active age group and which is the potential strength for the organization.

Table -3 Years of Work Experience of the Respondents

S. No.	Experience	Frequency	Percent
1	Below 3 years	64	21.3
2	3-10 years	44	14.7
3	11-25 years	76	25.3
4	above 26 years	116	38.7
Total		300	100.0

A significant proportion of the respondents (64%) had work experience more than 10 years. Around 36 percent of the respondents had work experience less than 10 years. As reflected in the table, the Port Trust had more experienced employees. It could be recommended that the work experience of the seniors be shared with the juniors in order to improve the organizational effectiveness and efficiency.

Table – 4 Views of the Respondents about Sensitivity Training Programmes

S.No.	Statements	SA	A	D	SD	Total
1	I have participated in many sensitivity training programmes organised by the company.	32 (10.7%)	192 (64.0%)	52 (17.3%)	24 (8.0%)	300 (100%)
2	The quality of the sensitivity training programmes is excellent.	32 (10.7%)	56 (18.7%)	136 (45.3%)	76 (25.3%)	300 (100%)
3	The sensitivity training programmes have helped me towards my personal growth.	0 (0.0%)	160 (53.3%)	56 (18.7%)	84 (28.0%)	300 (100%)
4	The sensitivity training programmes have helped me to improve the job performance.	32 (10.7%)	132 (44.0%)	84 (28.0%)	52 (17.3%)	300 (100%)
5	The sensitivity training programmes have helped me to understand and appreciate the differences in other people.	0 (0.0%)	248 (82.7%)	0 (0.0%)	52 (17.3%)	300 (100%)
6	The sensitivity training programmes have helped me to develop a genuine closeness to each other in a relatively short period of time.	32 (10.7%)	132 (44.0%)	84 (28.0%)	52 (17.3%)	300 (100%)

Most of the respondents (74.7%) had concurred with the statement that they participated in many sensitivity training programmes of the company. Around one- fourth of the respondents had not frequently participated in the sensitivity training programmes. Around seven-tenth of

the respondents disagreed with the statement that the quality of the sensitivity programmes is excellent. Contrarily, around 29.4% of the respondents agreed with the same assertion. More than half of the respondents had agreed upon the statement that the sensitivity training enabled them towards their personal growth. Around 46.7% of the respondents disagreed with the same statement. Most respondents (54.7%) agreed on that the sensitivity training programmes had helped them to improve their job performance; however, this statement was ignored by 45.3% of the respondents. The sensitivity training programmes enabled a large majority of the respondents (82.7%) to understand and appreciate the differences in other people. Contrarily, this statement was refused by 17.3% of the respondents. Most respondents (54.7%) had accepted that the sensitivity training programmes helped them to develop a genuine closeness to each other in a relatively short period of time. Around 45.3% of the respondents had denied the same assertion. From the above analyzed data it could be inferred that most respondents had positive views about the sensitivity training programmes conducted by the company.

Table 5 Opinion of the Respondents about Conflict Management

S.No.	Statements	SA	A	D	SD	Total
1	The management entails collaborative strategies which is acceptable to all.	71 (23.7%)	38 (12.7%)	66 (22.0%)	125 (41.7%)	300 (100%)
2	I give my opinion to my team members when they make mistakes in job performance.	104 (34.7%)	100 (33.3%)	76 (25.3%)	20 (6.7%)	300 (100%)
3	I have found an opportunity to extract and exploit the potentials of my team.	34 (11.3%)	50 (16.7%)	110 (36.7%)	106 (35.3%)	300 (100%)
4	I often confront my team for Controversial topics.	70 (23.3%)	35 (11.7%)	112 (37.3%)	83 (27.7%)	300 (100%)
5	My team faces conflicts among the members during the discussions.	68 (22.7%)	124 (41.3%)	64 (21.3%)	44 (14.7%)	300 (100%)
6	Team members quickly and genuinely apologize to one another when they say or do something inappropriate or possibly damaging to the team.	108 (36.0%)	140 (46.7%)	38 (12.7%)	14 (4.7%)	300 (100%)

Conflict Management

Resolving unhealthy conflicts and fostering healthy conflicts are the prime components of conflict management (McLean, 2006). Table5 presents the opinion of the respondents about conflict management. Many respondents (63.7%) had refuted the statement that the management entails collaborative strategies which are acceptable to all. However, this statement was accepted by 36.3% of the respondents. A considerable proportion of the respondents (68%) had given opinions to their teams when they made mistakes in job performances. About 32% of the respondents had not given views to their teams when the

members failed to do job performances. A majority of the respondents (72%) did not have opportunities to tap the potentials of their teams. Around 28 % of the respondents had opportunities to extract the potentials of their teams. Of the total respondents, 65% of them had not frequently confronted their teams for controversial topics and 35% of them had often confronted their teams for controversial topics. Most respondents (64%) had experienced conflicts among their team members during the discussions. 36% of the respondents had not undergone such conflict situations. A vast majority of the respondents (82.7%) felt that their team members quickly and genuinely apologies to one another for doing something appropriate works. This statement was denied by 17.3% of the respondents.

Management Approach

Table 6 presents the opinion of the respondents about the management approach towards the employees. Of the total respondents, 60% of them felt that they are not being respected and trusted by the management and 40% of them considered that they are respected and trusted by the management. Two-fifth of the respondents had satisfaction with the communication pattern existing between the employees and the management. Three- fifth of the respondents were dissatisfied with the communication pattern.

**Table – 6 Opinions of the Respondents about Management
 Approach towards the Employees**

S.No.	Statements	SA	A	D	SD	Total
1	I am being respected and trusted by the management.	0	120 (40%)	180 (60%)	0	300 (100%)
2	I am satisfied with the communication pattern existing between employees and the management.	0	120 (40%)	132 (44%)	48 (16%)	300 (100%)
3	I feel that a mixed social composition of employees works in my department.	24 (8%)	160 (53.3%)	68 (22.7%)	48 (16%)	300 (100%)
4	I feel that the needs of my department are being positively addressed by the management.	28 (9.3%)	176 (58.7%)	48 (16%)	48 (16%)	300 (100%)
5	My leaders are more cooperative and supportive for the execution of my job assignments.	52 (17.3%)	152 (50.7%)	48 (16%)	48 (16%)	300 (100%)
6	I feel that a democratic organizational climate exists in the company.	28 (9.3%)	108 (36%)	116 (38.7%)	48 (16%)	300 (100%)

Many respondents (61.3%) felt that a mixed social composition of employees works in their respective departments. This statement was denied by 38.7% of the respondents. Most of the respondents (68%) perceived that the management positively addressed the needs of their respective departments. Around 32% of the respondents denied the statement. The assertion that the leaders are more cooperative and supportive for the execution of the employees' job assignments was accepted by 68% of the respondents. This statement was refused by 32% of the respondents. More than half of the respondents denied the existence of a democratic organizational climate in the company. This assertion was accepted by 45.3% of the respondents.

Mean Differences between the Classification of Organizational Approach and the Job Sector Variables

The scores of the classification of organizational were examined with the job sector variables department, class category and educational qualification of the respondents to observe the significance of mean difference between variables using ANOVA and t test. Table 7 displays the significance of mean difference between the classification of organizational approach and the job sector variables. The classification of organizational approach significantly differed from the department of the respondents since the p value was lesser than 1% level of significance. Hence, there was a significant mean difference between the classification of organizational approach and the department of the respondents. The reported mean and F test discloses that the respondents working in the finance department (mean = 2.22) strongly realized that the company had a better organizational approach. There were no significant differences in other two hypothetical statements.

Table – 7 Mean Differences between the Classification of Organizational Approach and the Job Sector Variables

Variable	Item	N	Mean	Std. Dev	Df	ANOVA	Significance
Department	Administration	30	2.00	.525	6	ANOVA	**
	Civil engineering	38	1.82	.609			
	Finance	18	2.22	.428			
	Maintenance & Conservation	75	2.11	.649			
	Marine	44	1.73	.451			
	Mechanical Engineering	51	1.82	.385			
	Traffic	44	2.00	.000			
Class Category	Class I	17	2.00	.000	3	ANOVA	NS
	Class II	13	2.00	.000			
	Class III	174	1.90	.595			
	Class IV	96	2.01	.423			
Educational Qualification	UG (Technical)	90	1.91	.512	5	ANOVA	NS
	UG (Non-technical)	30	2.10	.403			
	PG (Technical)	18	1.83	.383			
	PG (Non-technical)	14	2.07	.267			
	Diploma/ITI	100	1.94	.565			
	Upto school education	48	1.94	.561			

** 0.01 level of significance * 0.05 level of significance NS – Not significant

Mean Differences between the Classification of Organizational Approach and the Job Satisfaction Variables

The classification of organizational approach viewed by the respondents (as low, moderate and high) was tested with the job satisfaction variables years of experience, extent of satisfaction with current salary and extent of satisfaction with current career situation using ANOVA. Table 7 presents the significance of mean difference between the classification of Organizational Approach perceived by the respondents and the job satisfaction variables.

Conclusion

In today's dynamic work environments, the role of teamwork in conflict resolution has become increasingly significant for improving organizational productivity. This study explored how effective teamwork contributes to resolving conflicts within organizations and its subsequent impact on productivity levels. The findings indicate that teamwork is a crucial element in mitigating conflicts, as it fosters open communication, collaboration, and a shared sense of purpose among team members. When conflicts arise, teams that operate with a high level of cohesion are better equipped to address disagreements constructively. Such teams are more likely to engage in problem-solving approaches that emphasize understanding different perspectives, leading to more innovative and effective solutions. Moreover, the study highlights that organizations with strong team-based cultures tend to experience fewer disruptions in productivity when conflicts occur. This is because teams with established trust and mutual respect can navigate conflicts more smoothly, minimizing the negative impact on workflow and morale. The collaborative efforts within teams also promote a more inclusive environment, where individuals feel valued and heard, further reducing the likelihood of conflicts escalating. Another key insight from the study is that teamwork enhances accountability and collective responsibility. When team members work together to resolve conflicts, they are more likely to take ownership of their roles in the process, leading to more sustainable resolutions. This shared responsibility not only resolves the immediate issue but also strengthens the team's ability to handle future conflicts, creating a more resilient and adaptable workforce. The study underscores the importance of fostering teamwork as a strategy for conflict resolution within organizations. By promoting teamwork, organizations can create a culture that not only addresses conflicts effectively but also leverages these situations as opportunities for growth and innovation. Ultimately, this approach leads to improved organizational productivity, as teams become more cohesive, efficient, and aligned with the organization's goals.

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BRIDGING GAPS, BUILDING FUTURES: A MULTISECTORAL APPROACH TO MENTAL HEALTH IN INDIA

Dr. T. Ambika

*Assistant Professor of Political Science
School of Law, Sathyabama Institute of Science and Technology
dr.t.ambikasenthilvel@gmail.com*

S. Joshika

*B.A.LL.B (Hons.)-4th year
School of Law, Sathyabama Institute of Science and Technology
sjoshika51@gmail.com*

Abstract

Mental health has become a pillar of individual well-being, business efficiency, and social cohesion in India's rapidly transforming socio-economic and cultural scenario. This article discusses the intertwined roles of law, management, and social sciences to construct mental health and social support systems with innovative solutions and resilient challenges.

The legal perspective is underpinned by the Mental Healthcare Act, 2017, which recognizes the right to access mental health care, ensures insurance cover for mental illnesses, and removes the criminalization of suicide. This rights model is an important shift in legislature towards dignity and accessibility but is let down by uneven implementation due to resource constraints, absence of trained staff, and inadequate public awareness.

In the corporate world, work mental health is now being increasingly regarded as a means to employee engagement and organizational success. Infosys, TCS, and Wipro are some of the large Indian companies that have implemented Employee Assistance Programmes (EAPs), stress management training, and flexible working policies. However, small and medium enterprises are typically constrained from implementing such interventions, and stigma around mental health is still affecting free discussion.

The social sciences approach highlights the role of cultural values, community organization, and socio-economic inequalities in shaping mental health. Community-based programs, support groups by peers, and culturally adapted counsellings have shown beneficial results. Teletherapy, mobile phone applications for mental health, and AI-powered self-help platforms are increasing reach, yet the digital divide threatens to completely leave out rural and marginalized groups.

This article contends that enduringly better mental health outcomes in India need cross-sectoral partnership, Legislation needs to ensure enforceable rights and accountability, management needs to develop psychologically safe environments, and social sciences need to provide culturally appropriate interventions. Innovations should also be based on values of empathy, ethics, and equity so that inequalities are not widened.

Finally, India's mental health is not a strictly medical issue but a social necessity. By incorporating legal protections, organizational methods, and community-based solutions, India can establish a mental health system that fosters resilience, inclusiveness, and dignity for all its people.

Keywords: *resilience, mental health, dignity, public awareness, socio-economic, cultural scenario*

Introduction

India's mental health exists at a crossroads of ancient beliefs and contemporary pressures. When cities expand and lifestyles become increasingly fast-paced, citizens are subjected to

increasing stress—from working long hours and intense competition to the fear of living up to family and societal expectations. These stresses are further exacerbated by ingrained cultural stigmas, so that conversations about mental health are still taboo and access to assistance is restricted.

While there has been advancement in economic and technological fronts, the mental health system of India is behind. Urban areas provide greater resources and experts, but rural and semi-urban zones are left with limited support, leaving major portions of the population exposed. A huge treatment gap exists: millions are in need of intervention, but only a few avail themselves of this even in time. The small pool of mental health professionals and poor infrastructure make this gap all the more pronounced.

Solving India's mental health emergency needs more than drugs. It needs legal changes guarding patient rights, stigmatization-fighting campaigns, work policies that prioritize well-being, and community-based solutions that promote acceptance and inclusion. Only by embracing mental health as a cornerstone of both individual happiness and national development can India promise a more resilient, caring future.

How Modernization Affects the Landscape of Mental Health

Urbanization in India has rapidly changed the landscape of mental health, bringing in new stressors that impact various segments of the population. With increasing numbers moving to urban areas, challenges in adjusting to high-speed, skyscraper cities have increased emotional and psychological difficulties. Urban life tends to be characterized by congestion, pollution, and incessant noise, wearing down mental strength bit by bit. Moreover, the disintegration of the conventional joint family system and the emergence of nuclear families have contributed to more fragile social support systems, which in turn amplify loneliness and alienation. These trends are particularly critical among susceptible populations like youth, women, and the elderly, who experience distinctive stressors such as technology overindulgence, gender-based violence, and social dislocation.

The urban grind of lengthy commutes, high expectations at work, and economic stress all lead to chronic stress, anxiety, and depression. With little time for relaxation or social engagement, many are left with mental fatigue and burnout. At the same time, urbanization is accompanied by economic possibilities, but also by increasing disparities, where those with lower socioeconomic status face worse living conditions, reduced mental health services, and increased exposure to environmental hardships. This cumulative effect of stressors is further linked with higher levels of substance abuse, self-injury, and other mental illness.

Cultural transformation makes it more complicated to adapt; individuals struggle to mediate pre-urban values with contemporary city lifestyles. The cultural mismatches between rural and urban environments may produce identity conflicts and emotional distress. Mental health in urban India therefore requires multi-level strategies—such as enhancing infrastructural facilities and access to healthcare, building support systems in communities, raising awareness to stem stigma, and incorporating workplace policies that address mental well-being. As modernization accelerates, promoting mental health requires holistic responses at both individual and systemic levels to build resilience, inclusivity, and sustained emotional well-being in India's cities.

Breaking the Silence: Attitudes, Myths, and Misconceptions

Social stigma and cultural barriers pose deep challenges to discussing mental health in India, where myths, misconceptions, and attitudes heavily impact public attitudes and help-seeking behaviours. Mental illnesses are usually masked by silence through universal stigma, whereby individuals with such conditions are unjustly portrayed as "weak," "crazy," or even "harmful." Indian families believe that admitting mental illness could shame them and affect their social standing, so they deny or hide them instead of seeking medical treatment. These beliefs stem from conventional assumptions that tend to place mental illness in supernatural realms like possession by demons, karma, or immorality, which creates fear and stigma. As such, patients often resort to spiritual healers or religious practices rather than seeking medical care, thereby hindering or postponing effective treatment.

This stigma is also heightened by gaps in education and awareness, with many people misinterpreting symptoms of mental health as flaws in character or individual weaknesses instead of treatable illnesses. The collectivist culture of Indian society prioritizes social harmony and family reputation, sometimes preventing individuals from freely discussing their problems or seeking therapy. The hierarchical family structure may also exert pressure to handle problems internally, perceiving outside assistance as failure or inadequacy.

Shattering such silence calls for collective efforts to reframe attitudes in society through education, destigmatization initiatives, and incorporating mental health promotion into schools, the workplace, and community programs. It is important to recast family support by fostering open discussion and openness with accepting that accessing mental health services reflects strength and active healing. Collaboration with community leaders and traditional healers can bridge cultural sensitivities and initiate empathetic, evidence-based care. By facing myths and altering perceptions, India has the ability to make a more inclusive setting that enables people to ask for help without shame or fear, ultimately leading to better mental health results and social well-being.

The Treatment Gap: Infrastructure, Professionals, and Access, unveiling the Challenge of Service Delivery and Accessibility

India also has a huge treatment gap in mental health services, which in turn challenges delivery and accessibility of services. Almost 14% of the population of India needs mental health intervention, but a shocking 80-85% of them do not benefit from appropriate treatment. This is a result of several factors, among which are poor infrastructure, lack of trained mental health workers, and socio-cultural obstacles to receiving care. India's healthcare infrastructure is frequently strained and geographically unbalanced, with mental health facilities and specialists overrepresented in urban centers at the expense of rural and hard-to-reach populations.

There are hardly enough mental health workers, including psychiatrists, psychologists, psychiatric nurses, and social workers, to cater to the population, with less than one psychiatrist per 100,000 persons. This shortage hinders early diagnosis, intervention, and subsequent treatment follow-up, especially for prevalent mental disorders such as anxiety and depression, which may not need extensive psychiatric treatment but still require psychosocial intervention. Also, stigma about mental illness keeps people from seeking assistance, adding to the gap.

Strategies to fill this gap involve adding mental health care to primary health through initiatives such as the District Mental Health Programme, with the aim of delivering community-

based interventions and early intervention. Lay health worker and counselor training for basic mental health services has been promising in increasing coverage and impact in low-resource contexts. Legal protections such as the Mental Healthcare Act, 2017, enshrine the right to receive mental health care, but enforcement is an issue.

Closing the gap in mental health treatment for India will demand a multi-pronged strategy: increasing infrastructure, reinforcing workforce capacity, increasing public awareness to alleviate stigma, and building engagement between non-governmental and governmental sectors. Technology-based solutions like telemedicine and web-based counseling platforms present promising means to enhance accessibility for remote locations. Closing the treatment gap is critical not just for alleviating individual distress but also for improving overall societal productivity and well-being, and mental health must be a core plank of public health policy in India.

The Effects of Work and Education, Pressures of the Workplace, Student Stress, and New Trends

Work and education settings in India place strong pressures that penetrate deeply into mental health, echoing overall societal and economic forces. Indian workplaces are marked by very high levels of stress, with recent accounts suggesting that as many as 30% of workers face daily stress and an astonishing 49% actively pursue new employment opportunities as a result of dissatisfaction. The excessive work hours, extreme rivalry, and relentless pressure to perform chip away at the mental health of employees, leading to burnout, anxiety, and reduced productivity. Cultural norms to put work and responsibility first, and economic insecurity, work against employees setting proper boundaries, leading to chronic stress and emotional exhaustion. The prevalence of post-work hour communications and the expectation of being available at all times also obscures the distinction between work life and personal life, accentuating stress levels.

Concurrently, Indian students experience increasing pressures linked to academic achievement, career ambiguity, and social expectations. The high-stakes exams and competitive education system create anxiety, lack of sleep, and fear of failure among young people. Mental health issues are exacerbated for law students and those in equally demanding disciplines by challenging curricula and cultural stigmatization of vulnerability, causing many to silently endure.

Rising trends underscore expanding awareness of these challenges, calling for changes at the systemic level in workplaces and schools. Mental health awareness, stress management education, and the incorporation of well-being into organizational cultures are increasingly promoted. Developments in flexible work schedules, counseling services, and peer support groups are starting to bring some relief, albeit patchy coverage.

Finally, alleviating workplace and student stress in India demands an integrated strategy that recognizes economic conditions, cultural norms, and individual requirements. Setting precedence for mental health at institutional levels, promoting open dialogue to alleviate stigma, and the balance are critical actions that can enhance well-being, increase productivity, and equip resilient, healthy future professionals. This shift not only benefits individuals but also contributes to broader societal progress by building a workforce and citizenry equipped to thrive amid ongoing change.

Policy Response and Legal Framework: Evolution of Mental Health Laws and Rights in India

The transformation of mental health legislation in India is a major paradigm shift towards a rights-based and participative system, focusing on dignity, autonomy, and protection of individuals with mental illness. The path-breaking Mental Healthcare Act (MHCA) of 2017 superseded the previous Mental Health Act of 1987, marking India's adherence to international human rights norms, specifically the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD). The MHCA 2017 focuses on mental health care as a right and requires the government to make available accessible, affordable, and quality mental health services in the country.

One of the most important provisions of MHCA 2017 is the decriminalization of attempted suicide as an act of extreme distress, not as a criminal act. This takes away the possibility of legal punishment for individuals in distress and compels the state to treat and rehabilitate them. The Act further provides for the right to give advance directives, where one can stipulate how one would like to be treated or not treated during mental health events in order to enhance patient autonomy.

The Act bans cruel, inhuman, and degrading treatment and restricts the administration of electroconvulsive therapy (ECT) with stringent precautions, specifically prohibiting it for children. It creates the district-level Mental Health Review Boards to monitor the safeguarding of patients' rights and handle complaints. Confidentiality and non-discrimination provisions also provide for persons with mental illness to be treated on the same level as individuals suffering from physical illness, promoting equality.

Governments have a responsibility to integrate mental health services with general health at all levels, ranging from primary levels to specialized institutions. The Act requires registration and regulation of mental health facilities to ensure uniformity in the quality of care. It also enhances public awareness, reduces stigma, and develops human resources through training and sensitization.

On the whole, the Mental Healthcare Act 2017 is a revolutionary mental health legislation in India that is centered on empowerment, protection, and accessibility, and aligns with international human rights principles to create a more humane and equitable mental health system. The Mental Healthcare Act (MHCA) 2017 brought some of the most important provisions that are central to learning about the development of mental health legislation in India and are most important for research on rights, protections, and service delivery:

1. **Right to Access Mental Healthcare (Section 18):** All individuals are entitled to receive mental health care services and treatment from funded or government facilities so that it is accessible, available, and affordable throughout India.
2. **Right to Community Living (Section 19):** The Act entitles individuals with mental illness to live and be part of the community and prohibits segregation or institutionalization against their will, ensuring social inclusion.
3. **Protection against Cruel, Inhuman, and Degrading Treatment (Section 20):** Mental health facilities are required to meet minimum standards of care that maintain dignity and humane treatment, and violation is punishable by law.
4. **Right to Confidentiality (Section 23):** Mental health data of patients is safeguarded, and it is disclosed only in exceptional situations, upholding confidence and confidentiality in treatment.

5. **Decriminalization of Attempted Suicide (Section 115 of the Indian Penal Code, amended by MHCA):** Attempted suicide is no longer a criminal act but is identified as an extreme stress manifestation that needs treatment and rehabilitation, diverting attention from punishment to care.
6. **Advance Directive (Sections 5-12):** One can define their desired treatment plan for future mental health episodes, increasing autonomy and informed consent.
7. **Mental Health Review Boards (Section 81):** Institutions tasked with the protection of rights, addressing grievances, and enforcing the Act compliance by mental health facilities.
8. **Regulation and Registration of Mental Health Establishments (Sections 65-72):** Sets standards for licensing, quality assurance, and accountability, with a goal to standardize mental health care services.

These sections together emphasize a rights-oriented, patient-centered, and ethical approach that enhances protection, stimulates autonomy, and imposes state obligation for mental healthcare. Knowledge of these provisions offers important insight into the prevailing legal regime defining mental health services and advocacy in India.

Digital Interventions and Telehealth: Opportunities and Risks

Digital interventions and telemedicine are transforming mental health treatment in India, bringing new hope to address the nation's large treatment gap. The accelerated growth in internet penetration and smartphone use has opened the door for cost-effective, convenient, and accessible provision of mental health treatment to hitherto underserved populations. Programs like the National Tele Mental Health Programme (Tele MANAS) provide round-the-clock counseling and psychiatric consultation via phone and video, supporting millions across diverse states and languages. Digital mental health apps are increasingly popular, offering psychoeducation, mood tracking, mindfulness exercises, and self-help plans, effectively reaching young and tech-savvy users. These tools enhance privacy and reduce stigma by allowing individuals to seek help anonymously and flexibly.

Yet, such advantages are accompanied by risks. Data privacy and security continue to be concerns, with sensitive mental health data being harvested and stored electronically, needing strong legal safeguards like India's Digital Personal Data Protection Act (DPDP) to protect user confidentiality. Furthermore, the efficacy of solely digital interventions is constrained by the absence of personalization and human interaction, which is paramount for engagement and treatment adherence. Significant dropout rates in app-based therapies confirm this problem, indicating the necessity for hybrid models integrating digital solutions with face-to-face consultation.

Access barriers remain in rural areas with low digital literacy and poor connection levels, hence potentially increasing inequities. In addition, ethical concerns involving informed consent, algorithmic bias, and quality control of mental health apps require continued focus and regulation. Despite those challenges, the ability of digital technology to scale and democratize mental health care in India is huge. Successful integration of digital technologies with current health systems, coupled with sound policy systems and community engagement, will enable these innovations to be harnessed responsibly, enhancing mental health outcomes and shaping a more equitable health environment for the future.

Conclusion

Constructing a robust and equitable mental health system for the future needs a comprehensive, multi-dimensional response that not just targets the clinical nature of mental illness but also the social, cultural, and legal factors that shape mental well-being. India has huge challenges, such as a huge treatment gap, stigma, insufficient mental health infrastructure, and inequity in access between rural and urban settings. In order to transcend these challenges, the next mental health system will have to become a unified ecosystem that integrates healthcare professionals, legal systems, schools, community centers, and technology.

Empowering communities lies at the heart of this change. Increasing access to mental health care by bringing it to people through trained community health workers and volunteers can dispel barriers of stigma and access. Programmes such as Atmiyata have shown that culturally appropriate, grassroots interventions can successfully provide psychosocial support and enable access to clinical care and social entitlements. This model points to the strength of empathy, trust, and local knowledge as the building blocks for sustainable mental health care.

Technology also presents unprecedented potential to expand reach and enhance quality. Tele-mental health websites and digital applications can link experts with distant groups, deliver timely advice, and provide mental health training. Technology needs, however, to be accompanied by tight controls around data privacy, equity of access to technology, and continued human care in order to have true effect.

Policy and legal frameworks must form the foundation of a rights framework, protecting the autonomy and dignity of individuals with mental illness. Education needs to be transformed to embed mental health literacy from the earliest stages, enabling young people to identify and cope with emotional distress while fostering caring environments within workplaces and schools.

Strong mental health treatment needs to address systemic discrimination and stigma by creating open discussion, community involvement, and culturally sensitive awareness initiatives. Sectoral collaboration is crucial — health, law, education, technology, and civil society need to collaborate to develop seamless care and advocacy networks.

By investing holistically in infrastructure, training, legal empowerment, and community action, India can lead the way to a mental health system that is fair, responsive, and humane. Such a system not only controls illness but fosters resilience and well-being, empowering people and communities to flourish in the face of change, ultimately leading to a healthier and more caring society for generations to come.

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ECONOMIC STABILITY PERCEPTIONS AMONG KERALITES IN GULF COUNTRIES: A COMPARATIVE STUDY OF SAUDI ARABIA AND OMAN

Shemeem K.H.

*Research Scholar, Department of Economics,
Vels Institute of Science, Technology, and Advanced Studies, Chennai*

Dr. V. Bala Ruby, M.A., M.Phil., Ph.D., SET

*Research Supervisor, Department of Economics,
Vels Institute of Science, Technology, and Advanced Studies, Chennai*

Abstract

This study examines the economic stability perceptions of Indian expatriates from Kerala who work in Saudi Arabia and Oman, comparing their experiences during expatriation and prospects after repatriation. Using survey data from 152 participants (76 from each country), the study analyzes differences in economic satisfaction through descriptive statistics, reliability analysis, and multivariate tests. Results indicate that while both groups prospect significant declines in economic stability post-repatriation, Saudi-based migrants report marginally higher satisfaction levels during expatriation. Gender disparities persist across both contexts, with women facing greater economic instability after return. The findings highlight the need for destination-specific reintegration policies for returning Indian migrants.

Keywords: *Expatriates, Economic Stability, Repatriation, Keralite Migrants*

Introduction

The Population of Non Resident Indians, according to the Ministry of External Affairs, is 32 million and 2-5 million Indians migrate every year. India's geographical pattern of migration has been ever dominated by GCC countries while the other regions like US, the UK, Canada, and South Africa has been around 30%. According to the Ministry of External affairs, India's emigration to the GCC region in the year of 2020 is 0.90 Lakhs.

Kerala accounts for over 30% of India's Gulf migrants, with Saudi Arabia and Oman being major destinations. While existing research has explored remittance patterns and employment conditions, few studies have compared how economic stability perceptions vary between these Gulf countries. This paper addresses this gap by analyzing survey data from returnees to Kerala, focusing on two key questions:

1. How do economic stability perceptions differ between Keralites in Saudi Arabia and Oman?
2. What factors explain the post-repatriation satisfaction gap between genders and destination countries?

Review of Literature

Job Nationalization Policies and Expatriates

To reduce the expatriate labour force replacing the nationals, both Oman and Saudi Arabia adopted different policies like other Gulf Co-operation Council (GCC) Countries.

Oman

To reduce the number of expatriates in the job market, Oman conducted Amnesty campaign in 2016. Due to the program 115,000 expats left the country during 2016 to 2018, meanwhile

many commercial property owners became bankrupt as their major source of income from building rent was lost. ¹ In 1999 Oman introduced Sector-specific "Omanization" quotas to generate additional job opportunities for nationals in specific activities. Due to this in banking sector the Omanization ratio was hit 92.5% in 2016. Automotive sector was also affected much as the jobs in this sector need more training and qualification. This policy was blamed for phantom employment. ² Public sector reforms were programmed in 2011, aiming to restructure and redefine the functions of public jobs. Government announced USD.390/= per month as unemployment benefits for natives and 35,000 new government jobs were created. Due to this program, 37,000 private sector labors quit their jobs in the same year. ³

Kingdom of Saudi Arabia

To make the Saudization program more practical and successful, Saudi Arabia introduced a new policy named *Nitaqat* (means Ranges in Arabic) in 2011. According to Nitaqat System as explained by the **Ministry of Human Resources and Social Development** Kingdom of Saudi Arabia, the firms in the country are classified in to five categories on the basis of their Saudization Rate. They are:

1. Platinum Range: They can apply for new expatriate worker visas and can change expatriate worker's occupations. They can also renew the expatriate worker's work permit. This range of companies can transfer expatriate workers' sponsorship to other companies each other.
2. High Green Range: This range of companies also can enjoy the same things as the platinum range.
3. Medium Range: This range of firms is also same as that of the above two groups.
4. Low Green Range: This group of companies can neither apply for new expatriate worker visas nor change expatriate workers' occupations. They can renew the existing expatriate workers' work permit.
5. Red Range: This group of companies cannot apply for new expatriate worker visas and they cannot apply to renew the existing expatriates' work permits. They cannot change the expatriate workers' occupations and cannot transfer their sponsorship also. Further they cannot issue work permit for new expatriate workers. ⁴

Within two years duration (2011-2013) around 500,000 Saudi nationals were hired for jobs which constituted a 70% of increase. ⁵

The nationalization programs (such as *Saudization* in Saudi Arabia and *Omanization* in Oman) and the introduction of levies on expatriates have contributed to feelings of job insecurity and economic uncertainty among foreign workers in the GCC. While these policies aim to boost local employment and reduce dependency on expatriate labour, they have also led to concerns about job stability, increased living costs, and financial preparedness for repatriation. Saudi Arabia and Oman, in particular, have implemented stringent regulations to accelerate workforce localization, which has left some expatriates anxious about their long-term prospects in the region.

Migration System and Gulf Countries

In the GCC countries Guest worker system is prominent. The migrated workers scarcely obtain permanent residency or citizenship. So it becomes compulsory for the labour to return to the home country after certain duration. (Hvidt, 2016)⁶

The empirical studies show that after repatriation the returned expatriates generally make investments in real estate, purchasing consumer durables etc. which do not lead to a productive wealth (Athukorala, 1990)⁷ and so they are forced to migrate again to the same GCC country or other Gulf countries.

From the existing studies, it is very evident that the expatriates prospect an unstable economic life after their repatriation. Further they experience job inconsistency and financial instability due to the daily reforming nationalization programs and rules of levies, and other financial burdens to the labours.

Methodology

Sample Characteristics

In cases where accessing samples with the desired characteristics is challenging, the snowball sampling method can be applied (Naderifar et al., 2017)⁸. Given that the target population in this study is widely dispersed and conducting a direct study of the entire population would be cost-prohibitive, the snowball sampling technique was deemed appropriate. For data collection, private social organizations operating in GCC countries were selected as initial contacts ("seeds") for the snowball sampling process. These organizations facilitated access to their members and broader networks, enabling the recruitment of additional participants through referrals. 152 Indian (Keralite) expatriates are obtained as a snowball sample for the study as detailed in the Table 1.

Table 1. Sample Demographics

	Women	Men
Age Group		
22-30	18	26
31-40	24	26
41-50	16	22
51-60	14	6
61 and Above	0	0
Total	72	80
Education		
Doctoral Level	0	0
Postgraduate Level	20	24
Graduate Level	40	38
Technical / Professional Level	12	12
HSC/Lower	0	6
Total	72	80
Job Class		
White Collar	60	44
Blue Collar		
Professionals	12	34
Business Men		2
Total	72	80

State		
Kerala	72	80
Total	72	80
Country of Residence		
Saudi Arabia	36	40
Oman	36	40
Total	72	80

Demographic Overview

The sample consists of **152 respondents** (72 women, 80 men) from Kerala, residing equally in Saudi Arabia and Oman.

1. Age Distribution:

- Majority are aged **22–40** (68% of women, 65% of men).
- No respondents are above 60.

2. Education:

- Most hold **graduate/postgraduate degrees** (83% women, 78% men).
- **No doctoral-level** education reported.

3. Employment:

- **White-collar jobs dominate** (83% women, 55% men).
- More men are in **blue-collar/professional roles** (43% vs. 17% women).

4. Gender Differences:

- Women are **more concentrated in white-collar jobs**, while men show **greater diversity in roles**.
- **6 men** reported only HSC/lower education vs. **none among women**.

This data reflects trends in education, gendered job preferences, and the expatriate workforce from Kerala in GCC countries.

Measures

A questionnaire was prepared with 8 questions apart from 13 questions for getting the demographics of the population.

- **Economic Stability Scale:** 4-item Likert scale (1 = "Very Unsatisfactory" to 4 = "Excellent").
- **Statistical Tools:** Descriptive analysis, MANCOVA, PCA, reliability testing (Cronbach's α).

Results

Table 1 Descriptive Statistics of Economic Stability During and After Expatriation by Gender

Variable	Men (N = 40)	Men (N = 40)	Women (N = 36)	Women (N = 36)
Time Period	During Expatriation	After Repatriation	During Expatriation	After Repatriation
Mean	12.40	9.38	11.90	8.94
Median	13.00	9.00	12.00	9.00

Standard Deviation (SD)	2.12	2.56	1.91	2.00
Minimum	7.00	4.00	7.00	4.00
Maximum	16.00	15.00	16.00	13.00
Missing	0	0	4	4

The descriptive statistics present the economic stability scores for men and women during expatriation and after repatriation. For men ($N = 40$), mean economic stability was higher during expatriation ($M = 12.4$, $SD = 2.12$, $Mdn = 13.0$) compared to after repatriation ($M = 9.38$, $SD = 2.56$, $Mdn = 9.00$). Similarly, women ($N = 36$) reported higher economic stability during expatriation ($M = 11.9$, $SD = 1.91$, $Mdn = 12.0$) than after repatriation ($M = 8.94$, $SD = 2.00$, $Mdn = 9.00$). The data suggest a decline in economic stability post-repatriation for both genders, with men showing slightly higher variability (larger SDs) than women. No missing data were reported for men, whereas four cases were missing for women.

Table 2. Comparative Economic Stability Scores

Phase	Saudi Arabia (Mean)	Oman (Mean)	Difference
Men - During Expatriation	12.4	12.1	+0.3
Men - After Repatriation	9.38	8.70	+0.68
Women - During Expatriation	11.9	11.0	+0.9
Women - After Repatriation	8.94	8.25	+0.69

- Saudi-based migrants reported **higher satisfaction during expatriation**, likely due to better wages and job security.
- Post-repatriation, **Oman returnees faced sharper declines** (-3.4 for men vs. -3.02 in Saudi Arabia).

Gender Disparities

- **Women in both countries** reported lower satisfaction post-return (Oman: -2.75 ; Saudi: -2.96).
- **Saudi women** had higher expatriation satisfaction ($+0.9$ vs. Oman), possibly due to more professional roles (e.g., nurses).

Reliability and Factor Analysis

- **Cronbach's α** : 0.627 (Saudi) vs. 0.608 (Oman) – indicating moderate consistency is acceptable for exploratory research but borderline low. Hair et.al. (2010) state that Cronbach's α as low as 0.6 is acceptable for new scales and for exploratory research. ⁹

Table 2 Shows Principal Component Analysis

Component	Oman (Variance %)	Saudi Arabia (Variance %)
Factor 1 (Expatriation)	48.9%	48.9%
Factor 2 (Repatriation)	45.2%	45.2%

Consistency

Both datasets revealed **identical variance structures**, confirming the stability of the two-factor model (expatriation vs. repatriation).

- **Factor 1:** Expatriation stability (48.9% variance in both).
- **Factor 2:** Repatriation stability (45.2% variance in both).

MANCOVA Results

Table 3 Showing Multivariate Tests

		value	F	df1	df2	p
Economic Stability After Repatriation (Men)	Pillai'sTrace	0.122	2.22	2	32	0.126
	Wilks'Lambda	0.878	2.22	2	32	0.126
	Hotelling'sTrace	0.138	2.22	2	32	0.126
	Roy'sLargestRoot	0.138	2.22	2	32	0.126
Economic Stability After Repatriation (Women)	Pillai'sTrace	0.144	2.69	2	32	0.083
	Wilks'Lambda	0.856	2.69	2	32	0.083
	Hotelling'sTrace	0.168	2.69	2	32	0.083
	Roy'sLargestRoot	0.168	2.69	2	32	0.083

A multivariate analysis of covariance (MANCOVA) was conducted to examine gender differences in perceptions of economic stability after repatriation, with economic stability during expatriation as a covariate. The multivariate tests revealed no statistically significant gender differences in economic stability perceptions after repatriation when controlling for economic stability during expatriation: Pillai's Trace = 0.122, $F(2, 32) = 2.22$, $p = .126$ for men; Pillai's Trace = 0.144, $F(2, 32) = 2.69$, $p = .083$ for women.

Table Showing Univariate Tests

	Dependent Variable	Sum of Squares	df	Mean Square	F	p
Economic Stability After Repatriation (Men)	Economic Stability During Expatriation (Men)	0.838	1	0.838	0.1731	0.680
	Economic Stability During Expatriation (Women)	2.102	1	2.102	0.5669	0.457
Economic Stability After Repatriation (Women)	Economic Stability During Expatriation (Men)	0.314	1	0.314	0.0648	0.801
	Economic Stability During Expatriation (Women)	3.847	1	3.847	1.0376	0.316

Residuals	Economic Stability During Expatriation (Men)	159.820	33	4.843		
	Economic Stability During Expatriation (Women)	122.356	33	3.708		

Follow-up univariate tests indicated that economic stability during expatriation did not significantly predict economic stability after repatriation for either men ($F[1, 33] = 0.17, p = .680$) or women ($F[1, 33] = 1.04, p = .316$). Similarly, cross-gender effects were non-significant, with men's economic stability during expatriation not predicting women's post-repatriation stability ($F[1, 33] = 0.06, p = .801$) and women's stability during expatriation not predicting men's post-repatriation stability ($F[1, 33] = 0.57, p = .457$).

The non-significant results suggest that perceptions of economic stability after returning home were not significantly related to economic stability during overseas employment for either gender in this sample. The model explained a small portion of variance in post-repatriation economic stability perceptions (partial $\eta^2 = .12$ for men, $.14$ for women).

Discussion

Why Do Saudi Returnees Report Higher Satisfaction?

1. **Higher Wages:** Saudi Arabia's oil-driven economy offers better salaries than Oman's diversified market.
2. **Job Security:** Saudi's Nitaqat system incentivizes formal employment for expatriates.
3. **Gender Dynamics:** More Saudi-based women work in healthcare (higher-paying vs. Oman's domestic/retail roles).

Post-Repatriation Challenges

- **Oman returnees** struggle with lower savings and weaker job networks.
- **Women universally face barriers** due to Kerala's limited high-paying opportunities for returnees.

Policy Recommendations

1. **Destination-Specific Reintegration Programs:**
 - **Saudi returnees:** Focus on entrepreneurship leveraging their savings.
 - **Oman returnees:** Skill-matching initiatives for local industries.
2. **Gender-Responsive Support:**
 - Subsidized childcare for returning women professionals.
 - Partnerships with IT/healthcare sectors to absorb skilled returnees.

Conclusion

This study reveals nuanced differences in how Keralite migrants perceive economic stability across Gulf destinations. While Saudi Arabia offers marginally better conditions, both groups face significant post-return declines. Policymakers must tailor reintegration strategies to migrants' destination-country experiences. Future research should explore longitudinal impacts of return migration on household economies.

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HARNESSING THE POWER OF ARTIFICIAL INTELLIGENCE (AI) TO SHAPE INVESTMENT DECISIONS IN DEVELOPING MARKETS

M. Farwis

*Lecturer, Department of Accountancy and Finance
Faculty of Management and Commerce
South Eastern University of Sri Lanka
farwism@seu.ac.lk*

Abstract

The objective of this research is to study the impact of Artificial Intelligent on investment decision-making in emerging market which is Sri Lanka. Data were gathered through a questionnaire distributed in the first quarter of 2024 from 145 professionals who are engaging with decision making exposure to AI in their professional life. There are four independent variables, such as Price Prediction, Financial Risk Management, Decision Making and Financial Reporting, with the dependent variable, which is Investment decision. The smart partial least square-structural equation (PLS) model was used to measure the relationship among these variables. The findings reinforce AI's potential to serve not just as a technical aid, but as a strategic tool in investment planning, particularly in developing economies where informed financial decisions are crucial. The research emphasises the perceptions of investment decision makers who are debut users of AI technology. The results of this study will enable the institutions to implement AI in crucial decision making.

Keywords: *Artificial Intelligence, Price Prediction, Financial Risk Management, Decision Making, Financial Reporting, Investments Decisions and Sri Lanka.*

Introduction:

Due to the advancement of technology, financial decision-making is transitioning from human-led to machine-led interactions, aiming to enhance accuracy, responsiveness and fraud management (Mahalakshmi, et al., 2022). This evolution is possible through the adaptation of artificial intelligence (AI), Machine Learning (ML), Blockchain, IoT and big data analytics. This transformation is inevitable because digital transformation, a vital catalyst, shapes a more interconnected world, profoundly impacting lives and fostering substantial business growth (Ren, 2021). Meantime, widespread adoption of AI has embedded itself as a robust tool across the financial services sector, offering vast potential for positive transformation (Dunis, et al., 2016).

The stock market's complexity, volatility, and unpredictability make it both a lucrative and risky investment space, particularly for inexperienced investors. Despite advancements in technologies like Business Intelligence and Management Information Systems, human intuition still dominates critical financial decisions, highlighting the limitations of rule-based systems in dynamic market conditions. With growing interest in AI and machine learning (ML), there is a clear need for intelligent Decision Support Systems (DSS) capable of adapting to changing realities, analysing large volumes of financial data, and supporting strategic investment decisions. While global financial sectors have begun to adopt these technologies, in Sri Lanka, the integration of AI into the financial and investment landscape remains under-researched. Particularly, the impact of these technologies on market behaviour, investor strategies, and

decision-making processes has not been thoroughly studied. Therefore, this research addresses that gap by examining the practical role of AI in reshaping investment decision-making in Sri Lanka's evolving financial sector.

Literature review of AI and Investment decision

In 1956 the word "artificial intelligence" was introduced by McCarthy and Minsky in a workshop at Dartmouth. According to Rai et al (2019) AI is "the capacity of a machine to execute cognitive operations commonly attributed to human minds, including but not limited to perception, reasoning, learning, problem solving, decision-making, and creative expression" Cognitive modeling, for instance, proposes that AI instantiations should possess the ability to reason like humans (Jiang et al., 2018) and be "machines with a mind" (Shah et al., 2019). When presented with the exact same data as an individual, the model should not only produce an equivalent outcome but also adhere to the same line of reasoning (Cavalcante et al., 2016). Whereas, Jiang et al. (2018) define cognitive modelling, for instance, suggesting that AI applications should possess the skill to think as a human and Shah et al. (2019) suggested that "machines with a mind". In addition to that, Cavalcante et al. (2016) propose that while feeding similar data, machines should produce the output as well as an identical explanation for a different set of input.

The usage of AI in the capital market to make investment decisions has gained significant attention in recent years. Researchers in the field of AI have contributed many studies focusing on AI and financial decision making. It was highlighted that the effectiveness of Machine Learning (ML) algorithms has been extensively used to find trends of financial data and patterns of financial data, which drives the undertaking of well-informed financial decisions (Zhang et al., 2018). At the same time, Liu et al. (2020) state that AI is being used in risk management as an investment risk mitigation tool. Moreover, D'Antonio et al. (2019) suggested that AI-powered portfolios have been widely used to optimise the investor's portfolio. Ultimately, the AI tools help to maintain a balanced portfolio, minimise risks, and maximise returns, thereby enhancing overall investment performance.

Hypothesis

Price Prediction

AI technology has been used in the prediction of the price of financial markets, which has been considered a main feature of investment decision making. Many studies are available on the usage of AI and ML in predicting the prices of the financial market instruments. Studies show the effectiveness of the ML and AI techniques, including support vector machines, neural networks, and random forests, in forecasting exchange rates, stock prices and other financial assets (Han et al., 2018 and Zhang et al., 2020).

H1: Price prediction via AI has an impact in Investment Decision making.

Financial Risk Management

A key strand of study explores how machine learning algorithms can be used to assess credit risk. Studies conducted by Li et al. (2020) and Wang et al. (2019) depict that AI techniques like support vector machines and neural networks can enhance credit scoring accuracy. The research shows that AI assist in decreasing the operational risks and financial losses (Chen et

al., 2020 and Jiang et al., 2017), and Jones et al. (2019) also reported that AI techniques can analyse data more effectively, helping financial institutions better predict and manage risks like credit, market, and operational risk.

H2: Financial Risk Management through AI has an impact in Investment Decision making

Decision-Making

Decision-making plays a vital role in financial management, as it involves comparing different options to choose the ones that best support the goals of the organisation and the interests of its stakeholders. Machine learning algorithms, such as random forests and gradient boosting machines, have shown promise in improving decision-making accuracy and efficiency by automating tasks such as risk assessment, portfolio optimisation, and fraud detection (Chen et al., 2018). Moreover, AI-driven decision support systems can incorporate real-time data feeds and market signals to enable more dynamic and adaptive decision-making in response to changing market conditions (Liu et al., 2019).

H3: Decision-Making through AI has an impact in Investment Decision making

Financial Reporting

AI applications in financial reporting encompass various tasks, including data collection, processing, analysis, and interpretation of financial data. NLP techniques enable AI systems to extract relevant information from financial documents, such as annual reports, earnings releases, and regulatory filings, with greater speed and accuracy than manual methods (Ghosh et al., 2019). Machine learning algorithms can detect patterns, trends, and anomalies in financial statements, helping auditors and analysts identify potential errors, fraud, or discrepancies (Petrov et al., 2018). Additionally, AI-powered predictive modelling can forecast future financial performance based on historical data, aiding in decision-making and strategic planning (Cao et al., 2020).

H4: Preparing Financial Reporting through AI has an impact in Investment Decision making

Data and Method

A descriptive survey design methodology was adopted. The primary data were used as a source of data for the research. The data were collected using the online questionnaire tool "Google Forms." The questionnaire was spread peer to peer. A single cross-sectional research design was used to collect data from practising professionals at one point in time, and the data would be analysed to test the stated hypotheses.

Empirical results

The data collected is entered and coded into Excel, SPSS 23 and Smart partial least square (PLS) 4. The study was conducted with Smart PLS 4 for both measurement and structural model.

Structural Equation Modeling (SEM)

The SEM uses in this study to establish the Measurement Model (MM) and structural model for conceptual framework. The MM model uses this study because MM confirms the studies' relevance, consistency and credibility. Goswami et al. (2021) conducted "Industry-focused" survey empirical research, where the SEM was used to underline the suitability of the

relationship among latent variables. Since AI is a relatively new and unique subject to test, the sample size is expected to be small. Hence, Rigdon et al. (2017) stress the use of the smart PLS-SEM (SPLS-SEM) rather than the covariance-based SEM (CB-SEM) for model validation.

The framework consists of 15 statements that were divided into: 3 statements for financial reporting, Price prediction and decision making each; 04 statements for Investment decision and 02 statements for financial risk management, which are shown in Figure 1. Financial reporting, Price prediction, financial risk management and decision making are each independent variables, and Investment decision is a dependent variable.

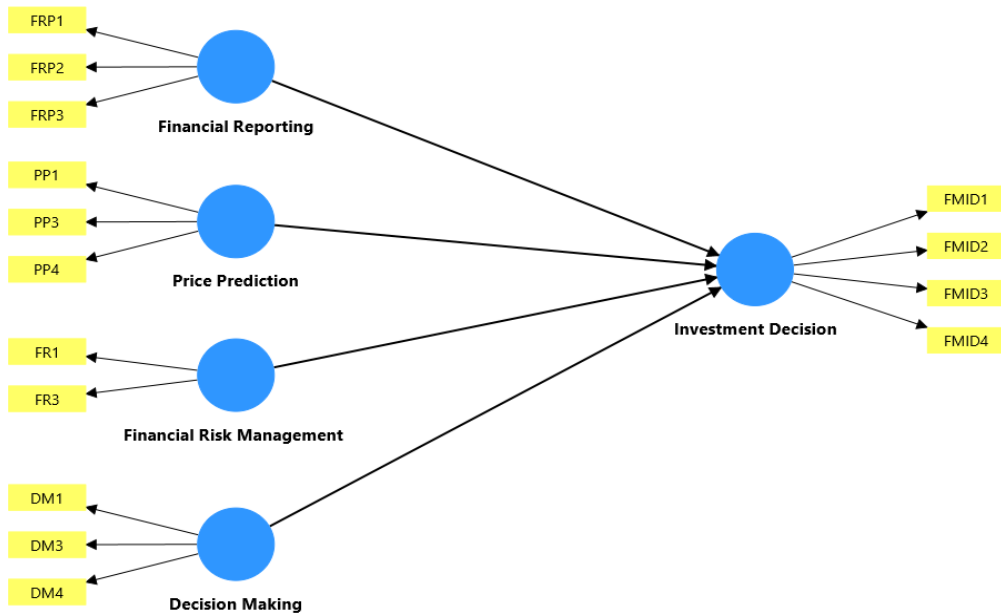


Figure 1 Figure by Author

Sample size

The sample size for the research revealed that almost 90% practitioners are involved in working on AI. Each company approached for five responses to meet the proposed sample size of 182, but because of availability, only 156 responses were collected. It means an 85% response rate recorded for the study. Out of 156, 11 responses were rejected because of incompleteness. The final results are based on 145 responses. Table 01 to Table 5 depict the demographical characteristics of the selected sample.

Table 1 Gender wise percentage

Gender	Frequency	%
Male	78	53.8
Female	67	46.2
Total	145	100.0

Table 2. Age wise percentage

Age	Frequency	%
20-24 Years	31	21.4
25-30 Years	57	39.3
31-35 Years	40	27.6
35-40 Years	17	11.7
Total	145	100.0

Table 3. Qualification wise percentage

Job Nature	Frequency	%
Full-time	69	47.6
Freelancer	51	35.2
Consultant	25	17.2
Total	145	100.0

Table 4. Job nature wise percentage

Qualification	Frequency	%
Bachelor	93	64.1
Masters	33	22.8
Professional	12	8.3
PhD	07	4.8
Total	145	100.0

Table 5. Expertism wise percentage

Expertism	Frequency	%
Financial Modelling	86	59.3
Investment Banking	13	9.0
Risk Management	46	31.7
Total	145	100.0

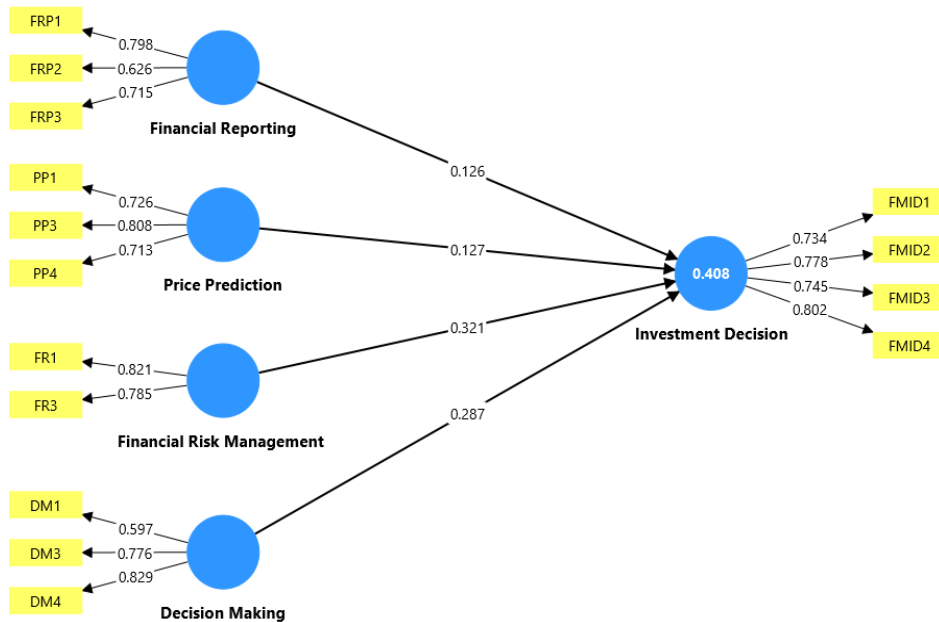
Structural Model

Figure 2 summarises the results of the MM for the proposed conceptual framework of the research in Figure 2. The results of the model are presented in the tables with interpretations. Few statements were deleted from this questionnaire due to low outer loading values, which are less than 50% (Hair et al., 2022). SEM is used to test the effect of an exogenous construct on AI and the impact it has on the investment decision – cause and effect relationship – (Ullman and Bentler, 2012). The tested proposed model is presented in Figure 2, and the results of the structural model are exhibited in the tables.

Outer loadings: are the expected relations in reflective MMs (i.e. arrows from the latent variable to its indicators). They define a statement's absolute contribution to its assigned construct.

Table 6 shows that the factor loading of each statement in the construct exceeded the endorsed value of 0.5 as stated by (Hair et al., 2014).

Cross loading: In cross loadings, a particular statement should have higher loadings on its parent construct in comparison to other constructs in the study. In Table 7, the cross-loading value of statements in a few constructs is just low (below 0.5), so the 15 statements were decided to be maintained for the main data collection



Reliability

Reliability of the MM can be retrieved using two values: the Cronbach's alpha coefficient of above 0.6 and composite reliability, where value ranged from 0.7 or greater is considered acceptable (Fornell and Larcker, 1981) and According to Hair et al. (2022), Cronbach's Alpha values between 0.60 and 0.70 are acceptable, while values between 0.70 and 0.90 are considered good for confirmatory studies. Table 8 shows that the composite reliability of the model measurement values ranged from 0.644 to 0.863 for Cronbach's alpha value and ranged from 0.650 to 0.865 for composite reliability. The rho_A should ideally fall between 0.70 and 0.90 for constructs to be considered reliable. The values prove that it is acceptable to consistently measure the instruments. It can be tested through convergent validity and discriminant validity tests. Convergent validity can be assessed by looking at the results of the MM factor loading, composite reliability, and AVE exceeding 0.5 (Hair et al., 2014). The factor loading of each statement in the construct exceeded the endorsed value of 0.5 as stated by (Hair et al., 2014). According to Hair et al. (2022), an AVE value of 0.50 or higher is the accepted threshold for demonstrating convergent validity. An AVE value below 0.50 indicates that the variance explained by the construct is less than the variance accounted for by measurement error.

Discriminant validity

To further examine the status of model discriminant validity, as suggested by Henseler et al. (2015), it is best to assess the discriminant validity in PLSSEM. This is performed by looking at the Heterotrait-Monotrait ratio (HTMT) criterion value to confirm that the statements across the construct measure different constructs in the model. It is identified by looking at the fact that the confident interval value of HTMT statistic must not comprise the value of 1 for an entire combination of the construct and by assessing the value of HTMT below 0.90 (Hair et al., 2014) as presented in Table 9. It shows the value of HTMT for the most construct is less than 0.90, which indicates minimal discriminant validity for the model.

Variance inflation factor.

The collinearity statistic of the variance inflation factor (VIF) value of the constructs and results is presented in Table 10. VIF value of the constructs is less than 5 for all, as depicted in Table 10, which indicates that there are no collinearity issues between the constructs in the proposed conceptual model. Based on the proposed model measurement analysis findings, it can be summarised that all seven constructs are valid measures of their constructs based on their factor estimations and statistical significance. The MM established an adequate reliability and validity standard.

Table 6. Outer loading results

Statements	DM	FRM	FRP	PP	ID
DM1	0.597				
DM3	0.776				
DM4	0.829				
FR1		0.821			
FR3		0.785			
FRP1			0.798		
FRP2			0.626		
FRP3			0.715		
PP1				0.726	
PP3				0.808	
PP4				0.713	
FMID1					0.734
FMID2					0.778
FMID3					0.745
FMID4					0.802

Notes: DM=Decision Making, FRM= Financial Risk Management, FRP = Financial Reporting, PP= Price Prediction, ID=Investment Decision

Source(s): Table by author

Table 7. Cross loading results

Statements	DM	FR	FRM	ID	PP
DM1	0.597	0.163	0.224	0.149	0.125
DM3	0.776	0.421	0.399	0.400	0.348
DM4	0.829	0.249	0.457	0.511	0.146
FMID1	0.376	0.401	0.309	0.734	0.312
FMID2	0.412	0.147	0.433	0.778	0.305
FMID3	0.371	0.343	0.449	0.745	0.161
FMID4	0.486	0.240	0.412	0.802	0.152
FR1	0.458	0.225	0.821	0.439	0.084
FR3	0.372	0.217	0.785	0.405	0.191
FRP1	0.339	0.798	0.269	0.325	0.253
FRP2	0.197	0.626	0.079	0.235	0.249
FRP3	0.286	0.715	0.226	0.204	0.171
PP1	0.135	0.222	0.091	0.233	0.726
PP3	0.250	0.155	0.139	0.243	0.808
PP4	0.256	0.360	0.152	0.200	0.713

Notes: DM=Decision Making, FRM= Financial Risk Management, FRP = Financial Reporting, PP= Price Prediction, ID=Investment Decision

Source(s): Table by author

Table 8. Reliability and validity results

Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Decision Making	0.734	0.763	0.881	0.548
Financial Reporting	0.634	0.650	0.758	0.513
Financial Risk Management	0.751	0.753	0.884	0.645
Investment Decision	0.863	0.865	0.949	0.586
Price Prediction	0.711	0.717	0.894	0.563

Table 9. Hetero -monotorial (HTMT)

Variables	DM	FR	FRM	ID	PP
Decision Making					
Financial Reporting	0.637				
Financial Risk Management	0.883	0.544			
Investment Decision	0.668	0.559	0.892		
Price Prediction	0.439	0.564	0.329	0.443	

Notes: DM=Decision Making, FRM= Financial Risk Management, FR = Financial Reporting, PP= Price Prediction, ID=Investment Decision

Source(s): Table by author

Table 09. VIF Results

Statement	VIF
DM1	1.352
DM3	1.388
DM4	1.142
FMID1	1.414
FMID2	1.632
FMID3	1.414
FMID4	1.710
FR1	1.093
FR3	1.093
FRP1	1.172
FRP2	1.094
FRP3	1.245
PP1	1.158
PP3	1.327
PP4	1.240

Table 10. Path coefficients

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Decision Making -> Investment Decision	0.287	0.288	0.086	3.326	0.001
Financial Reporting -> Investment Decision	0.126	0.129	0.088	1.433	0.152
Financial Risk Management -> Investment Decision	0.321	0.322	0.085	3.780	0.000
Price Prediction -> Investment Decision	0.127	0.142	0.069	1.850	0.064

Discussion and Conclusion

To evaluate the factors influencing Investment Decision Making, a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was employed. The model included four independent variables: Decision Making, Financial Reporting, Financial Risk Management, and Price Prediction. The results of the path analysis are summarized below:

Table 11. Testing hypothesis

Path	Coefficient	T-Statistic	P-Value	Significance
Decision Making → Investment Decision	0.287	3.326	0.001	Significant
Financial Reporting → Investment Decision	0.126	1.433	0.152	Not Significant
Financial Risk Management → Investment Decision	0.321	3.780	0.000	Significant
Price Prediction → Investment Decision	0.127	1.850	0.064	Not Significant

Table 12. R-Square and Adjusted R-Square

AI usage	R-Square	Adjusted R-Square
Investment Decision	0.408	0.391

Table 11 shows that Financial Risk Management had the strongest and most statistically significant impact on investment decisions ($\beta = 0.321$, $p < 0.001$). This suggests that firms that manage financial risks effectively are more likely to make sound investment decisions. And also, Decision Making also had a significant positive effect ($\beta = 0.287$, $p = 0.001$), indicating that improved decision-making processes directly contribute to better investment outcomes. On the other hand, Financial Reporting ($\beta = 0.126$, $p = 0.152$) and Price Prediction ($\beta = 0.127$, $p = 0.064$) showed positive relationships, but these were not statistically significant at the 0.05 level. This suggests that while they may play a role, their influence is not strong or consistent enough to be confirmed in this model.

Table 12 depicts that the R-Square (R^2) value of 0.408 indicates that approximately 40.8% of the variance in investment decision making can be explained by the combined effects of the four independent variables: Decision Making, Financial Reporting, Financial Risk Management, and Price Prediction. This suggests a moderate level of explanatory power, which is considered meaningful in social science and behavioral finance research, especially within the context of developing markets. The Adjusted R-Square value of 0.391 accounts for the number of predictors in the model and adjusts for any potential overfitting. An adjusted value close to the original R^2 confirms that the model is relatively stable and not overfitted, meaning the selected variables genuinely contribute to explaining the dependent variable.

The findings highlight the critical role of Financial Risk Management and structured Decision Making in shaping effective investment decisions. Risk management appears to provide a solid foundation for making informed, strategic investment choices by minimizing uncertainties and evaluating potential losses. Similarly, efficient decision-making processes likely enhance the timeliness and accuracy of investment actions. On the other hand, while Financial Reporting and Price Prediction are traditionally important in financial analysis, their non-significant impact in this model suggests that these factors may need further refinement or may be mediated by other variables not captured in the current analysis. This opens potential for more complex models or qualitative exploration. This study set out to explore how AI-driven insights influence investment decision-making in developing markets. Using PLS-SEM analysis, we found that among the AI-generated variables, Financial Risk Management and Decision Making had the strongest and most statistically significant impact on investment behavior.

These findings highlight the practical value of AI in surfacing meaningful predictors that drive financial decisions. The model explained 40.8% of the variance in investment decision making, with an adjusted R-square of 0.391, indicating a good level of explanatory power in a real-world context. This suggests that AI can meaningfully support financial decision-making by identifying relevant risk and decision-related factors, especially in environments with limited data availability. While Financial Reporting and Price Prediction showed some positive associations, their effects were not statistically significant. This may imply the need for more advanced models or domain-specific tuning to fully capture their influence. In conclusion, the findings reinforce AI's potential to serve not just as a technical aid, but as a strategic tool in investment planning, particularly in developing economies where informed financial decisions are crucial. Future research could explore more refined AI-driven predictors, longitudinal data, or cross-sector comparisons to further strengthen these insights.

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GENDERCIDE IN TAMIL NADU: A CRITICAL EXAMINATION OF FEMALE INFANTICIDE AND ITS ROOTS

S. Aadhirai, B.B.A LL.B.(HONS),

Saveetha School of Law,

Saveetha Institute of Medical and Technical Sciences (SIMATS),

Saveetha University, Chennai

saadhirai21@gmail.com

Abstract

*Gender-based discrimination, particularly female infanticide, remains a critical social issue in India, with Tamil Nadu being one of the states significantly affected by this practice. Female infanticide, the deliberate killing of female infants, is rooted in deep-seated cultural, economic, and social biases that favor male children. This study **aims** to examine the prevalence, impacts, and preventive measures of female infanticide in Tamil Nadu, aiming to shed light on this persistent gender-based violence. The **objectives** of the research are threefold: to analyze the prevalence of female infanticide in India, particularly in Tamil Nadu; and to assess the effectiveness of preventive methods implemented to combat this social menace. The study adopts an **empirical** and **descriptive** research design, with a sample size of 205 respondents selected through convenient sampling. The sample frame includes individuals from diverse demographic backgrounds in Tamil Nadu. The study reveals that female infanticide persists due to a combination of factors, including son preference, dowry systems, and economic dependency on male heirs. The **findings** highlight the adverse impacts of this practice, such as skewed sex ratios, increased gender inequality, and long-term demographic imbalances. Despite **governmental** and **non-governmental interventions**, such as awareness campaigns and financial incentives for families with girl children, the practice continues in certain regions due to entrenched cultural norms. In **conclusion**, the study underscores the urgent need for multi-faceted approaches to address female infanticide, including stricter enforcement of laws, community-based awareness programs, and economic empowerment of women. By addressing the root causes and strengthening preventive measures, Tamil Nadu and India at large can work towards eradicating this gender-based violence and promoting gender equality.*

Keywords: Girl child, infanticide, killing, crime, menace.

Introduction

Gender-based discrimination and violence, particularly female infanticide, have long been pervasive issues in India, with Tamil Nadu emerging as one of the states most severely affected by this practice. Female infanticide, the deliberate killing of newborn girls, is a manifestation of deep-rooted patriarchal norms, son preference, and economic considerations that devalue the lives of female children. This practice, though historically prevalent, gained significant attention in the late 20th century when Tamil Nadu was identified as a hotspot for gender-based violence against infants.

The **evolution** of this issue reflects a complex interplay of cultural, social, and economic factors, including dowry systems, the perceived economic burden of raising girls, and the lack of access to education and employment opportunities for women. Over time, the practice has evolved from overt infanticide to more covert methods such as sex-selective abortions, facilitated by advancements in medical technology.

The Indian government has implemented several **initiatives** to combat female infanticide and promote gender equality. Programs like the *Beti Bachao Beti Padhao* (Save the Daughter, Educate the Daughter) campaign, introduced in 2015, aim to address the declining child sex ratio and empower girls through education and awareness. In Tamil Nadu, the *Cradle Baby Scheme*, launched in 1992, encourages parents to abandon unwanted female infants in government cradles rather than killing them, providing an alternative to infanticide.

Despite these efforts, challenges persist due to inadequate implementation, lack of awareness, and entrenched societal attitudes. Several **factors** exacerbate the issue, including poverty, illiteracy, and cultural practices that prioritize male heirs.

Current trends indicate a slight improvement in sex ratios due to increased awareness and stricter enforcement of laws like the Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act, which prohibits sex determination. However, the problem remains significant, particularly in rural areas. Gendercide in Tamil Nadu, while less overt than in the past, persists through subtle forms like neglect, limited healthcare access for girls, and early marriages. Despite growing awareness and government initiatives, deeply ingrained societal biases and economic disparities continue to challenge gender equality.

Comparatively, states like Kerala and Punjab offer contrasting scenarios. Kerala, with its high literacy rates and matrilineal traditions, reports far lower instances of female infanticide, while Punjab, despite economic prosperity, struggles with a skewed sex ratio due to strong son preference. Internationally, China's one-child policy and its aftermath provide a stark parallel, highlighting the global nature of gender-based discrimination. This research **aims** to examine the roots of female infanticide in Tamil Nadu, evaluate government initiatives, and explore comparative perspectives to propose sustainable solutions for eradicating this practice.

Objectives

- To analyse the prevalence of female infanticide in India
- To examine the impacts of female infanticide
- To assess the preventive methods against this social menace

Review of Literature

Jenifa et.al (2022), Aim: To highlight the prevalence of female infanticide in India, primarily attributed to the patriarchal nature of society. Findings: Female infanticide remains a significant issue despite efforts by human rights organizations and the government. Social, religious, and historical factors contribute to the continuation of this practice. While initiatives like financial incentives and education are in place, the issue persists in various regions. **Rajaram (2019)**, Aim: To examine the issue of female infanticide in Tamil Nadu, specifically focusing on the efforts undertaken to combat it. Findings: The "Girl Child Protection Scheme" and other coercive measures have been implemented. Concerns were raised about the government's potential denial, silence, or ineffective actions regarding the issue. **Priya and Sridhar (2019)** Aim: To investigate the historical prevalence of female infanticide within the Kallar community in Madurai, Tamil Nadu. Findings: Female infanticide was a widespread practice within this community, involving various methods like administering harmful substances. Government initiatives like the "Cradle Infant Programme" and "Female Child Protection Programme" successfully eradicated this 300-year-old tradition. **Sharqua Ansari (2018)** Aim: To conduct a

theoretical examination of the prevalence of infanticide and female genital mutilation in India, linking them to the patriarchal societal structure. Findings: Sex-selective abortions and female infanticide are significant social issues across all castes, classes, and groups in certain regions. The patriarchal nature of Indian society plays a crucial role in the perpetuation of these practices. **Kumaravel et.al (2016)** Aim: To analyze the current situation of the child sex ratio in Dharmapuri, Tamil Nadu, and examine the clinico-social characteristics of babies preserved under the "Cradle Baby Scheme." Findings: The study provides insights into the effectiveness of the "Cradle Baby Scheme" in addressing female infanticide in the region. **Swarna Rajagopalan (2012)** Aim: To examine the campaign against female infanticide in Tamil Nadu, focusing on the collaboration between the government and NGOs. Findings: While significant progress has been made in combating female infanticide, grassroots organizations suggest that sex-selective abortions have become a prevalent alternative. The chapter uses the issue of female infanticide as a lens to analyze security, development, and democratic governance within the context of gender violence. **Srinivasan and Bedi (2012)** Aim: To challenge the claim made in the EPW article "Declining Child Sex Ratio and Sex Selection in India: A Demographic Epiphany" that government and NGO initiatives have had little impact on sex selection and female infanticide in India. Findings: This study likely argues that government and NGO interventions have played a significant role in improving the child sex ratio in India. **Shraddha and Arjun (2012)** Aim: To evaluate the effectiveness and impact of the Cradle Baby Scheme in Tamil Nadu, particularly in preventing female infanticide. Findings: The scheme, while aiming to prevent infant deaths, is criticized by some for potentially encouraging the abandonment of female children rather than addressing the root cause of sex selection and female infanticide. The study likely emphasizes the need for such schemes until societal attitudes towards girls improve. **Perwez and Shahid (2009)** Aim: To investigate the cultural and political underpinnings of female infanticide and sex-selective abortion in modern South India. Findings: This study examines these practices from the perspectives of the government, NGOs, and communities, focusing on how they impact modern Tamil women. It utilizes a multi-sited research approach, providing a broader perspective compared to earlier studies that focused on single locations. **Smith et.al (2008)** Aim: To understand the factors influencing childbearing decisions among women in rural Tamil Nadu. Findings: The study suggests that "daughter aversion" driven by the perceived financial burden of raising girls is a more significant factor than son preference in motivating female infanticide. It highlights how mothers utilize female infanticide as a means of controlling the sex of their offspring. **Ramaswami Mahalingam (2007)** Aim: To investigate caste-specific factors contributing to female infanticide and neglect among the Thevar and Gounder castes in Tamil Nadu. Findings: The study identifies distinct reasons for son preference in these castes: patrilineal land inheritance among Gounders and honor concerns among Thevars. It explores the psychological precursors that lead to these extreme forms of gender-based violence. **Tandon and Sharma (2006)** Aim: To analyze the extent and impact of sex-selective abortions and female infanticide as significant social phenomena across various castes, classes, and regions in India. Findings: The study highlights the misuse of medical technologies like amniocentesis and ultrasonography for sex determination and subsequent female feticide. It emphasizes the widespread nature of these practices across different segments of Indian society. **Sudha and Rajan (2002)** Aim: To investigate the persistence of gender bias against girls in India, focusing on its impact on fertility, mortality, and the emergence of prenatal sex

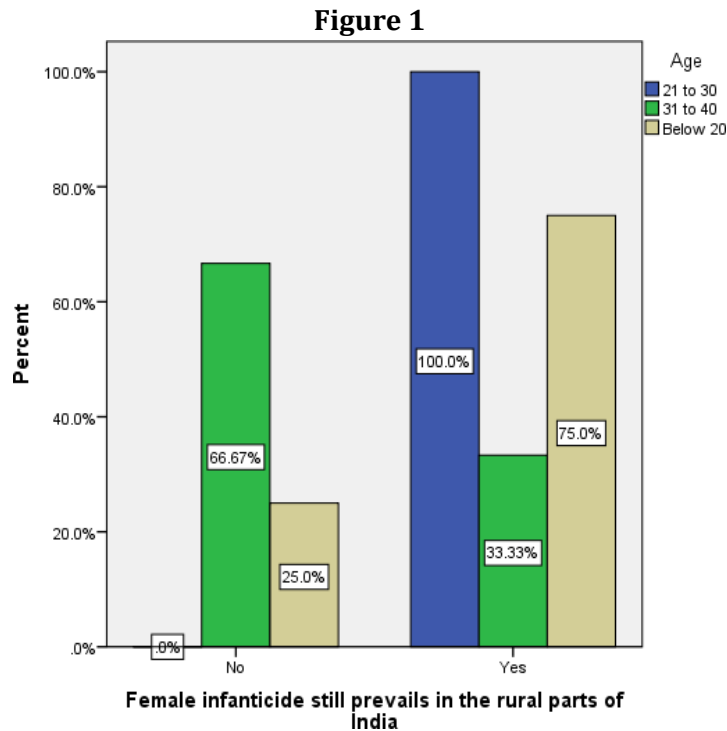
selection. Findings: Despite declining overall mortality rates, the study found an increase in "masculine" sex ratios at birth (SRBs). Women continue to face a mortality disadvantage. Existing legislation and policies addressing gender discrimination have had limited success in mitigating the demographic disadvantage faced by women. **Mangai (1998)** Aim: To explore the impact of a women's theatre production ("Pacha Mannu") on raising awareness about female infanticide within communities where it is prevalent. Findings: This study likely highlights the effectiveness of using theatre as a tool for social change, particularly in challenging cultural norms that contribute to female infanticide. It may demonstrate how artistic expression can be used to subvert harmful cultural practices. **Chunkath and Athreya (1997)** Aim: To investigate the prevalence of female infanticide in Tamil Nadu beyond the previously identified pockets of Madurai and Salem districts. Findings: The study, based on analysis of primary health center records, found evidence of female infanticide across a wider geographical area in Tamil Nadu. **Sabu M George (1997)** Aim: To examine government initiatives to combat female infanticide in Tamil Nadu, particularly the "Girl Child Protection Scheme." Findings: This study likely highlights concerns about the effectiveness of some government interventions, including potential downplaying of the issue or implementation of ineffective measures. **Chunkath et.al (1997)** Aim: Similar to Chunkath and Athreya (1997), this study aims to investigate the geographical spread of female infanticide in Tamil Nadu. Findings: Based on analysis of primary health center records, it confirms the widespread occurrence of female infanticide across a significant portion of Tamil Nadu. **George et.al (1992)** Aim: To investigate the prevalence and impact of female infanticide in a rural South Indian population.

Findings: The study found that female infanticide affected 10% of newborn girls in the study villages. A significant proportion of female deaths were attributed to femicide, emphasizing the importance of accurate data collection to understand child survival rates. **Krishnaswamy (1984)** Aim: To understand the socio-cultural factors contributing to female infanticide within a specific community in Tamil Nadu. Findings: This anthropological study identified cultural, socio-economic, marital, and religious factors as potential drivers of female infanticide within the community. **Jeffery and Lyon (1984)** Aim: To investigate the nature and context of female infanticide in the Bijnor District of Uttar Pradesh, India. Findings: The study explores the link between cultural norms that devalue girls, female foeticide, and higher mortality rates among female infants and children.

Methodology

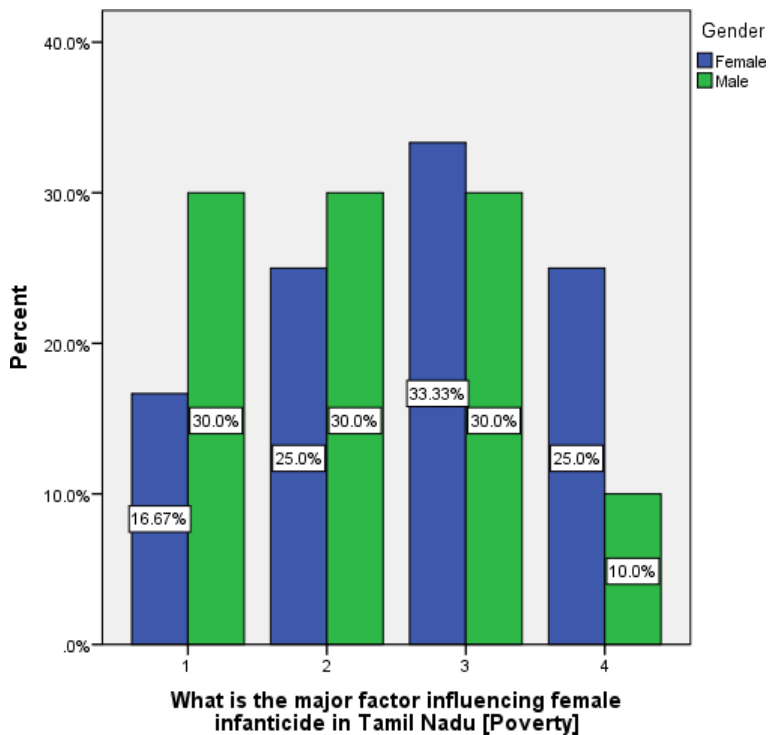
This is an **empirical** and **descriptive** study using primary data collected from **205** respondents with convenient sampling from in and around Chennai. The **independent variables** such as age, gender, education qualification along with the **dependent variables** on the opinions on female infanticide in Tamil Nadu were collected through survey questionnaire. The collected data was analyzed using the **SPSS software**. The statistical method used by the researcher is **graphical** representation.

Data Analysis and Interpretation



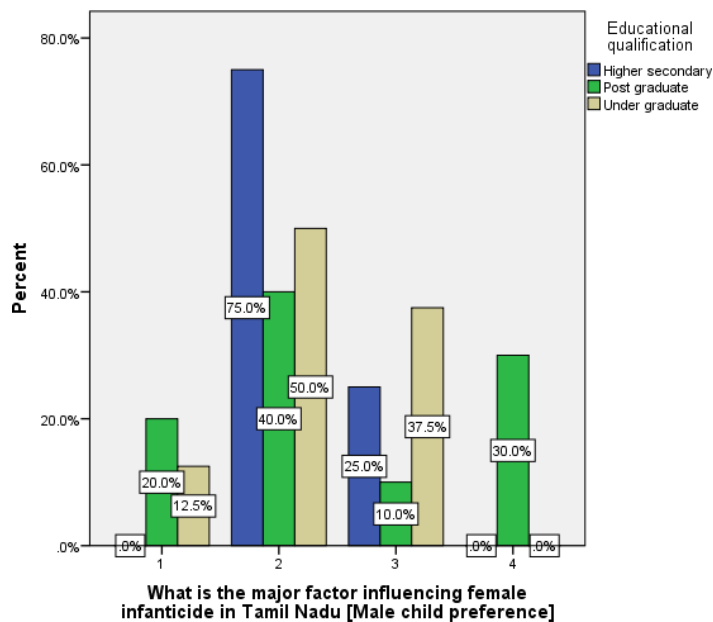
Legend 1

Figure 1 shows age and respondent's awareness of the prevalence of female infanticide in the rural parts of India



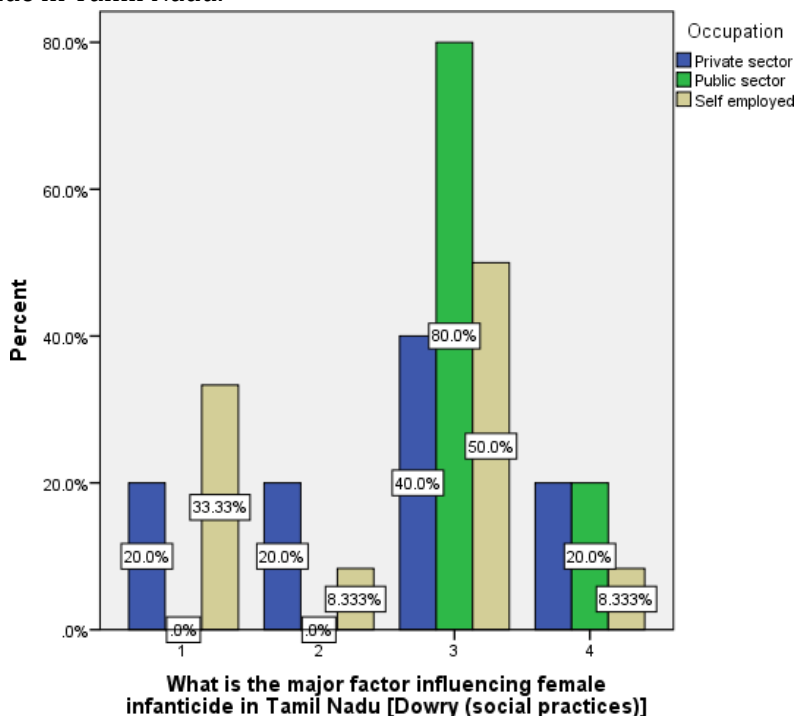
Legend 2

Figure 2 shows gender and the major factor influencing female infanticide in Tamil Nadu.



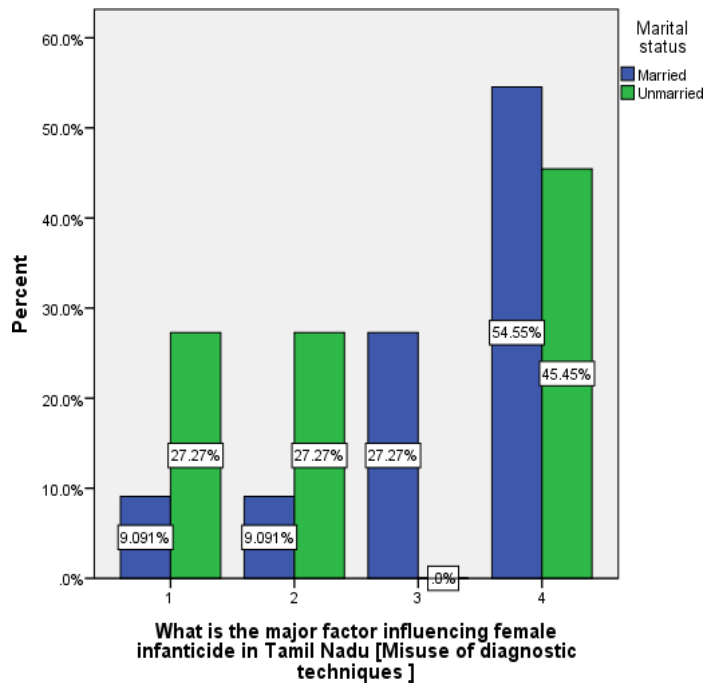
Legend 3

Figure 3 shows education and male child preference being the major factor influencing female infanticide in Tamil Nadu.



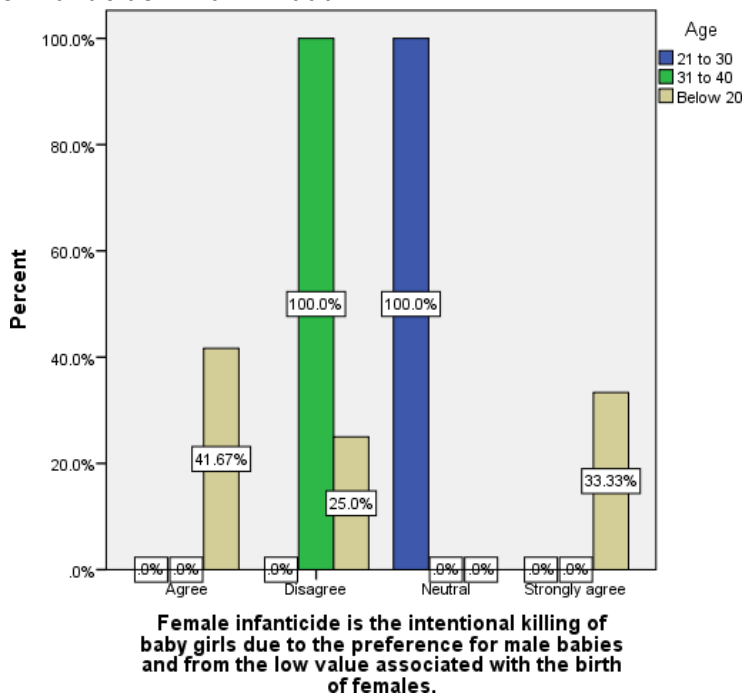
Legend 4

Figure 4 shows occupation and dowry being the major factor influencing female infanticide in Tamil Nadu.



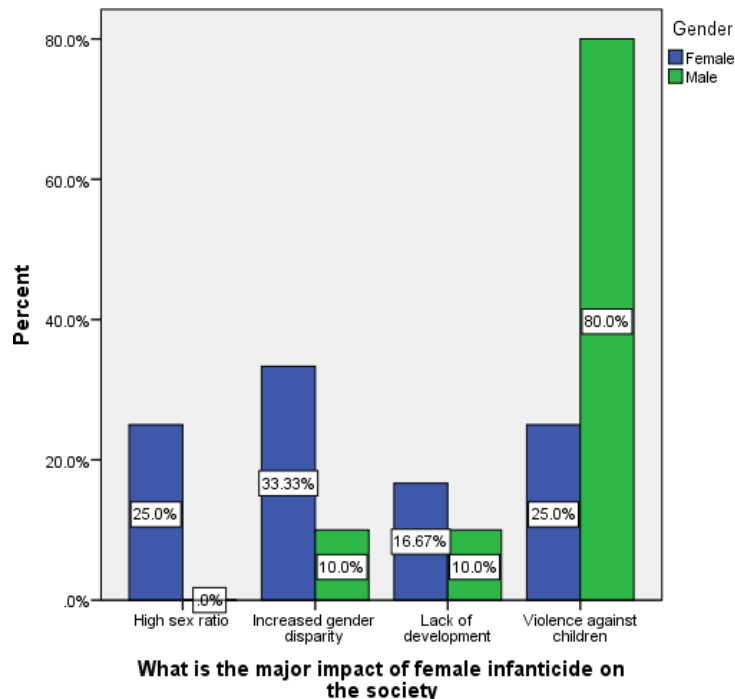
Legend 5

Figure 5 shows marital status and misuse of diagnostic techniques to be the major factor influencing female infanticide in Tamil Nadu.



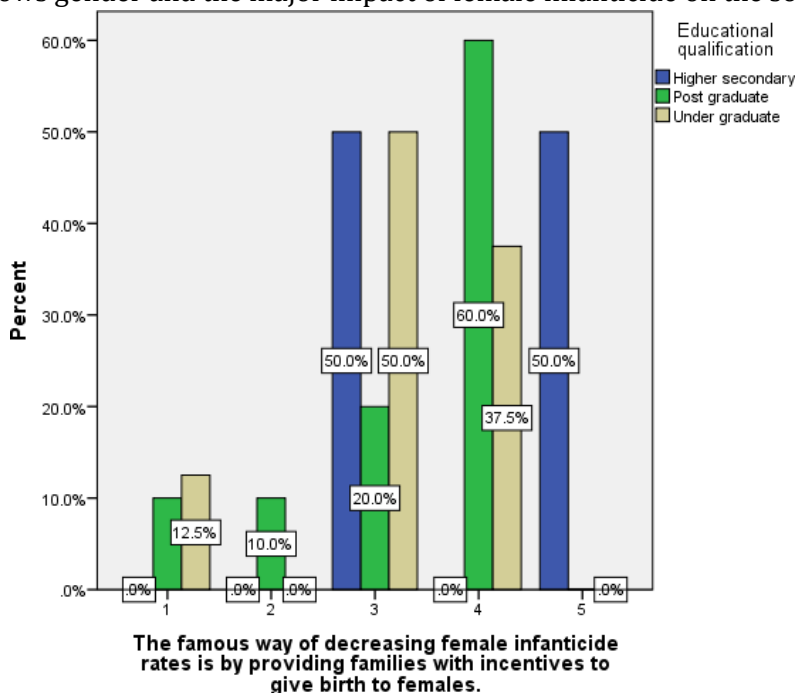
Legend 6

Figure 6 shows age and respondent's agreeability on female infanticide being the intentional killing of baby girls.



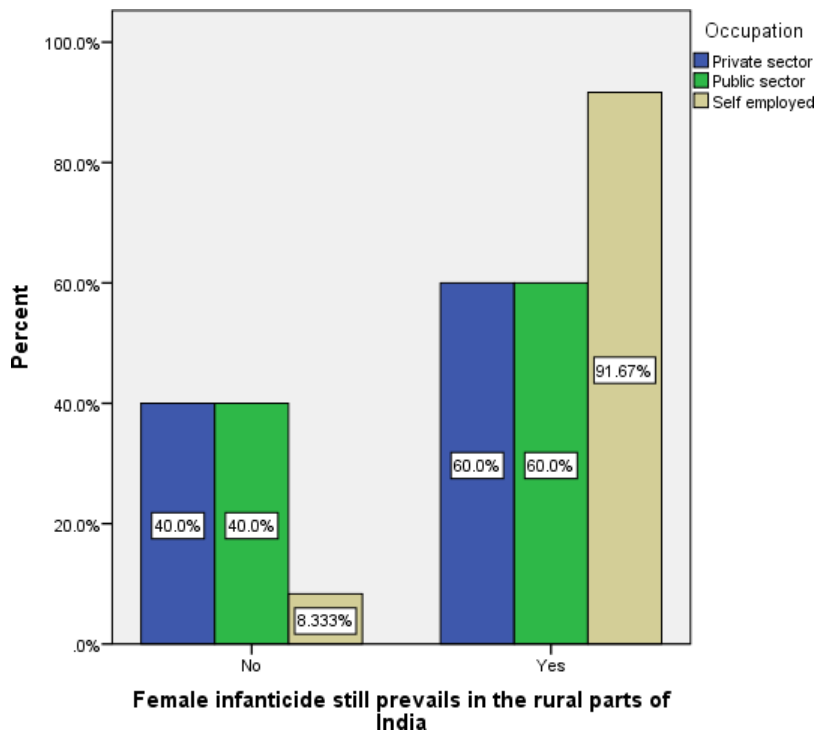
Legend 7

Figure 7 shows gender and the major impact of female infanticide on the society.



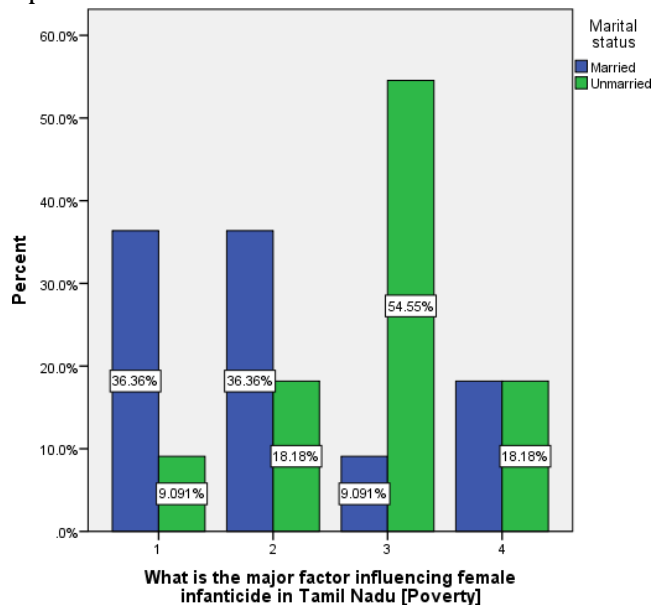
Legend 8

Figure 8 shows qualification and respondent's opinion on incentives being a famous way to decrease female infanticide rates.



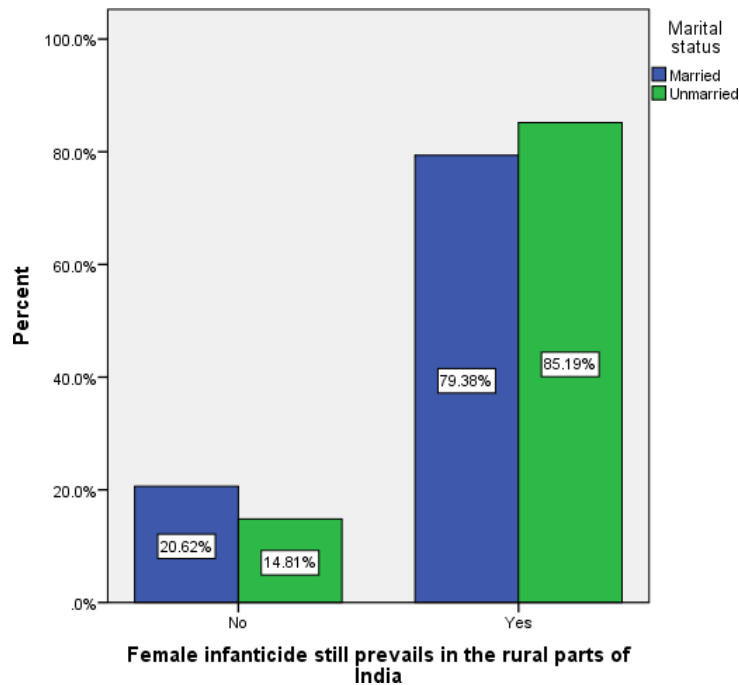
Legend 9

Figure 9 shows occupation and respondent's awareness of the presence of female infanticide in the rural parts of India.



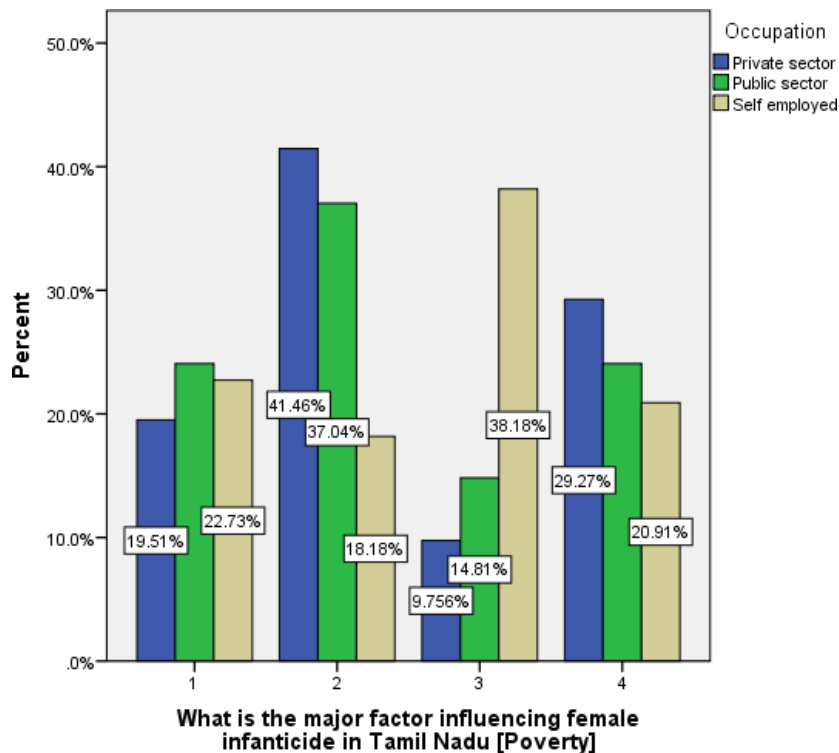
Legend 10

Figure 10 shows marital status and poverty being the major factor influencing female infanticide in india.



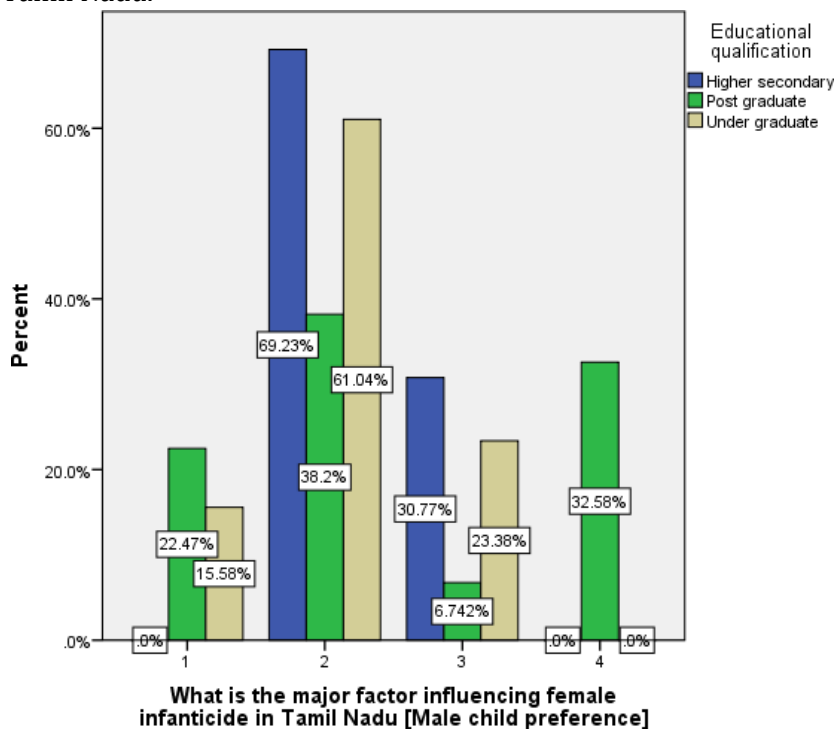
Legend 11

Figure 11 shows marital status ans the prevalence of female infanticide in the rural parts of India.



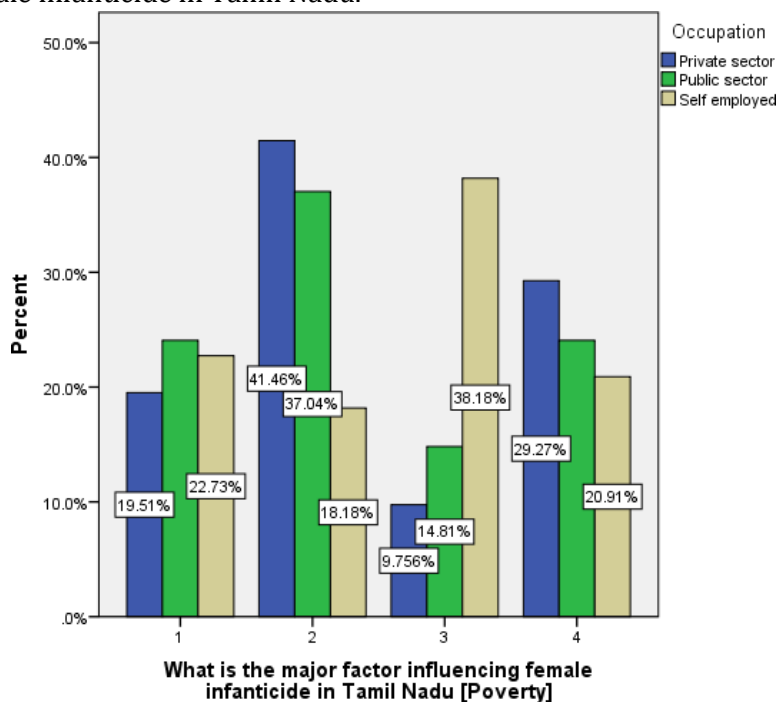
Legend 12

Figure 12 shows occupation and poverty being the major factor influencing female infanticide in Tamil Nadu.



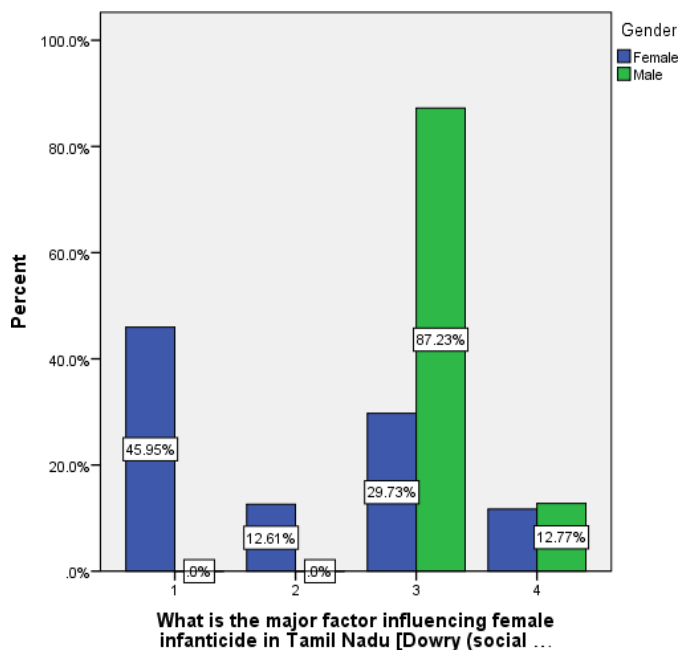
Legend 13

Figure 13 shows educational qualification and male child preference being the major factors influencing female infanticide in Tamil Nadu.



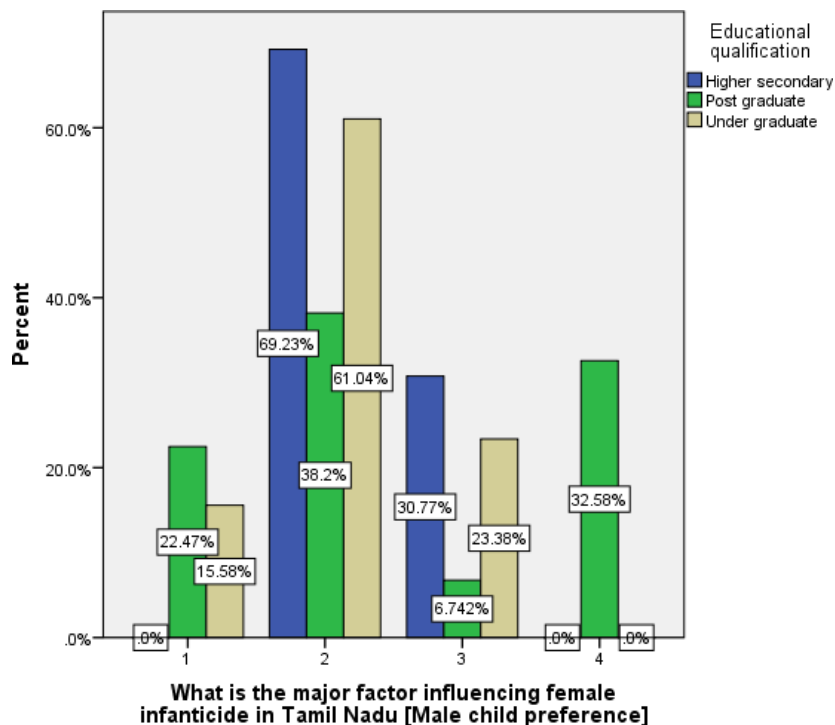
Legend 14

Figure 14 shows occupation and poverty being the major factor influencing female infanticide in Tamil Nadu.



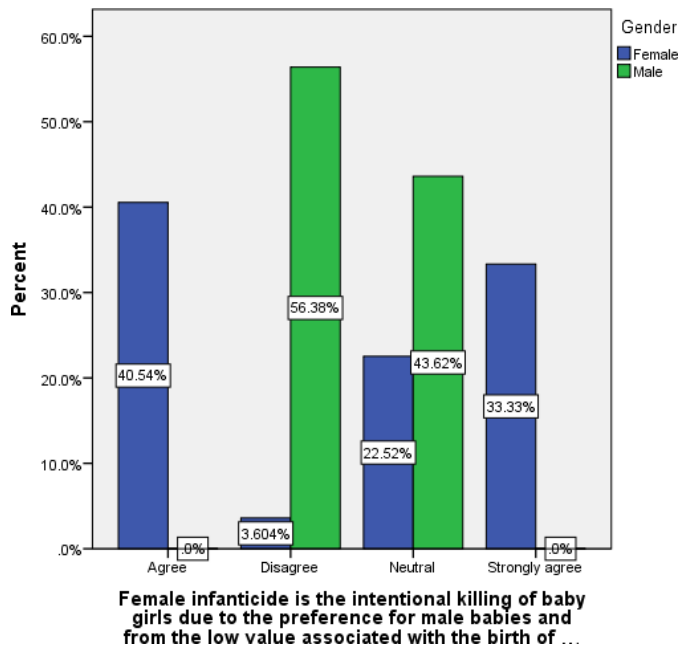
Legend 15

Figure 15 shows gender and dowry being the major factor influencing female infanticide in Tamil Nadu.



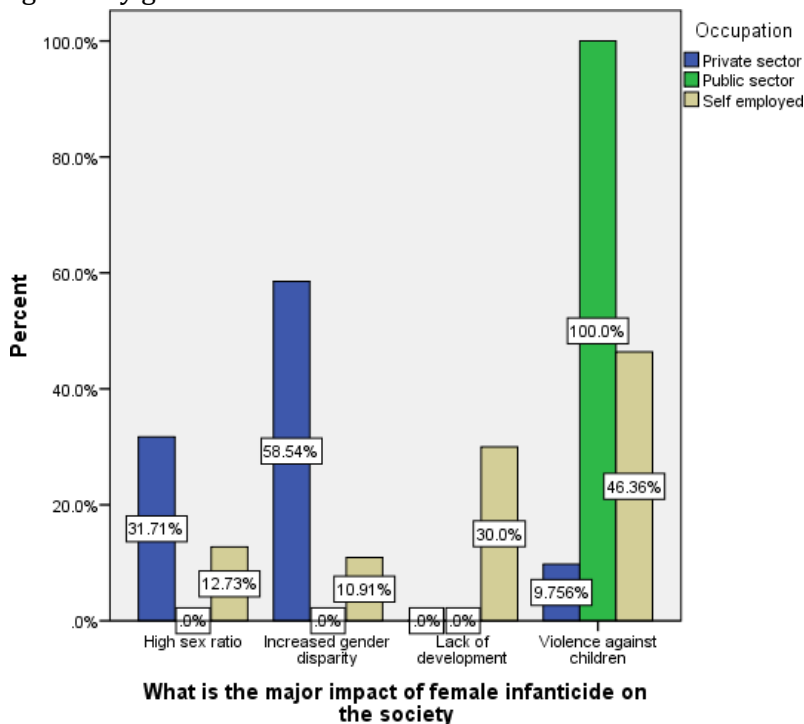
Legend 16

Figure 16 shows educational qualification and male child preference being the major factors influencing female infanticide in Tamil Nadu.



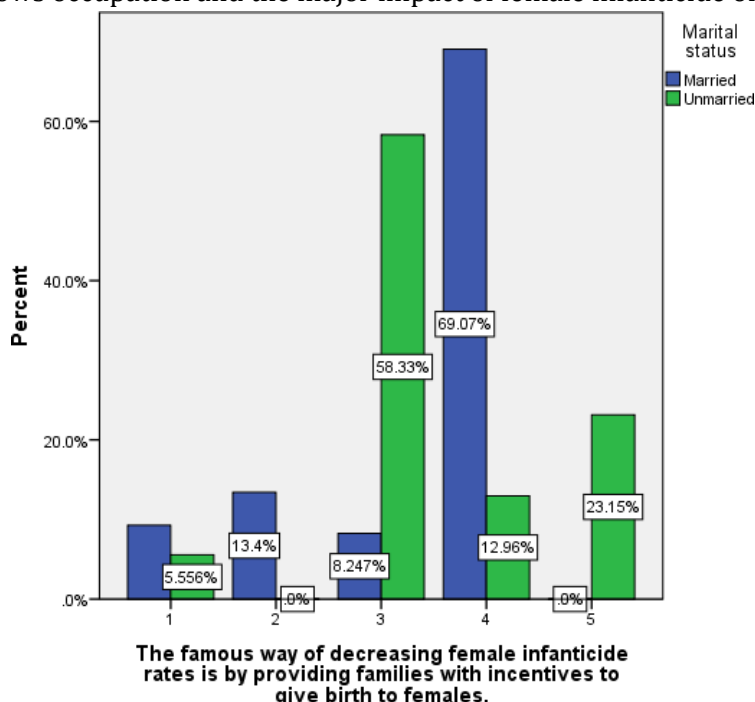
Legend 17

Figure 17 shows gender and the respondents agreeability on female infanticide being the intentional killing of baby girls.



Legend 18

Figure 18 shows occupation and the major impact of female infanticide on the society



Legend 19

Figure 19 shows marital status and respondent's opinion on incentives being a famous way to decrease female infanticide rates.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Educational qualification * Female infanticide still prevails in the rural parts of India	205	100.0%	0	0.0%	205	100.0%

Educational qualification * Female infanticide still prevails in the rural parts of India Crosstabulation

Count

Chi-Square Tests				Female infanticide still prevails parts of India	
	Value	df	Asymptotic Significance (2-sided)	Yes	Total
Pearson Chi-Square	13.954 ^a	2	.001	39	39
Likelihood Ratio	20.117	2	.000	65	89
N of Valid Cases	205			65	77
				169	205

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.85.

Null Hypothesis

There is no association between educational qualification and the perception of the prevalence of female infanticide in India.

Alternate Hypothesis

There is an association between educational qualification and the perception of the prevalence of female infanticide in India.

Table Result

The P value is 0.001 nrejectiondull hypothesis is

Results

In figure 1, 66% of the 31 to 40 age group respondents are not aware of the prevalence of female infanticide in the rural parts of India. **In figure 2**, 30% of the males have ranked 1 for poverty being the major factor influencing female infanticide in Tamil Nadu. **In figure 3**, 75% of the higher secondary respondents have ranked 2 for male child preference being the major factor influencing female infanticide in Tamil Nadu. **In figure 4**, 80% of the public sector employees have ranked 3 for dowry being the major factor influencing female infanticide in Tamil Nadu. **In figure 5**, 54% of the married respondents have ranked 4 for misuse of diagnostic techniques to be the major factor influencing female infanticide in Tamil Nadu. **In figure 6**, 41% of below 20 age group respondents have agreed that female infanticide is the intentional killing of baby girls due to the preference for male babies. **In figure 7**, 33% of the females responded that increased gender disparity is the major impact of female infanticide on the society. **In figure 8**, 50% of the higher secondary students have ranked 3 for incentives being the famous way to decrease female infanticide. **In figure 9**, 91% of the self employed respondents are aware of the prevalence of female infanticide in the rural parts of India. **In figure 10**, 36% of the married respondents have ranked 2 for poverty being the major factor influencing female infanticide in Tamil Nadu. **In figure 11**, 85% of the unmarried respondents are aware of the prevalence of female infanticide in Tamil Nadu. **In figure 12**, 41% of the private sector employees have ranked 2 for poverty being the major factor influencing female infanticide in Tamil Nadu. **In figure 13**, 69% of the higher secondary respondents have ranked 2 for male child preference being the major factor influencing female infanticide in Tamil Nadu. **In figure 14**, 38% of the self employed respondents have ranked 3 for poverty being the major factor influencing female infanticide in Tamil Nadu. **In figure 15**, 87% of the males have ranked 3 for dowry being the major factor influencing female infanticide in Tamil Nadu. **In figure 16**, 69% of the higher secondary respondents have ranked 3 for male child preference being th major factor influencing female infanticide in Tamil Nadu. **In figure 17**, 56% of the males disagree that female infanticide is the intentional killing of baby girls due to the preference of male babies. **In figure 18**, 58% of the private sector employees have responded that the major impact of female infanticide on the society is increased gender disparity. **In figure 19**, 58% of the unmarried respondents have rated 3 for the famous way of decreasing female infanticide rates is by providing families with

incentives to give birth to females. In **table 1**, since the P value is less than 0.001, the null hypothesis is rejected and the alternate hypothesis is accepted.

Discussion

Figure 1: The data indicates a significant gap in awareness, with 66% of respondents aged 31–40 unaware of female infanticide in India, while 75% of respondents below 20 are aware, highlighting the need for targeted education campaigns across age groups. **Figure 2:** Males prioritize poverty as the primary factor influencing female infanticide (30% rank it 1), while females show less agreement, with 25% ranking it 4, suggesting differing perspectives on the root causes of infanticide by gender. **Figure 3:** Higher secondary students recognize male child preference as a major factor, with 75% ranking it 2, showing awareness of gender bias in society, but also some variation in rankings, indicating differing levels of importance attached to this factor. **Figure 4:** A stark contrast emerges between self-employed and public sector respondents, with 33% of the self-employed ranking dowry as the primary factor, while 80% of public sector respondents rank it 2, reflecting socio-economic and employment-related influences. **Figure 5:** Unmarried respondents view misuse of diagnostic techniques as more influential (27% rank it 1) compared to married respondents, with 54% ranking it 4, possibly reflecting different societal pressures or awareness levels based on marital status. **Figure 6:** Among respondents below 20, 41% agree that female infanticide stems from male child preference, while 25% disagree, showcasing a generational divide in understanding or acceptance of this cultural practice. **Figure 7:** The data highlights gender differences in the perceived impact of female infanticide. While 80% of males associate it with violence against children, 25% of females point to the high sex ratio as the primary societal impact. **Figure 8:** The effectiveness of incentives as a strategy to reduce female infanticide is viewed differently by educational level, with only 12% of undergraduates rating it highly, while 50% of higher secondary students are more supportive, showing a divide in policy perceptions. **Figure 9:** Private sector employees show less awareness (40%) compared to the self-employed (91%), revealing a potential gap in knowledge or outreach efforts between different employment sectors, especially regarding rural female infanticide. **Figure 10:** Poverty is seen differently across marital status, with 36% of married respondents ranking it as the top factor, while 54% of unmarried respondents rank it third, suggesting varying experiences or awareness based on marital roles. **Figure 11:** Unmarried respondents are more aware of the prevalence of female infanticide in Tamil Nadu (85%) than married respondents, 20% of whom disagree, indicating a possible disconnect in awareness between these groups. **Figure 12:** Poverty's influence on female infanticide is ranked higher by private sector employees (41%) compared to self-employed respondents, showing a difference in socio-economic outlooks when considering the causes of female infanticide. **Figure 13:** Male child preference is a major factor influencing female infanticide, with 69% of higher secondary respondents and 61% of undergraduates recognizing its impact, indicating a broad acknowledgment of gender bias across educational levels. **Figure 14:** Differences between employment groups are evident, with 38% of self-employed respondents ranking poverty third and 41% of private sector employees ranking it fourth, showing variations in perceptions of socio-economic factors. **Figure 15:** Dowry's influence is ranked differently by gender, with 87% of males ranking it third and 45% of females ranking it first, reflecting how deeply ingrained gendered practices like dowry are perceived differently by men and women. **Figure 16:** Both higher secondary students (69%) and undergraduates (61%) rank male child preference highly, indicating a consensus across educational levels that gender bias remains a significant factor influencing female infanticide.

Figure 17: There is a notable gender divide in the understanding of female infanticide, with 56% of males disagreeing that it is rooted in male child preference, while 40% of females agree, reflecting differing perspectives on gender bias. **Figure 18:** Private sector employees and self-employed respondents see different societal impacts, with 58% of the former citing gender disparity and 46% of the latter focusing on violence against children, suggesting occupational influences on social perspectives. **Figure 19:** Incentives to reduce female infanticide are perceived differently by marital status, with 58% of unmarried respondents rating them third, while 69% of married respondents rank them fourth, suggesting varying beliefs on effective interventions. **Table 1:** The rejection of the null hypothesis indicates a significant relationship between educational qualifications and awareness of female infanticide, emphasizing that education level plays a key role in shaping understanding of this societal issue.

Suggestion

Female infanticide is a social and ancient menace which prevails in Tamil Nadu. Both girl and boy children must be respected and valued equally in the society as females are no lesser than males. The society must be educated on female infanticide and ways to overcome this social menace.

Limitation

The main limitation of this paper is the given time period of the sample frame. The general public are aware of the definition of female infanticide, but they are not aware of the prevalence of female infanticide. Since many respondents considered this social menace as an eradicated crime, the responses were not very helpful for this study.

Conclusion

Female infanticide, the intentional killing of female infants, is a grave violation of human rights and a deeply rooted societal issue. This study **aimed** to critically examine the prevalence of female infanticide in Tamil Nadu, analyze its impacts, and assess preventive methods against this social menace. Rooted in deeply entrenched patriarchal norms and socio-economic disparities, female infanticide has severe consequences for individuals, families, and society as a whole. This study aimed to critically examine the prevalence of female infanticide in Tamil Nadu, analyze its impacts, and assess preventive methods against this social menace. Female infanticide, the intentional killing of female infants, is a grave violation of human rights and a deeply rooted societal issue. This research delved into the historical, cultural, and socio-economic factors contributing to the persistence of this heinous practice in the state. **Findings** revealed a complex interplay of factors driving female infanticide. Deep-rooted patriarchal norms, son preference for inheritance and social status, economic pressures, and the availability of prenatal sex determination technologies were identified as major contributors. The study highlighted the devastating **impacts** of female infanticide, including skewed sex ratios, increased vulnerability of women, and social and economic imbalances. While **government initiatives** and NGO efforts have been implemented, such as the Cradle Baby Scheme and awareness campaigns, their impact has been limited. This research underscores the urgent need for multifaceted interventions. Strengthening existing legislation against sex-selective abortions, promoting gender equality through education and awareness programs, and

addressing economic disparities are crucial steps. Furthermore, community-based interventions involving local leaders, religious institutions, and women's groups are essential to challenge harmful cultural norms and promote the value of girls. **Future research** should focus on evaluating the effectiveness of existing interventions, exploring innovative approaches to address the issue, and monitoring the long-term impact of female infanticide on the social and economic fabric of the state. In conclusion, female infanticide remains a serious challenge in Tamil Nadu, demanding a multi-pronged approach involving government, civil society, and the community. By addressing the root causes, empowering women, and fostering a more equitable society, we can strive towards a future where every child, regardless of gender, is valued and protected.

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CLIMATE MIGRANT'S LIFE IS UNDER THREAT: ANALYSING VARIOUS EFFORTS MADE WORLD-WIDE IN COMBATING CLIMATE CHANGE AS PART OF SDG GOAL NO.13

Dr. Sincy Wilson

Assistant Professor, VELS University
Chennai, India
sincyw@gmail.com

N. Amuthalakshmi

Assistant Professor
VELS University, Chennai
lakshmia346@gmail.com

Abstract

Climate migration is a growing concern worldwide, with millions of people displaced due to climate-related disasters and slow-onset events. Analysing global efforts to combat climate change, particularly in relation to SDG Goal 13 (Climate Action), reveals both progress and challenges. Climate change is arguably the biggest problem of the twenty-first century. As temperatures and sea levels rise, governments around the world will experience huge and unprecedented human displacement for which international law currently lacks a mechanism. Despite the fact that there are no climate refugees recognised by the international community, research is being done to alter the status that has been given to them. Two reasons for non-recognition are the lack of a specific definition of climate refugees and efforts by international organisations to address and clarify the issue. The 1951 Convention Relating to the Status of Refugees, which provides protection to persons who have a well-founded fear of being persecuted on account of their race, religion, or other affiliations, does not apply to or address climate change refugees. Because there is little government information on them, climate refugees are frequently referred to as the "forgotten victims of climate change." In this article, the researcher makes an effort to analyse global efforts to address the vulnerability of climate migrants. Due to climate-related factors, many actions have been taken to ensure that they have certain rights during their migration processes, including a review of common international agreements and region-specific conventions. This paper makes an effort to take into account the subtleties of identifying this specific group of people, explaining the legal protections that are now in place for them, as well as what is truly required for them in order to enjoy the fundamental human rights.

Keywords: 1.Climate refugees, 2.Climatological factors, 3.International Conventions, 4. Climate change, 5.Human rights.

Introduction

There is a clear correlation between sustainable development and climate change. The least developed and impoverished nations will be the most severely impacted, and they will be the least equipped to handle the expected shocks to their social, economic, and environmental systems. Many people anticipate that a rising climate would affect their access to energy, freshwater, and food security. Efforts to combat climate change, both via mitigation and adaptation, will also have an impact on and influence the global development agenda. Member states pledge to stop environmental deterioration and act quickly to combat climate change in the 2030 Agenda for Sustainable Development. In addition, the Agenda notes in paragraph 14

that "its adverse impacts undermine the ability of all countries to achieve sustainable development" and calls climate change "one of the greatest challenges of our time." Sea level rise, ocean acidification, temperature increases worldwide, and other effects of climate change are having a major negative impact on low-lying coastal nations, particularly several Small Island Developing States and Least Developed Countries. Numerous societies' survival as well as the planet's biological support systems are under jeopardy.

While recognising that the United Nations Framework Convention on Climate Change is the main international, intergovernmental body for negotiating the global response to climate change, Sustainable Development Goal 13 states that "urgent action to combat climate change and its impact" is the goal. SDG 13's related aims, in particular, are concentrated on improving education, developing public awareness, and institutional capacity for mitigating, adapting to, reducing the effect of, and early warnings from climate change.

The text conveys the Member States' concerns on the steady increase in greenhouse gas emissions and the susceptibility of all nations, especially developing ones, to the detrimental effects of climate change. Given these concerns, Member States have asked for the greatest collaboration and participation of all countries in an effective and acceptable international response to climate change.

The alphabetical targets of SDG 13 also demand that the UNFCCC fulfil its commitments and that procedures be promoted that can boost the ability of least developed nations and Small Island Developing States to effectively plan and manage their climate change-related affairs. Climate change is emphasised as "an inevitable and urgent global challenge with long-term implications for the sustainable development of all countries" in the Rio+20 Conference conclusion paper, *The Future We Want*.¹

Climate Change and Climate Refugees

Everyone has the right to life, liberty, and personal security, according to Article 3 of the Universal Declaration of Human Rights (UDHR)². The most difficult issue facing nations today is how to protect basic human rights when they are violated due to the effects of climate change and natural disasters. Because climate change-related migration and displacement-related human rights violations have not yet been acknowledged internationally through a convention and more over there is no agreement among the member countries on how to address these violations.

This study focuses on a group of individuals commonly referred to as "*forgotten victims of climate change*."³ Millions of people are internally and externally displaced by every single natural calamity. A further oddity in this process is that natural disasters and climatic change do not discriminate against people and property based on race, colour, or gender, as well as nationality, religion, developed nations or underdeveloped nations.

Climate change, Sustainable Development Goals, <https://sustainabledevelopment.un.org/topics/climatechange>

² Universal Declaration of Human Rights (UDHR).art., adopted in Dec.10, 1948.

³ The term "forgotten victims of climate change" refers to those individuals, communities, and groups who are disproportionately affected by the impacts of climate change but often receive inadequate attention or support in climate adaptation and mitigation efforts," World Economic Forum, *Climate refugees - the world's forgotten victims*, (2021), <https://www.weforum.org/agenda/2021/06/climate-refugees-the-world-s-forgotten-victims/>.

The term "climate refugees" will be used in this study to refer to people moving to other countries to escape the consequences of climate change, such as floods, landslides, droughts, storms, tsunamis, sea level rise, and other disasters. Before moving on to the main topic of discussion, the researcher would like to make it clear that this term is not intended to be a pejorative. Using the term "refugee" along with climate change, an argument is going on because climate change is not an accepted reason for migration to other nations according to the "refugees" definition under Refugee Convention, 1951.⁴

This is true even though the fact that the climate refugees are not recognised internationally or regionally is very clear from many research studies already being conducted.⁵ For the purpose of an easier understanding of the overall concept presented in this research study, those who migrate to other countries as an impact of climate change might be referred to as climate refugees. The term "climate refugee" does not mean that the international convention on refugees is in violation. The group Climate Refugees fights for the rights of those who have been uprooted and made to traverse borders due to climate change. The component of global climate change that contributes to population migration to other nations is the study's main focus. Apart from the essential human rights violations committed during the course of migration for a safer life in the event of climate disasters and when the nation they live in is unable to support them because of the greatest destruction caused by the natural calamity and they are left with no choice as to where to go, this study does not aim to have a comprehensive analysis of migration-related issues in socio economic perspective instead trying to address in humanitarian rights based approach.

The majority of the time, when natural disasters hit, the nation may respond with its own laws and programmes of rehabilitation. When a country cannot handle a situation that is beyond its control, the problems of leaving their comfort zone and seeking assistance from other states usually begin. However, the question of whether all of these people can find housing in neighbouring states often remains unanswered, and when that is the case, people start migrating from that country to neighbouring countries. This process is known as migration because of climate change.

The severity of climate change at the moment is such that no country can control or foresee how severely it will affect each nation, regardless of whether they are low-lying Island nations or wealthy or poor countries. People in these countries do not receive protection from their own governments for a variety of reasons, mostly financial ones and a lack of help from the international community, despite the fact that poor and low-lying Island nations are very badly impacted by natural disasters. Whether or not they are identified as climate refugees, they should have access to a safe place to live and a means of subsistence as a fundamental human right. It is important to recognise that changes in climate poses a major danger to everyone's

⁴ The Convention relating to the Status of Refugees, art.31, adopted July.28, 1951. "The 1951 Refugee Convention, also known as the Geneva Convention of July 28, 1951, or the Convention Relating to the Status of Refugees, is a multilateral United Nations treaty that establishes the definition of a refugee, as well as the rights of people who are granted asylum and the obligations of states that do so. The Convention specifies who is ineligible for refugee status, including war criminals. The 1948 Universal Declaration of Human Rights, which acknowledges the right of individuals to seek shelter from persecution abroad, is the foundation for the Refugee Convention. A refugee may be granted additional rights and advantages in a state than those outlined in the Convention."

⁵ The Convention relating to the Status of Refugees, adopted in July. 28,1951.

life and safety. Children, adults, women, the elderly, and people with disabilities are all negatively stuck in diverse methods by climate change.

As a result of the well-known fact that the effects of climate change are having an important effect on all facets of life on Earth, including people, plants, and animals, especially our health is at risk. Additionally, these effects have an impact on the food, weather, air and on the water, furthermore, it can result in increased environmental migration.⁶ However, it has had a greater impact on emerging countries and has disproportionately affected the poorer countries.⁷ There is general consensus, nevertheless, that within the next 50 years, climate change will exceed other environmental disturbances as the main force behind population migration and may even already be creating climate refugees. The premise of this study is that if a theory of international justice is unable to sufficiently address the issue of climate change, it would be difficult to adequately solve the problem of climate refugees. Since no legal framework exists for assisting climate refugees the researcher attempts to evaluate the studies that have already been conducted on the subject. Researcher suggests what was lacking and what needs to be done right away for them in order to have an immediate impact.

Statistics on climate change and migration

There are numerous reports on the forecasting of climate changes and their effects, most of which have been confirmed thus far without any specific action being done. The researcher listed out a few chosen examples of these reports. The coastlines would be most impacted by climate change, according to the Intergovernmental Panel on Climate Change (1990)⁸ because of sea level rise and saltwater intrusion into water bodies, and lower agricultural output in these areas. Depending on migration assumptions, the IPCC projects that; the coastal population could grow from 1.2 billion people in 1990 to 1.8 to 5.2 billion people by 2080."In 1995, there were at least 25 million refugees due to environmental factors globally the report says.

- a. According to the Inter-governmental Panel on Climate Change's (IPCC) Fifth Assessment⁹, which was published in 2014, climate change will probably alter local climate styles and increase the occurrence and harshness of extreme weather events, with flash floods, heat waves, hurricanes, extreme cold spells, and drought being among the most dangerous of these.¹⁰
- b. The Intergovernmental Panel on Climate Change (IPCC) Synthesis reports,¹¹ which describe the implications of climate change and the necessity for policy responses, constitute the foundation for UNFCCC decisions. The IPCC (2014) states in its Fifth Assessment Report

⁶ *Climate Change as a Security Risk*, German Advisory Council on Global Change (2007), https://www.wbgu.de/fileadmin/user_upload/wbgu/publikationen/hauptgutachten/hg2007/pdf/wbgu_hg2007_engl.pdf.

⁷ *Climate Change and the Poor*, Economic & Political Weekly EPW (2019), Vol.5, Editorials, <https://www.epw.in/editorials>.

⁸ Intergovernmental Panel on Climate Change (1990), <https://www.ipcc.ch/about/history/>

⁹ Inter-governmental Panel on Climate Change's (IPCC) Fifth Assessment Report (2014) <https://www.ipcc.ch/assessment-report/ar5/>.

¹⁰ Catherine Devitt, *Climate Change and Population Displacement*, Working Notes (2016), https://www.researchgate.net/publication/301700029_Climate_change_and_Population_Displacement/citation/download.

¹¹ Intergovernmental Panel On Climate Change, *Climate Change, Synthesis Report* (2014), <https://www.ipcc.ch/Report/Ar5/Syr/>.

(AR5) that "Climate change over the 21st century is projected to increase displacement of people. "Extreme weather happenings propose the most direct link between climate change and migration, according to the IPCC's analysis of the evidence, but over the long term, "sea level rise, coastal erosion, and loss of agricultural productivity will have a significant impact on migration flows." The AR5¹² also emphasises the requirement for more thorough data to develop and test models about how climate change affects culture, migration, livelihoods, and conflict. This data must be gathered across numerous sites and over extended periods of time.

- c. According to a United Nations Environmental Programme (UNEP) seminar held in 1989 at the American Institute of Biological Sciences, as many as 50 million people could become environmental refugees.¹³
- d. In 1999,¹⁴the head of the World Water Council asserted that "more people flee due to environmental problems than due to war," and he estimated that there were 25 million environmental refugees worldwide.
- e. The United Nations University (UNU)¹⁵ issued a warning in October 2005 stating that up to 50 million environmental refugees may be present in the world by the year 2010.
- f. Oxford ecologist Norman Myers¹⁶estimated that 25 million people were "environmental refugees" in 1995. The repercussions of global warming may drive 200 million people to abandon their homes, according to Norman Myers also in 2001, environmental or climatic factors accounted for more displaced individuals than armed fight.
- g. In a May 2005 Professor Norman Myers¹⁷ in one of his article stated: "There is a new phenomenon in the global arena: environmental refugees. "In recent years, the news and scholarly studies have been replete with warnings of an impending "environmental refugee crisis," with rising worldwide environmental deterioration pushing people to cross borders.
- h. According to the UN High Commissioner for Refugees, Roughly 20 million of the 36 million individuals who were uprooted by natural disasters in 2009 had to migrate because of issues related to climate change¹⁸. Since 2008, the UNHCR has stated that "on average, 21.5 million people are forcibly displaced by weather-related hazards" each year. By 2050, according to some estimates, there could be 150 million people on earth. By 2060, the UN Environment Programme predicts that 50 million environmental refugees would be living in Africa.
- i. The Red Cross and Red Crescent Societies' in the year 2001 in its World Disasters Report¹⁹ confirmed 25 million "environmental refugees" as estimated. Furthermore, in October 2005, the United Nations University's Institute for Environment and Human Security issued a

¹² Fifth Assessment Report (AR5), Intergovernmental Panel On Climate Change, Climate Change, Synthesis Report (2014), <https://www.ipcc.ch/Report/Ar5/Syr/>.

¹³ United Nations Environmental Programme (UNEP), <https://www.un.org/en/conferences/environment>

¹⁴ World Water Council, <https://www.worldwatercouncil.org/en/BE5>

¹⁵ Annual report, United Nations University (UNU)(2005), <https://archive.unu.edu/publications/annualreports/files/ar2005-report.pdf>

¹⁶ Norman Myers (24 August 1934-20 October 2019) was a British environmentalist specialising in biodiversity and also noted for his work on environmental refugees."

¹⁷ *Id.*

¹⁸ UN High Commissioner for Refugees, <https://www.unhcr.org/in/>.

¹⁹ World Disaster Report (2001), <http://www.oceansatlas.org/item-details/en/c/323429/>.

- warning stating that society must be ready to accommodate 50 million environmental refugees by that year. 150 million refugees by 2050 will be a result of climate change, according to the Intergovernmental Panel on Climate Change (IPCC),²⁰ which made this claim in 2014. The number of these "climate refugees" is "more than three times as many" as the number of people fleeing persecution and conflict.
- j. Since 2008, global floods, windstorms, earthquakes, or droughts have caused 26.4 million people to relocate on average, according to data from the Internal Displacement Monitoring Centre.²¹ Disasters caused 203.4 million people to leave their homes between 2008 and 2015, and since the 1970s, the likelihood that this may happen again in its severity. The Internal Displacement Monitoring Centre reports that in 2011,²² 14.9 million people were displaced by sudden-onset natural catastrophes.
 - k. The 2015 Paris Climate Accord²³ brought attention to the issue of climate refugees and established nation-specific pledges to reduce emissions and slow additional hotness rise, which indirectly could address the issues of climate refugees by decreasing the dislocations as a result of more stable weather patterns. Forced migration was taken into consideration but not specifically addressed in the climate change agreement in Paris during the Twenty-first Conference of the Parties in December 2015.
 - l. The 2018 Global Report on Internal Displacement²⁴ states that in 2017, "30.6 million new internal displacements related with conflicts and disasters were registered across 143 countries and territories" This corresponds to a daily relocation of 80,000 individuals. According to the report, floods and storms, primarily tropical cyclones, were the primary causes of 8.6 million and 7.5 million displacements, respectively. Coastal flooding in Dhaka, Hurricane Maria in Puerto Rico, or the drying up of Lake Chad in West Africa are a few examples of climate refugees. Climate change is predicted to raise the number of persons applying for asylum in the European Union²⁵ by 28% by the year 2100. Both on a regional and global level, the situation are the same.
 - m. Without crucial global and national climate action, Sub-Saharan Africa, South Asia, and Latin America may see more than 140 million people move within their borders by 2050, according to the World Bank²⁶ research "Groundswell - Preparing for Internal Climate Migration". Another issue is determining the difference between migration caused by climate change that is choice and coerced. This can be difficult to demonstrate, particularly in cases of slow-onset disasters like droughts and agricultural deterioration. Millions of

²⁰ Intergovernmental Panel on Climate Change (IPCC), The Intergovernmental Panel on Climate Change is an intergovernmental body of the United Nations. Its job is to advance scientific knowledge about climate change caused by human activities, <https://www.ipcc.ch/>.

²¹ Disaster Displacement a Global Review (2008), <https://www.internal-displacement.org/publications/disaster-displacement-a-global-review>.

²² Activity Report (2011) <https://www.internal-displacement.org/sites/default/files/publications/documents/2011-activity-report-corporate-2011-en.pdf>.

²³ The Paris Agreement, adopted Dec.12, 2015.

²⁴ Global Report On Internal Displacement (GRID) (2018) *Norwegian Refugee Council's Internal Displacement Monitoring Centre (IDMC)*.

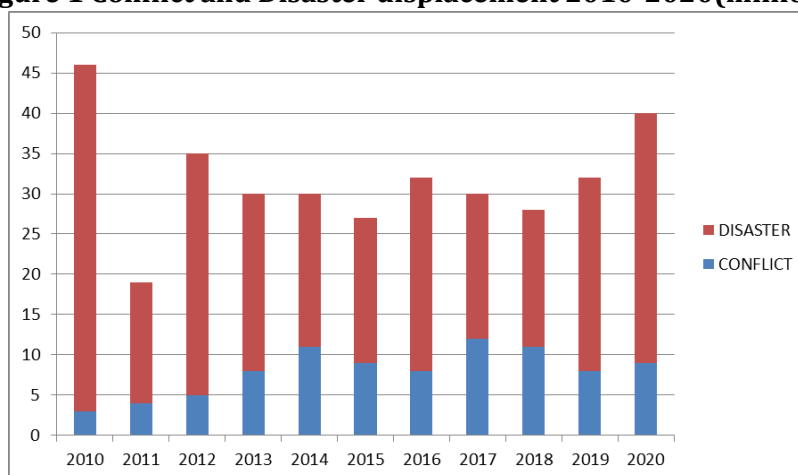
²⁵ *Climate Change and the Poor*, Economic & Political Weekly EPW (2019), <https://www.epw.in/editorials>.

²⁶ World Bank's Report, Groundswell Preparing For Internal Climate Migration (2021), <https://www.worldbank.org/en/news/infographic/2018/03/19/groundswell---preparing-for-internal-climate-migration>.

people were displaced last summer due to multiple floods and landslides brought on by a powerful monsoon season that hit Nepal, Bangladesh, and India. At the same period, several powerful storms pounded the Caribbean Islands and the United States. Following hurricane Maria, thousands of Puerto Ricans immigrated to the American mainland.

- n. Following in-depth research on the subject, data on the number of people displaced due to natural disasters between 2010 and 2020 was released in the World Migration Report 2022²⁷.
- o. Finally according to World Migration Report 2024 more human beings are being displaced by force than at any other time in human kind's history²⁸.

Figure 1 Conflict and Disaster displacement 2010-2020(millions)



Source: World Migration Report, 2022.²⁹

Global hotspots of high human vulnerability due to climatic change are found particularly in West, Central and East Africa, South Asia, Central and South America, Small Island developing states and the Arctic.

Nations Witnesses Impacts of Climate Change

Of the approximate number of 900,000 Islands globally, around 16,000 are inhabited. Approximately 11% of the world's total population, over 730 million people, lives on these Islands. Some of these Islands are modern and densely populated, while others are very isolated and have very few residents³⁰. Examples of countries that are dealing with the effects of climate change include those that have climate change victims who are utterly without legal support and are unsure of what to do.

²⁷ World Migration Report (2022), <https://publications.iom.int/books/world-migration-report-2022> "Since 2000, International Organisation for Migration Has Been Producing World Migration Reports. The World Migration Report 2022, The Eleventh in the World Migration Report Series has been produced to Contribute to Increased Understanding of Migration throughout the World."

²⁸ World Migration Report (2024), <https://worldmigrationreport.iom.int/>.

²⁹ World Migration Report (2022), <https://publications.iom.int/books/world-migration-report-2022>.

³⁰ How Many Islands are there in the World, <https://a-z-animals.com/blog/how-many-islands-are-in-the-world/>.

Bangladesh: A Drowning Country

Bangladesh, a nation in south central Asia with 165 million people, is one of the nation's most susceptible to climate change³¹. More than 60% of Bangladesh is located at or below 5 metres above sea level,³² which has a variety of climate-related effects. Tropical cyclones and storm surges are forcing people from their homes in coastal areas. Each year,³³ flooding alone drives over 250,000 Bangladeshis to relocate. Climate change will cause "one in every seven people" to be uprooted by 2050. By that time, a rise in sea level and the resulting loss of land will force 18 million Bangladeshis to relocate. The IPCC.³⁴ came to the conclusion that Bangladesh would lose "up to 20% of its current landmass".³⁵ due to a "one-meter sea level rise in the south."

Kiribati

A disappearing paradise, Kiribati is a low-lying republic made up of 33 atolls in the central Pacific. It has a population of 100,000 and is only 2 metres above sea level on average. The Island nation of Kiribati, which is endangered by climate change and rising sea levels, is one of those already feeling the effects of climate-related risks. Kiribatians must evacuate because climate change is still causing the Islands to sink.³⁶

Tuvalu

The rise in sea levels caused by global warming has caused low land flooding, saltwater intrusion, coastal erosion and more destructive storms in Tuvalu. It has become 'an endangered nation'.³⁷

Other Island in the urge of disappearance

Maldives

Climate change severely threatens the existence of the Maldives, as an archipelago of low-lying islands and atolls in the Indian Ocean. The future sea levels projected to increase in the range of 10 to 100 centimeters by the year 2100, the entire country could be submerged."³⁸

The World Bank says that at the current projections of sea level rise, the entire country could be underwater by the year 2100. In 2009, the Maldives president held a meeting under water in an attempt to bring attention to the impending disaster.³⁹

³¹ McDonnell, T, *Climate change creates a new migration crisis for Bangladesh*(2019), <https://www.nationalgeographic.com/environment/2019/01/climate-change-drives-migration-crisis-in-bangladesh-from-dhaka-sundabans/>

³² EJF, 2009. *No Place Like Home: Where Next For Climate Refugees*, London: EJF.

³³ Vidal, J, *Boats pass over where our land was: Bangladesh's climate refugees* (2018), <https://www.theguardian.com/global-development/2018/jan/04/bangladesh-climate-refugees-john-vidal-photo-essay>.

³⁴ Intergovernmental Panel on Climate Change (IPCC), <https://www.ipcc.ch/>.

³⁵ Intergovernmental Panel On Climate Change, *Climate Change, Synthesis Report*(2014), <https://www.ipcc.ch/Report/Ar5/Syr/>.

³⁶ McNamara, K. E., *Cross-border migration with dignity in Kiribati*, FORCED MIGRATION REVIEW (2015).

³⁷ Apisai Ielemia, *A treat to our Human Rights: Tuvalus Perspective on Climate Change* (2007), <https://www.un.org/en/chronicle/article/threat-our-human-rights-tuvalus-perspective-climate-change>.

³⁸ No High Ground, International Monetary Fund (2021), <https://www.imf.org/en/Publications/fandd/issues/2021/09/maldives-climate-change-aminath-shauna-trenches>.

³⁹ "In 2009, the Maldives held the world's first underwater cabinet meeting. The meeting was held to raise awareness of the threat of rising sea levels to the Maldives. The meeting was held underwater to highlight how pressing the

Fiji

Fiji, which consists of 332 Islands including low-lying atolls, has a prominent coastline and thus is highly susceptible to the impacts of climate change such as sea-level rises and storm surges. Higher sea levels result in an increase in coastal flooding during storm surges.⁴⁰

List above are just few examples and there are more reports on the same line but the severity of climate change the Island nation face is going to be worse.

Climate Refugees Becoming Slaves

Researchers have already noted that this will eventually result in the formation of slaves since it is extremely dangerous when climate refugees are not provided with any protection at the national or international level. Slavery is frequently dismissed as something of the past. However, statistics indicate that there are more individuals in slavery today than there have ever been.

While several socio-economic, political, cultural and institutional vulnerabilities act as drivers to modern slavery, they are increasingly considered to be made worse by climate change impacts and environmental degradation.⁴¹

The Food and Agriculture Organization of the United Nations (FAO) released a report in March 2021 demonstrating that the increasing frequency and intensity of extreme weather disasters due to climate change such as floods, droughts and megafires are having a devastating effect on food security and the livelihoods of those already living in poverty and marginalisation.⁴² These situations create circumstances where vulnerable communities are coerced into slavery and slavery type practices. For instance, if environmental conditions due to climate change are affected to the extent that livelihoods collapse, then climate-induced migration could affect already vulnerable communities and expose them to slavery.

UNICEF confirms that climate change increases the risk of girls being pushed onto unsafe migration/displacement pathways that can expose them to the risk of modern slavery. 'Girls are at increased risk of violence and exploitation, including sexual and physical abuse, and trafficking during and after extreme weather events. These risks are heightened when collecting food, water and firewood or when staying in temporary shelters or refugee camps. In addition, when a family is faced with economic hardship caused by climate change, studies suggest that the risk of child marriage can increase.'³⁵ Thus, there is a need for more attention to be placed on social inequality when dealing with climate-related migration and vulnerability to modern slavery

Does climate change policy recognise climate-induced migration and displacement as an issue? The Cancún Adaptation Framework (CAF) shaped how international and national actors

issue is for the sea-level nation. During the meeting, officials signed a document asking all countries to reduce their carbon dioxide emissions. The document was presented in Denmark. The meeting was held by President Mohamed Nasheed, <https://sos.noaa.gov/education/phenomenon-based-learning/underwater-cabinet-meeting/>."

⁴⁰ Climate Change and Coastal Resilency of Fiji, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9838293/>

⁴¹ Siddiqui T., Szaboova L., Adger W., Safrá de Campos R., Rashed M., Bhuiyan M. and Bilah T. 2020. Policy Opportunities and Constraints for Addressing Urban Precarity of Migrant Populations, Global Policy, special issue article. Available at: <http://dx.doi.org/10.1111/1758-5899.12855>.

⁴² FAO. 2021. The impact of disasters and crises on agriculture and food security. Available at: <http://www.fao.org/documents/card/en/c/cb3673en>.

currently understand and approach climate-related movements. It shifted the discourse from the use of the homogeneous term 'environmental migration' to distinguish between three modes of mobility due to climate impacts migration, displacement and planned relocation.³⁶ According to the Intergovernmental Panel on Climate Change (IPCC), climate change impacts all three modes of mobility.⁴³ This has enabled specific climate policies, interventions and operations which are more adequately aligned with their distinct features, mobility patterns and outcomes.⁴⁴ Prior to CAF, the international humanitarian community considered the policies, frameworks and guidelines for climate-related cross-border movements or forced displacements to be insufficient⁴⁵ and the protection agenda for affected people inadequate.⁴⁶ Their concern stemmed from no clear distinction between migration and displacement and that, with rising climate change impacts, 'migration will become less of a choice; in many cases, migration will become displacement.'⁴⁷

Shortly after the adoption of CAF, an intergovernmental Nansen Initiative⁴⁸ was formulated on migration and displacement. It was assigned with developing policies and operational capacities to manage climate change-induced movements, and to fill a legal gap with regards to protection and cross-border displacement.⁴⁹ Five years later, in 2015, two major breakthroughs were achieved. First, the endorsement of the Protection of Cross-Border Displaced Persons in the Context of Disasters and Climate Change by international and national actors that effectively ended the Nansen Initiative and marked the inception of the Platform on Disaster Displacement.⁵⁰ And second, in December 2015, the Paris Agreement was adopted, representing an unprecedented development of action on migration and climate with the formal inclusion of 'migrants' in the Preamble.⁵¹

⁴³ Key expert interview, Susan F. Martin, 13 May 2021.

⁴⁴ According to Warner K. et al. "Different policies are required for different types of human mobility related to climatic changes. Hence, it is necessary to distinguish between migration, displacement and planned relocation in climate policy and operations." Reference found in endnote 4 above

⁴⁵ The Nansen Initiative. 2015. Agenda for the protection of cross-border displaced persons in the context of disasters and climate change: volume I. Available at: <https://disasterdisplacement.org/wp-content/uploads/2015/02/PROTECTION-AGENDA-VOLUME-1.pdf>.

⁴⁶ Though policies were lacking, the will of international humanitarian actors to respond and agree on a coherent approach to protect persons displaced cross-border in these climate-driven disaster situations was already evident. Three years before COP16, in 2007, the then acting UN High Commissioner for Refugees António Guterres for instance asserted that environmental degradation and climate change were drivers of displacement and called for UNHCR to continue its duty to provide protection (under direction of the State) in these situations. Volker Turk, Assistant Secretary-General for Strategic Coordination in the Executive Office of the UN Secretary-General, has since also noted that climate change can both contribute to conflicts that cause displacement and can exacerbate existing displacement situations. See: Turk V. 2019. 'Preventing displacement, addressing root causes and the promise if the Global Compact on Refugees'. Available at: <https://www.fmreview.org/return/turk>

⁴⁷ NRC. 2011. The Nansen Conference: Climate Change and Displacement in the 21st Century. 5-7 June 2011. pp.7. Available at: <https://www.unhcr.org/4ea969729.pdf>.

⁴⁸ NRC. 2011. The Nansen Conference: Climate Change and Displacement in the 21st Century. 5-7 June 2011. Available at: <https://www.unhcr.org/4ea969729.pdf>.

⁴⁹ Approaches for those displaced internally are informed by the UN Guiding Principles of IDPs. Those who cross the border were left without protection under international refugee law as they are not recognized under the 1951 Convention

⁵⁰ The Platform on Disaster Displacement. Available at: <https://disasterdisplacement.org/>.

⁵¹ Also adopted in 2015 were the Sendai Framework for Disaster Risk Reduction, in which States highlighted displacement because of disasters and the 2030 Agenda for Sustainable Development, which called for climate action, as well as safe and regular migration

The Paris Agreement acknowledging that climate change is a common concern of humankind, parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.

A year later, in 2016, the UN General Assembly decided, through the adoption of the New York Declaration for Refugees and Migrants,⁵² to develop a first-ever negotiated global framework on migration. The non-legally binding Global Compact for Safe, Orderly and Regular Migration was finalised in 2018, signalling that the international community officially recognised that 'migration in the context of climate change, environmental degradation and disasters is a reality, and the Compact makes commitments to support both climate migrants and states'.⁵³

According to the IOM, in these desperate circumstances and during displacement particularly, 'recruiters will naturally target the most disaster-affected and vulnerable groups'.⁵⁴ 'The use of informal and dangerous trafficking networks is likely to rise as the impacts of climate change become more pronounced, rural populations become increasingly desperate, and nations in the Global North steadily fortify borders and limit inward migration'.⁵⁵

In 2016, the IOM acknowledged the climate change-human trafficking nexus.⁵⁶ More recently, it was suggested that a modern slavery-environmental degradation-climate change nexus may threaten the achievement of SDGs.⁵⁷

Climate change is exacerbating poverty and inequality and pushing people, already in precarious situations, to the limits of coping and forcing them to pursue risky strategies. The lack of recognition and priority given to the issue means there's an absence of strong policies, so labour and migrant rights abuses remain largely unregulated or are disregarded at the expense of achieving rapid economic growth and infrastructure development.

Nations already have victims of slavery

In 2018, modern slavery was reportedly most prevalent in Africa in relation to population size, followed by Asia and the Pacific region,⁵⁸ with West Africa and South Asia considered the hot spots.

⁵² The New York Declaration for Refugees and Migrants. Available at: <https://refugeesmigrants.un.org/declaration>.

⁵³ IOM. 2020. Environmental Migration Portal – Environmental Migration. Available at: <https://environmentalmigration.iom.int/environmentalmigration-1>.

⁵⁴ David F., Bryant K. and Joudo Larsen J. 2019. Migrants and their Vulnerability to Human Trafficking, Modern Slavery and Forced Labour, IOM, Available at: https://publications.iom.int/system/files/pdf/migrants_and_their_vulnerability.pdf.

⁵⁵ Molinari N. 2017. 'Intensifying Insecurities: The impact of climate change on vulnerability to human trafficking in the Indian Sundarbans', Anti-Trafficking Review, issue 8, pp. 50-69. Available at: <https://www.antitraffickingreview.org/index.php/atrjournal/article/view/226/212>.

⁵⁶ IOM. 2016. Climate Change and Human Trafficking Nexus. Available at: https://publications.iom.int/system/files/pdf/mecc_infosheet_climate_change_nexus.pdf.

⁵⁷ Decker Sparks J L., Boyd D S., Jackson B., Ives C D. and Bales K. 2021. Growing evidence of the interconnectedness between modern slavery, environmental degradation, and climate change, Volume 4, Issue 2, One Earth, pp. 181-191. Available at: [https://www.cell.com/one-earth/pdf/S2590-3322\(21\)00061-0.pdf](https://www.cell.com/one-earth/pdf/S2590-3322(21)00061-0.pdf).

⁵⁸ Walk Free. 2018. The Global Slavery Index. Available at: <https://www.globalslaveryindex.org/2018/methodology/vulnerability/>.

Alongside governance issues and disenfranchisement,⁵⁹ armed conflict, state-sponsored forced labour and forced marriages were the main factors behind the estimated 9.2 million Africans who live in servitude.⁶⁰ In South Asia, 'India alone is estimated to have the largest "absolute" number of people in modern slavery, with nearly 8 million people living in modern slavery, followed by Pakistan (3.2 million), Bangladesh (592,000) and Nepal (171,000).⁶¹ In South Asia, members of historically oppressed castes and tribes are at particular risk of modern slavery.⁶² Inadequate access to healthcare and social benefits, poor working and living conditions and low literacy, characterise the vulnerability of these marginalised groups. West Africa and South Asia have high economic disparities, with a large segment of the population, especially young people, impoverished and/or unemployed/underemployed. These two regions are also home to marginalised groups who experience economic barriers and face discrimination and social exclusion all known drivers of vulnerability to modern slavery and factors for risky migration.⁶³

Livelihoods and climate change

The delta region is characterised by intense, recurrent and sudden onset disasters, as well as slow onset ecological degradation making large areas uninhabitable. Rising sea levels, erratic rainfall, increased frequency of cyclones, tidal surges and floods, mean that millions of people across the Sundarbans are unable to work for most of the year. Survival in the region is becoming increasingly difficult. In 2009, Cyclone Aila caused widespread damage to lives and livelihoods. In 2020, during Cyclone Amphan, 400km of embankment was breached and seawater entered the flood plains resulting in widespread displacement from homes and loss of livelihoods for more than two million people. Severe flooding and cyclones make access to agricultural land difficult and agricultural work less obtainable for landless labourers. As roads and waterways become unusable, household income and food security diminish; access to markets is limited and fishing opportunities more risky and costly. In the Bangladesh Sundarbans, crops also fail because of drought, prolonged cold spells and coastal seawater intrusion, leading to a scarcity of drinking water and high morbidity due to extremes of heat and cold, and outbreaks of dengue, malaria, cholera and diarrhoea. Approximately 3.5 million people live in the region, where the main crop is rice. Fishing and honey collection is also prevalent. Damage to property and crop failures during the frequent flooding and cyclones, has pushed a large section of the population into poverty 43.5% live below the national designated poverty

⁵⁹ Walk Free. 2018. The Global Slavery Index. Available at: <https://www.globallslaveryindex.org/2018/methodology/vulnerability/>.

⁶⁰ Abdi Latif Dahir. 2018. 'Africa has the highest rate of modern slavery in the world'. Quartz Africa, 23 July 2018. Available at: <https://qz.com/africa/1333946/global-slavery-index-africa-has-the-highest-rate-of-modern-day-slavery-in-the-world/>.

⁶¹ Oosterhoff P., Yunus R., Jensen C., Somerwell F. and Pocock N. 2018. Modern Slavery Prevention and Responses in South Asia: An Evidence Map. pp. 4. Available at: https://assets.publishing.service.gov.uk/media/5c0e42f7ed915d0c736a1e2e/MS_Evidence_Map_Report_final_.pdf.

⁶² David F., Bryant K. and Joudo Larsen J. 2019. Migrants and their Vulnerability to Human Trafficking, Modern Slavery and Forced Labour, IOM, Available at: https://publications.iom.int/system/files/pdf/migrants_and_their_vulnerability.pdf.

⁶³ O'Connell C. 2021. From a Vicious to a Virtuous Circle. Anti-Slavery International. Available at: https://www.antislavery.org/wp-content/uploads/2021/04/ASI_ViciousCycle_Report_web2.pdf.

line.⁶⁴In the smaller Indian Sunderbans, single crop agriculture and fishing are the main sources of income. 50% of the population are landless labourers. During the non-agricultural season, the community depend on forest and river resources for their livelihoods.

Migration Frequent environmental pressures and climatic crises drive displacement and forced migration from both the Indian and Bangladeshi sides of the delta. Intra-state migration is common in both countries. It is primarily men that migrate. Many women stay at home to take care of the family and household, and are more likely to become part of the marginal unskilled workforce in sectors such as handicrafts or crabbing. Women (wives, mothers, sisters and daughters) who do migrate with male migrants are 'associational migrants'. In the Indian Sundarbans, women only migrate to the semi-urban areas of Kolkata for domestic work. However, the overall trend of migration in the region is 'rural to rural' or 'rural to urban', within the state, to other states or other countries. According to a recent study, in the Bangladesh Sundarbans, 'Post-Cyclone Aila, three quarters of households reported the labour migration of at least one family member, with children comprising a fifth of those out-migrating.'⁶⁵ Migrants mostly fall below 'the poverty line', have a low level of literacy and usually work as unskilled labourers. On the whole, they migrate to urban slums – especially Dhaka, one of the world's most densely populated megacities. Once there, they face hardship increased poverty, public health hazards, lack of access to services and, for some, homelessness.

Teitiota case as an illustration

The human rights committee correctly draws attention to the fact that this is the most recent ruling regarding the status of climate refugees and how they must be cared for.

The case of Mr. Teitiota⁶⁶ exemplifies how courts are attempting to define and address the confusing legal status of "climate refugees." In *Teitiota v. Chief Executive Ministry of Business, Innovation and Employment*, Teitiota, a citizen of Kiribati, requested refugee status in New Zealand. He argued that because he had been residing in the country unlawfully since his visa had expired, he should be granted refugee protection.

Teitiota requested refugee and protected person status "on the basis of changes to his environment" because sea level rise and other climate change effects are driving residents of Kiribati from their island home. Teitiota's eligibility for refugee status under the Refugee Convention had to be determined by the court.

In its earlier ruling, the lower court in New Zealand "expressed worry about expanding the scope of the Refugee Convention and opening the door to millions of individuals facing hardship as a result of climate change" in addition to finding no significant injury or human rights violation.

Despite the fact that climate change is a significant and developing concern, the New Zealand Court of Appeals determined that the applicant did not meet the requirements for refugee status

⁶⁴ The World Bank. 2014. 'A Resilient Future for Bangladesh Sundarbans'. 2 July 2014. Available at: <https://www.worldbank.org/en/news/feature/2014/07/02/a-resilient-future-for-bangladesh-sundarbans#>.

⁶⁵ Brown D., Boyd D S., Brickell K., Ives C D., Natarajan N. and Parsons L. 2021. 'Modern slavery, environmental degradation and climate change: Fisheries, field, forests and factories', *Environment and Planning E: Nature and Space*. 2021;4(2): pp. 191-207. Available at: <https://journals.sagepub.com/doi/full/10.1177/2514848619887156>.

⁶⁶ Ioane Teitiota v. The Chief Executive of the Ministry of Business, Innovation and Employment, 2015.

under the 1951 Refugee Convention since the Convention does not address the issue. The New Zealand Supreme Court and the Court of Appeals both acknowledged the "gravity of climate change" and the possibility that "environmental degradation resulting from climate change or other natural disasters could create a pathway into the Refugee Convention or protected person jurisdiction." Teitiota's asylum request was ultimately denied.

After Teitiota's application for refugee status in New Zealand was turned down, he and his family were deported back to Kiribati. He then petitioned the UN Human Rights Committee, alleging that by deporting him, New Zealand had violated his right to life as guaranteed by the International Covenant on Civil and Political Rights (ICCPR). Mr. Teitiota continued by claiming that Kiribati's whole population was no longer able to live there due to increasing sea levels and other effects of climate change. The Human Rights Committee found that Teitiota's court in New Zealand did not infringe upon his right to life under the International Covenant on Civil and Political Rights (ICCPR)⁶⁷ and under refugee law" because Teitiota "did not objectively face a severe risk of being persecuted if returned to Kiribati."

The Committee also stated that Teitota was not a "refugee" in accordance with the definition of the Refugee Convention because he had never been involved in a land dispute and there was no evidence that he feared a genuine risk of future serious physical harm from violence related to housing, land, and property conflicts. He could find land on which he and his family could settle. Furthermore, there was no evidence to support his assertion that he was unable to obtain clean water or grow food. There was no evidence that he lacked access to potable water or that the environment he was in or would return to so hazardous that his life was in danger.

The UN decision was noteworthy because it acknowledged the connections between climate change, migration, and human rights, noting that migration that is caused by climate change may happen as a result of increasing sea levels, salinization, degrading land conditions, severe storms, and flooding. It also emphasized how crucial it is for nations to take action to stop and lessen climate change. The Republic of Kiribati's existing circumstances "are exceedingly severe, and pose a genuine, personal, and reasonably foreseeable risk of a threat to his life under Article 6(1) of the ICCPR," according to Committee Member Dunan Laki Muhumuza's dissenting opinion. He disagreed with the majority's assessment that Teitiota's deportation to the Republic of Kiribati did not breach his rights, contending that Kiribati was at greater risk than the majority anticipated as a result of climate change.

It is being hailed as a "landmark" judgement that the UN Human Rights Committee's resolution, which states that governments shouldn't send refugees back to nations where their lives are in danger due to climate change, is correct. Despite rejecting Teitiota, the Committee acknowledged that environmental deterioration and climate change pose a serious threat to both present and future generations. The Committee stated that "without national and international action on climate change, impacts could grow serious enough to jeopardise the right to life, making it unlawful for countries accepting climate refugees to turn them away."

The Committee acknowledges that, despite the fact that nations like Kiribati still have time to protect their own citizens, "climate change may threaten the right to life" if "strong national and international action is not taken."

⁶⁷ International Covenant on Civil and Political Rights, adopted Dec.16,1966.

The Committee acknowledges that, despite the fact that some nations, like Kiribati, still have time to take steps to protect their own citizens, "climate change may undermine the right to life, "thus triggering the non-refoulement obligations" of countries receiving climate refugees, in the absence of strong national and international action." As a result, the UN Human Rights Committee recognized the rights of climate refugees, which was a significant step forward. Examining some of the actions that the world community has already taken and yet to take in coming years to assist climate refugees in this connection are the following.⁶⁸

Looking for a Future Policy

At both the international and national levels, a variety of policy solutions to migration that is related to the environment have been put forth. Frameworks based on refugee protection, supplemental protection, a new international instrument, internal displacement protection, and regionally based responses are some examples of policy responses at the international level. Unsurprisingly, none of them have been able to completely address the variety of situations in which environmental related migration may occur due to the fundamental challenge of conceptualizing it.

Despite the difficulties on the global stage, a number of nations have internal laws and regulations governing migration related to the environment. Additionally, the applicability of these approaches is constrained, and none of them seem to adequately address migration brought on by slow-onset processes. Below is a summary of the responses at the national and regional levels. Given the variety of contexts in which environmental migration may take place, McAdam (2011) argues that regional or local approaches may offer more effective solutions than broad international normative frameworks.⁶⁹

Policymakers may find a way to examine the various settings in which migration that is related to the environment may present possibilities and problems through regional dialogues. Here is a list of the refugee-related treaties and agreements before we look at the policies and programs.

3.5.1 International and regional instruments relating to refugees include:

- a. 1951 Convention relating to the Status of Refugees.
- b. 1967 Optional Protocol relating to the Status of Refugees.
- c. Universal Declaration of Human Rights (art. 14).
- d. American Declaration on the Rights and Duties of Man (art. 27).
- e. American Convention on Human Rights (art. 22).
- f. Cartagena Declaration on Refugees, Colloquium on the International Protection of Refugees in Central America, Mexico and Panama (Cartagena Declaration).
- g. African [Banjul] Charter on Human and Peoples' Rights (art. 12)0.

⁶⁸ Ioane Teitiota v. The Chief Executive of the Ministry of Business, Innovation and Employment, 2015, <https://climatecasechart.com/non-us-case/ioane-teitiota-v-the-chief-executive-of-the-ministry-of-business-innovation-and-employment/>.

⁶⁹ McAdam, J. (2011, 29–30 March). *Climate change, displacement and the role of international law and policy*. Paper presented at the international dialogue on migration 2011: The future of migration: Building For instance, the Pacific area has been actively engaged in ongoing talks about the threat that rising sea levels pose to low-lying Pacific Island states and the priorities of impacted populations for a number of years. capacities for change, Geneva.

- h. OAU Convention Governing the Specific Aspects of the Refugee Problem in Africa.
- i. Arab Charter on Human Rights (art. 28).
- j. Cairo Declaration on Human Rights in Islam (art. 12).
- k. European Convention on Human Rights (arts. 2, 3, and 5).
- l. Council Regulation EC No 343/2003 of 18 February 2003 establishing the criteria and mechanisms for determining the Member State responsible for examining an asylum application lodged in one of the Member States by a third country national.
- m. Council Directive 2004/83/EC of 29 April 2004 on minimum standards for the qualification and status of third country nationals or stateless persons as refugees or as persons who otherwise need international protection and the content of the protection granted.
- n. Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (art. 3).
- o. African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa.
- p. Convention on the Rights of the Child (art. 22).

Do these tools offer enough protection for persons moved due of climate change? This is adequate, but states do not support this population of people who are emigrating because they are unable to cope with the natural calamities wreaking havoc in their native countries.

Little initiatives

1. The Cancun Adaptation Framework ⁷⁰

"Climate change induced displacement, migration, and planned relocation" were recognised as elements to be talked inside the framework of climate change adaptation by parties to the United Nations Framework Convention on Climate Change (UNFCCC)⁷¹ in the Cancun Adaptation Framework adopted in December 2010, paragraph 14(f).

This state-level recognition of the impacts of climate change on human movement fulfilled three functions it provided as a historical record, a point of comparison for arguing for greater action, and a basis for obtaining adaptation finance to create migration and relocation programmes. The UNHCR failed to persuade governments to consent to the formation of a "global guiding framework" on displacement caused by climate change and natural disasters throughout 2011. The launch of the state-led Nansen Initiative in late 2012, which was a tentative "first step" towards global policy-making in this area, and the conclusion of its first sub-regional consultation in the Pacific in May 2013 are two more initiatives in this direction.

The UNHCR's strategic role in bringing displacement and climate change to the fore globally is a major theme of the essay. UNHCR anticipated a substantial challenge in convincing nations to embrace additional legal commitments in this area given their resistance to upholding their current responsibilities under the Refugee Convention and other international protection mechanisms.⁷²

⁷⁰ The Cancun Adaptation Framework (2011), <https://unfccc.int/tools/cancun/adaptation/index.html>.

⁷¹ "The United Nations Framework Convention on Climate Change UNFCC., adopted May.9,1992.

⁷² Jane McAdam, *Creating New Norms on Climate Change, Natural Disasters and Displacement: International Developments* (2013).

2. The Nansen Initiative⁷³

The Cancun Adaptation Framework's clause 14(f) serves as a foundation for the Nansen Initiative. In order to comprehend crossing boundaries in the context of natural disasters and climate change, Switzerland and Norway together launched the Initiative in 2012. A willingness to assist people displaced climate change disasters was shown in 2015 with the endorsement of the Nansen Initiative by 109 nations.⁷⁴

Although achieving consensus among States was the Initiative's primary goal, it is theoretically feasible that this consensus "could lead to new laws, soft law instruments, or binding agreements."⁷⁵The Paris Agreement's pledge is supported by the Nansen Initiative, which also acknowledges that climate change might lead to migration. The Initiative, however, continues to fall short in terms of assisting "climate refugees." The Nansen Initiative strives to unite nations in order to reach consensus on critical tenets and elements for safeguarding people who have crossed boundaries due to natural disasters, particularly those associated with climate change.

3. The Kampala Accord⁷⁶

This programme aims to create a protection agenda built upon three pillars: solidarity and international cooperation; admission, stay, and status requirements for affected individuals; and operational responses, which include financial mechanisms and the duties of international humanitarian and development actors.

The schedule will include all necessary steps, such as:

- a. Preparation before displacement;
- b. Protection and aid during displacement; and
- c. After a tragedy, turn into a solution.

Enhancing disaster readiness was one of the goals in order to prevent such displacement and guarantee that those affected were better protected. A supposed Protection Agenda allegedly contained certain programs and probably better methods for reducing catastrophe risk, coping with climate change, and providing humanitarian aid. 109 nations endorsed the Protection Agenda⁷⁷ in Geneva in October 2015. The Norwegian and Swiss governments are the main sponsors of the Nansen Initiative, with significant backing from Germany and the European Commission.

The Kampala Convention, which covers cases of displacement brought on by both man-made and natural disasters as well as climate change, was adopted by the African Union. This agreement contains measures to stop internal displacement and deal with its causes. Humanitarian organizations are requested to assist when a state is incapable of providing

⁷³ "Based on the outcome of the Nansen Conference on Climate Change and Displacement in Oslo, Norway and Switzerland pledged at the UNHCR Ministerial Conference in December 2011 to address the need for a more coherent approach to the protection of people displaced across borders in the context of disasters (June 2011)." <https://sustainabledevelopment.un.org/partnership/?p=7564,23-03-2022>. December 22, 2022.

⁷⁴ Devadason, C. A., *Is the World Ready for Climate Change Refugees?* (2019), <https://www.globalhealthnow.org/2019-01/world-ready-climate-change-refugees>

⁷⁵ *Id.*

⁷⁶ The Kampala Accord, adopted June 9, 2011, <https://www.un.org/press/en/2011/sgsm13631.doc.htm>.

⁷⁷ *Agenda for the Protection of Cross-Border Displaced Persons in the Context of Disasters and Climate Change Volume I*, (2022), <https://Disasterdisplacement.Org/Wp-Content/Uploads/2015/02/Protection-Agenda-Volume-1.Pdf>,

adequate protection. People have been uprooted within their country is about 20 million as a result of natural disasters or infrastructure projects in more than 50 countries worldwide, Mr. Jan Egeland, Under Secretary General for Humanitarian Affairs and Emergency Relief Coordinator, highlighted in the Guiding Principles. Since they are compelled to vacate their homes and means of support, displaced people within the nation are usually ignored and neglected.

As Secretary-General Kofi Annan⁷⁸ has said, internal displacement is the "great tragedy of our time." The most vulnerable individuals in humanity are those who are internally displaced. Thus, one of the humanitarian community's most urgent problems today is providing the safety and support that internally displaced people need. The guiding principles outline the rights and safeguards that are applicable to internally displaced individuals at every point in their journey. They guarantee safe return, resettlement, and reintegration and protect against arbitrary deportation, safety, and help during deportation.

Even if the Guiding concept on Internal Displacement covers persons who are displaced due to climate change, that concept does not apply to people who cross borders. In order to protect all climate refugees, there are needs and cries for a globally recognized legal framework.

4. Guiding Principles on Internal Displacement, 1998.

Although these guidelines are not legally enforceable, they are consistent with and reflect international humanitarian law as related refugee legislation. Under this code, there are 30 such concepts. Everyone should have the same degree of freedom and equality, according to Principle 1; and the government should not enact any anti-discriminatory laws, according to Principle 2. Principle 5 states that those who have been compelled to escape their homes must have their human rights upheld by international authorities. Clause (d) of Principle 7 states that in the event of a crisis, those who are impacted must be evacuated unless their safety and health need it. Principle 6 discusses the protection against arbitrary relocation. According to Principle 8, displacement cannot be done in a way that threatens someone's life, dignity, or freedom.

5. Sendai Framework⁷⁹

The Sendai Framework 2015, adopted at the third UN World Conference on Disaster Risk Reduction in Sendai Japan. The voluntary, non-binding agreement recognizes the state's major role in disaster risk reduction but also calls for other stakeholders, including local governments and the business community, to join in this duty.

6. The Paris Agreement

The adoption of the Paris Agreement occurred on December 12, 2015. For the first time, for combating climate change nearly all States joined together. The Agreement's preamble vaguely mentions "climate refugees" when it states that "Parties should respect, promote, and consider the right of migrants and people in vulnerable situations when taking action to address climate change."⁸⁰

⁷⁸ "Kofi Atta Annan was a Ghanaian diplomat who served as the seventh secretary-general of the United Nations from 1997 to 2006. Annan and the UN were the co-recipients of the 2001 Nobel Peace Prize." <https://www.un.org/sg/en/formersg/koffi.shtml>.

⁷⁹ Sendai Framework for Disaster Risk Reduction 2015-2030, adopted, Mar. 18, 2015, <https://disasterdisplacement.org/portfolio-item/sendai-framework-for-disaster-risk-reduction-2015-2030>.

⁸⁰ The Paris Agreement, adopted Dec. 12, 2015..

The phrase "climate refugees" is still not used, despite the fact that the aforementioned assertions are "crucial entry points for addressing environmentally-linked root causes of forced displacement." Given that the Agreement was made at a time when the world's leaders, particularly those in Europe, were coping with a "migrant crisis," this is unfortunate. 'Climate refugees' are not mentioned in the UNFCCC documents.⁸¹

The Agreement also stresses the significance of safeguarding people and their means of subsistence, particularly in poorer nations that are more susceptible to the impacts of climate change. The necessity to "protect people, livelihoods taking into account the urgent and immediate needs of those developing country Parties that are particularly vulnerable to climate change" is summed up in Article 7, which stipulates that parties should understand this need.

7. Global Compact on Refugees

The New York Declaration, a series of agreements addressing large-scale migrations of refugees and migrants, was signed by all UN Member States on September 19, 2016. The Global Compact on Refugees (GCR) and the Global Compact for Safe, Orderly, and Regular Migration (GCM) were both born out of the Declaration.⁸² It is not the goal of the GCR to "promote refugees' human rights, needs, and preferences." The GCR's objective is to advocate for the "need for more equitable sharing of the burden and responsibility for hosting and supporting the world's refugees, while taking account of existing contributions and resources among States."⁸³

These goals are lauded by UNHCR⁸⁴ and most Member States as a "minor miracle." NGOs, for instance, contend that the GCR is too conservative. For instance, the GCR doesn't give a "concrete target"⁸⁵ for how many migrants need to be resettled. It's unclear how it plans to deal with internal displacements brought on by climate change. The GCR contends that natural calamities, environmental deterioration, and the climate do not drive refugee migrations. As opposed to this, these elements "increasingly interact with the drivers of refugee movements".⁸⁶ This shows the unwillingness of States to deal with calamities brought on by climate change that affect within and moving to other nations. As a result, "climate refugees" might not gain from the GCR.

8. Global Compact on Safe, Orderly and Regular Migration

The first international agreement to address "all dimensions of international migration in a holistic and comprehensive manner"⁸⁷ is the Global Compact on Safe, Orderly, and Regular Migration (GCM). The UNGA formally endorsed the Compact on December 19th, 2018. The GCM's objectives include "supporting international cooperation on international migration; providing States with policy options to address issues surrounding international migration; and

⁸¹ *Id.*

⁸² Perry, J. & Schwartz, S., *The Global Compact on Refugees Misses the Mark on Refugee Return*(2019), <https://rli.blogs.sas.ac.uk/2019/02/21/the-global-compact-on-refugees-misses-the-mark-on-refugee-return/>.

⁸³ The Global Compact on Refugees, adopted, Dec. 17, 2018, 2018.

⁸⁴ ICVA, *The Global Compact on Refugees Explained*, Geneva: ICVA(2017).

⁸⁵ *Id.*

⁸⁶ The Global Compact on Refugees, adopted, Dec. 17, 2018.

⁸⁷ Allinson, K., Erdunast, et al., *GCM Commentary: The Legal Status of the UN's Global Compact for Safe, Orderly and Regular Migration in International and UK Law*(2019), <https://rli.blogs.sas.ac.uk/2019/01/31/gcm-commentary-the-legal-status/>.

states' space and flexibility to pursue implementation based on their own migration realities and capacities." ⁸⁸

The GCM is also the first significant migration framework that takes climate change into account. The framework's goal to "*address migration movements from sudden-onset and slow-onset natural disasters, climate change, and environmental degradation, while ensuring the effective protection of all migrants*" is highlighted in Objective 2(h). The GCM recognises that migration is influenced by climate change and requests on nations to begin "planning for people who move due to natural disasters and climate change".⁸⁹ More significantly, States should make sure that these people have "access to humanitarian assistance and rights,"⁹⁰

The GCM does not currently contain any such provisions. "The genuine inclusion of communities facing serious climate change impacts"⁹¹ is a need for success on this front. Simply put, if they are included, the GCM cannot adequately safeguard 'climate refugees'. In addition to rejecting "climate refugees," many nations have expressed scepticism against the GCM. The document was not signed by Israel, the Dominican Republic, Australia, Austria, Bulgaria, Poland, the Czech Republic, Slovakia, or Austria. Due to the "restrictive migration agenda"⁹² of several of these nations, refusing to join prevented adherence to brand-new international commitments pertaining to migrant rights.

Additionally, these nations did not want to be seen as "open to immigration." The only choice was to "reaffirm their restrictive position" by withdrawing. The GCM is being rejected because to concerns that it would become "common practice, or even common law" and that "would-be migrants" won't adhere to the GCM procedure.

In general, 'climate refugees' are not technically included in the GCM. The GCM is also completely optional and non-binding legally. Additionally, the GCM is powerless to impose any migratory regulations. Therefore, it is uncertain whether or how the 34-page framework will be turned into practical policy to assist "climate refugees."

The process of reform must be sped up because none of the frameworks discussed above sufficiently accommodate "climate refugees." Reform may provide 'climate refugees' with a secure evacuation route. How to better protect 'climate refugees' is covered in the last chapter. The 1951 Refugee Convention, the UNFCCC, and the UNHCR Mandate all need to be revised. These three frameworks comprise the majority of those that address "climate refugees." Any of them would benefit from reform, which would have a good knock-on effect on the existing international frameworks and protections. The chapter concludes with a suggestion for a reform that would better protect "climate refugees."

⁸⁸ GCM, *Global Compact For Safe, Orderly And Regular: Final Draft* (2018).

⁸⁹ Farbotko, C., *We need a fresh approach to climate change migration* (2019), <https://www.weforum.org/agenda/2019/02/we-need-a-fresh-approach-to-climate-change-migration/>

⁹⁰ Hall, N, *Is the U.N.'s new migration compact a major breakthrough*(2018),<https://www.washingtonpost.com/news/monkey-cage/wp/2018/12/09/is-the-u-n-s-new-migration-compact-a-major-breakthrough/>.

⁹¹ Farbotko, C., *We need a fresh approach to climate change migration. This is why*(2019), <https://www.weforum.org/agenda/2019/02/we-need-a-fresh-approach-to-climate-change-migration/>

⁹² Espinoza, M. V et al., *Global Compact for Migration: what is it and why are countries opposing it?*(2018) <https://theconversation.com/global-compact-for-migration-what-is-it-and-why-are-countries-opposing-it-106654>.

Conclusions and Suggestions

As a result, global agreement on the subject of climate change displacement has been difficult to come by. There is still a need for agreement on the definition of environmental refugees, as well as on responsibility-sharing and protection principles. In the absence of this accord, a regional framework or bilateral agreement would be the most viable alternative for South Asia. Driving such an initiative would, without a doubt, be in India's best interests. An agreement like this would take current geopolitical and economic links into account, allowing the parties to act based on their political will and capabilities. It would also allow for the development and exchange of best practises within the region.

However, because the negative effects of climate change are becoming more severe every day, people should gain acceptance at the worldwide level through legislative initiatives. Better stakes from policy holders and framers are hoped for. A single document granting all of the rights described in the preceding conventions could be a better approach that everyone is considering.

Suggestions

- An international legal agreement on formal recognition, protection, and help for climate refugees might be developed, which could be considered as a significant step toward assisting climate refugees and ultimately encourage all states to sign the 2015 Paris Agreement.
- More emphasis might be placed on reducing people's vulnerability to climate change, which could be accomplished through regional platforms. Hotspots can also form in locations where there are more frequent and intense natural disasters, as well as other sorts of environmental changes, such as a mix of catastrophic occurrences and gradual environmental degradation.
- In these countries, the poor, children, women, the elderly, indigenous peoples, and, in some cases, migrants and displaced persons who may be particularly vulnerable to environmental consequences must be prioritised.
- Organizations such as the UNHCR should look towards assisting countries in putting comprehensive policies and programmes in place at both the international and national levels.
- Bridging the gap between humanitarian, development, and climate change communities and policies, such as incorporating climate change adaptation factors into existing national development plans, poverty reduction strategy papers, and disaster risk reduction strategies (DRRs), with the goal of increasing resilience and reducing any other risk management strategies. Discussion of "mandate organisation" could help with climate-related displacement, migration, and planned resettlement.

CLASS SIZE IN ONLINE LEARNING SETTINGS

A.C.M. Hanas

*Department of Economics and Statistics, Faculty of Arts and Culture
South Eastern University of Sri Lanka, Sri Lanka.
acmhanas@seu.ac.lk*

Ali Aljamal

*College of Business and Economics,
American University of Kuwait
P.O. Box 3323, Safat 13034, Kuwait*

Abstract

Online learning continue to shapes the modern day education and the educators quick to embrace the technological developments to improve student achievement and learning outcomes. Further, the technology also facilitated the resource use efficiency. More and more courses are offered online or using distance education modules and class sizes are also increased as the instructors use online homework as they can save time and energy from manual grading. So far, online learning assessment in larger and smaller classes in terms of improving student learning outcome is mixed. In this paper, we empirically assess the effectiveness of online learning practice in larger and smaller class settings. An experiment was designed between larger and smaller classes and in each class was subjected to two treatments. First treatment group was assigned with online homework assignments while the other group had traditional homework assignments. A common standard test (Test of Understanding in College Economics (TUCE)) was administered to assess the students learning outcome. The results show that student GPA and larger class size had a positive and significant impact while online assignments and having a government scholarship had a negative significant impact final exam performance.

Keyword: *eLearning, Economic Education, Business Education*

Introduction

Technology has been widely used higher education and has become an integral part of the higher education system. Development in technology and telecommunication lead to unprecedented possibilities and opportunities in the new era of higher education. Online delivery and learning is vastly transforming traditional formal instructions. Higher education institutions have been adopting these technologies to improve instructions delivery in terms of quality and efficiency. Most of the development and use of online learning methods and materials have been widely used in North America and Western Europe, it is relatively new to the Middle East region. Still in many countries like in Kuwait online degree certificates were not accepted as recognized degree certificates. With the given limited acceptance some of the higher education institutions resolved to use technology with limited scope.

In the American University of Kuwait (AUK), the Department of Economics took a leading role in introducing the online technology in to principles of economics classes. Combining the traditional teaching practices along with online homework and assignments have changed the learning environment at AUK and expected to have an impact instructions delivery and learning outcome. The students were assigned to complete online homework and assignments from reputable academic source provider "the Cengage Learning." The company's website claim that its objective is to increase student engagement, improve learning outcomes and deliver authoritative information to people whenever and wherever they need. The flexibility for the students to learn and complete their homework and assignments not only whenever and

wherever they are but also in their own time is a very unique to educational learning delivery and assessment. On the other hand, the faculty will have multiple delivery options like case studies, videos, newspaper and other reading materials. Further, the faculty has the flexibility to assign number of assignments and homework's until the student learning objectives are achieved. i

The Cengage learning's Aplia®⁹³, online software offers interactive assignments customized for economics textbook. Although it was first developed for principles of economics classes, it was soon expanded to include not only economics and business, but also fields such as biology, humanities and social sciences. Today, Aplia® claims that students around the globe have thus far submitted more than 1.5 billion web-based answers over the last 10 years. This growth could be considered as a widespread acceptance and success of online learning.

Literature Review

In today's higher education, there has been a rapidly increasing integration of online learning (or eLearning) into many business oriented courses taught in many universities. Consequently, eLearning is co-evolving seemingly with the pragmatic approach increasingly adopted by several higher educational institutions to optimize the pedagogical quality of their eLearning environments. It is characterized by a strong need to facilitate the development and delivery of pedagogically effective eLearning environments, due partly to the gaps identified between the bodies of knowledge relating to learning theories, instructional design principles and student learning in higher education (Siragusa and Dixon, 2005). To facilitate the development of this recent instructional strategy to improve the student's learning experiences, the Internet is perceived to provide significantly different and interesting possibilities for computer-mediated communication and learning from other forms of educational technologies (Weller, 2002).

In recent times, there have been wide ranging studies that examine the eLearning environments in higher education and also evaluate numerous aspects of students' eLearning experiences with regard to effective eLearning environments and improvements in students' eLearning experiences. In a recent study by Siragusa (2005), factors that makes an effective instructional design principles and learning strategies for higher education students studying within these learning environments was examined. According to one of the study, a survey of students and lecturers in Western Australian universities revealed numerous areas of students' e-learning experiences which they had perceived as being successful and those needing improvements. Again, in a continuation of the study by Siragusa et al., (2007) that incorporates the findings from the (Siragusa 2005), twenty-four sets of recommendations that were developed from the previous study's survey findings was presented in instructional design for online learning to examine the role online learning will have with the delivery of the unit. The model presented twenty-four pedagogical dimensions for web-based instructions. It also incorporated wide ranging pedagogical needs of online learning existing in higher education that include: Online learning evaluation, Internet-based information, collaborative learning,

⁹³ It was developed by economic professor Paul Romer at Stanford University in the late 1990s. His goal was to develop web-based platform to engage students by bridging the gap between textbook and the real world by using interactive chapter assignments, tutorial and experiments while avoiding the daunting task of processing paper flow and grading.

Interaction, study flexibility – when, where, at what pace, accommodation of individual learning styles, content guiding learning strategies, development of learning strategies, lecturer's development activities, lecturer's online support and training⁹⁴.

Given the current rapidly increasing interest by many universities to exploit the innovative and consistent evolving internet technologies to improve the learning experiences of their students, it is not surprising that available literature on e-learning and on web-based learning focused more mainly on evaluating the potential benefits of adopting of e-learning in higher educational institutions. Accordingly, e-learning technologies have been perceived to create an opportunity to enhance teaching or the learning experiences of students. Previous literatures on e-learning were concentrated mainly on the technical aspects of e-learning. But, in an effort to address the gaps in the current body of literature in e-learning, Taha (2010), examined empirically the factors that affect students' continuing use of e-learning technologies. The study identified the following six perceived constructs that affect the continuous use of e-learning by university students, namely: usefulness, ease of use, availability, reliability, convenience and familiarity. The results of the study shows that these identified factors can influence the student's intention to use e-learning.

Instructors in higher educational institutions are increasingly integrating e-learning to enhance the traditional learning environment. Remarkably, however, Ravenscroft (2001) noted that the notion that 'electronic learning' is a recent initiative is a misconception. Apparently, initiatives to adopt electronic learning (or presently e-learning) started in the 1950s.

To add to the existing body of knowledge on the perceived potential benefits of e-learning, Macgregor and Turner (2009) described several essential benefits of e-learning. These include: the ability to engage students in non-linear information access and synthesis; the availability of learning environments from any location and at any time; the ability for students to influence the level and pace of engagement with the learning process; and increased opportunities for deploying disparate learning strategies. While the development of e-learning activities focused mainly on the likely potential benefits to students, there are several suggestions in various literatures that the implementation of e-learning is also potentially beneficial to both student and educational institutions. In a recent study, Zhang et al. (2006) clearly identified the potential benefits of e-learning to both student and educational institutions that effectively promotes the use of online learning technologies in higher institutions. These expanded on Macgregor and Turner (2009) identified benefits of e-learning and presents other dimensions to the potential benefits of e-learning to both student and educational institutions. These include: possible flexibility in terms of time and location; cost and time savings for educational institutions; fostering self-directed and self-paced learning by enabling learner-centered activities; creates a collaborative learning environment by linking each learner with physically dispersed experts and peers; allows unlimited access to electronic learning material; and allows knowledge to be updated and maintained in a more timely and efficient manner.

Similarly, other studies examined as well empirically the effects on student's achievement from the continuing use of e-learning technologies. In their study, Lee et al. (2009) examined empirically the effects on student learning of an online homework tool, *Aplia*®, compared to the more traditional instructor assigned and graded homework. While the results of the study

⁹⁴ Please see (Siragusa et al., 2007) for a comprehensive details and outline of these pedagogical needs of online learning existing in higher education.

reported an interesting conclusion of lack of improvement in the Test of Understanding in College Economics (TUCE) scores for all students on online homework tool, Aplia, compared to the more traditional homework, it further suggests that student achievement is not adversely affected by using online homework.

Existing studies focuses more on the use of e-learning tools but failed to quantify the impact on learning outcome. In this paper, therefore, we attempted to provide further insight to the student learning outcome as a result of the utilization of web-based assignments software, *Aplia*®, in Principles of Macroeconomics and show the potential association by quantifying student achievement on a standardized exam. Our study will use robust empirical models involving the application of econometric technique. The rest of the paper is organized as follows: section 3 discuss the data and research methodology, section 4 presents the empirical results and discussion of the findings, and finally, section 5 concludes the paper with a summary and views on the significance of the paper.

Data and Methodology

This study is designed to assess the *effectiveness of Aplia® online assignments on student's achievement* in principles of macroeconomics classes at the American University of Kuwait (AUK). Beside the chapter assignments, Aplia platform offers the convenience of math and graphical tools tutorials, news analysis assignments based on chapter-related articles, and experiments. The experiment option was not used, but we offered the math and graphical tutorials, and news analysis assignments as extra credit to give students more incentives to improve their Aplia score. The study was based on 10 sections (5 males and 5 females) with 183 students of principles of macroeconomics offered in spring, summer and fall 2010, by two full time economic professors. Students were divided into two groups, a control, which includes 2 sections with 46 students; and a treatment with 8 sections and 137 students.

Course requirements for both groups were the same except that the treatment group was required to complete Aplia online assignments as part of the course requirements. The Aplia score accounts for 15% of the course grade in the treatment group, while the same 15% weight was distributed equally among the three midterms for the control group. There were a total of 24 assignments, half of which were required chapter-based assignments. The remaining includes a couple of math and graphical tutorial assignments, in addition to short chapter-related news analysis assignments, all of which were designated as optional extra credit. Both groups received comparable instructions and were equally required to take pop quizzes, three midterms and a final exam. We adopted two different, but similar, tools as a common final exam throughout the study, namely TUCE⁹⁵ and IUPUI⁹⁶ to gauge students' achievements. We chose to rotate different common final exams in order to improve the reliability and validity of assessment tools and to reduce chances of possible bias since 10 to 20 percent of students repeat the course. In the spring and summer semesters, we used TUCE while in the fall we used

⁹⁵ Test of Understanding in College Economics (TUCE) - Macroeconomics, 4th edition was developed by the National Council on Economic Education (NCEE) about 45 years ago and has been widely used as an assessment instrument and, more importantly, as a means of comparing individual class performance to a national sample of students and instructors.

⁹⁶ This 25-question comprehensive final examination was developed and is regularly utilized as a common final in all principles of macroeconomics in the Department of Economics at the Indiana University-Purdue University at Indianapolis (IUPUI).

IUPUI exam. The common final exam was administered as PRETEST and as POSTTEST in all sections. A class achievement variable (PERFORMANCE) is calculated as the difference between POSTTEST and PRETEST. Since we used two different final exams, PRETEST and POSTTEST scores were normalized based on the maximum score in each respective section using Equation One. The purpose of the pretest is to benchmark students' level of macroeconomic knowledge prior to enrolling in the class at the beginning of the semester. In addition, we collected other data that include Aplia assignments score (APLIAScore), midterms score (MIDTERM_i), cumulative grade point average (CGPA), cumulative earned credit hours (CECH), gender (GENDER), and a dummy variable for status of prior economic training (NOPRIOEC) equals to 1 if student had prior economic training and equals to 0 if not. Also, an Aplia dummy variable (APLIADUMMY) equals to 1 if student was required to do Aplia assignments (treatment group) and equals to 0 if Aplia was not required (control group) was also included. The midterms and Aplia scores were normalized based on the maximum score earned in each respective section using Equation One. Table 1, lists variables used in the model.

Table 1: Tobit model variables descriptions

Variables	Description	Notes
Apliadummy	Aplia dummy	Dummy
Apliascore	Aplia score	Normalized
Cech	Cumulative earned credit hours	Discrete
Cgpa	Cumulative grade point average	Discrete
Gender	Gender	Dummy
Midterm1	First midterm exam	Normalized
Midterm2	Second midterm exam	Normalized
Midterm3	Third midterm exam	Normalized
Noprioec	No prior economic training	Dummy
Performance	Difference between POSTTEST and PRETEST	Normalized
Posttest	Posttest score (the same as common final exam)	Normalized
Pretest	Pretest score	Normalized

$$\text{Normalized Score} = 100 * \left(\frac{X_i}{\text{Section Maximum score}} \right) \quad (1)$$

Where: X_i is student's score; and
 Section Maximum score is the highest earned score in the student's section.
 An ordinary least square model is defined as:

$$y_i = \beta' x_i + \varepsilon_i \text{ where } \varepsilon_i = (0, \sigma^2) \quad (2)$$

if y_i is a latent variable the (2) can be re-written as;

$$y_i^* = \beta' x_i + \varepsilon_i \text{ where} \quad (3)$$

$$y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases}$$

In model 3, y_i^* is not observable but y_i

Define $f(x_i) / f(x_i^*)$ as the density funtion of y_i / y_i^* for $y_i > 0$

$$\text{The probability of observing } [y_i | x_i] = \Phi\left(\frac{\beta' x_i}{\sigma}\right) \quad (4)$$

$$\text{If } y_i \leq 0 \text{ then probability of observing } [y_i | x_i] = 1 - \Phi\left(\frac{\beta' x_i}{\sigma}\right) \quad (5)$$

In the analysis, the model in (2) is specified as a linear model. However, when it is transformed into Tobit model, it becomes a probability model. In model 3, dependent variable is unobservable and as such, estimated coefficients cannot be interpreted as the impact of independent variable on the dependent variable and, more importantly, cannot be meaningfully interpreted except for level of significance. In this regard, the marginal effect of the independent variable in model (4) is defined as the likelihood impact on the conditional density function and be derived by the following model:

$$\text{Marginal effects of } x_i = \frac{\partial E(y_i | x_i)}{\partial x_i} = \beta' \phi\left(\frac{\beta' x_i}{\sigma}\right) \quad (6)$$

Results and Discussions

Table 2 shows the means of PRETEST and POSTTEST raw scores for both TUCE and IUPUI exams. The AUK students' POSTTEST mean for TUCE is 8.694, which is lower than the US national mean score of 9.80, as reports by NCEE. However, the POSTTEST mean is 14.755, which is slightly higher than the US national mean of 14.19 (Walstad et al., 2007: p8). The AUK students' PERFORMANCE in the TUCE exam is 6.061, which is higher than the national average of 4.39. The PERFORMANCE scores for both TUCE and IUPUI are statistically significant at 0.01 level. Moreover, the results in both exams indicate that students learning outcomes from taking the economic subject did contribute to students' knowledge on economic principles.

Table 2: Pretest and Posttest Mean Scores for TUCE and IUPUI exams

	Pretest	Posttest	Performance (posttest - pretest)	t-value	Number of Observations
TUCE exam (30-questions)	8.694 (0.501)*	14.755 (0.501)*	6.061	12.106	98
IUPUI exam (20-questions)	5.918 (0.430)*	12.306 (0.430)*	6.388	14.843	85

*Value in parenthesis is combined standard error for Pretest and Posttest using unpaired t-test and assuming equal variances.

The unpaired t-test was used to compare the Normalized PERFORMANCE of the two instructors. The null hypothesis of equal means was not rejected at 0.05 level, indicating student PERFORMANCE were not significantly different between the instructors. The objective is to examine whether the Aplia online assignments did have a significant impact and to assess the

contribution of online assignments on students' PERFORMANCE along with other explanatory variables. In order to examine the presence of multicollinearity among the dependent and other explanatory variables (PRETEST, MIDTERM 1, MIDTERM 2, MIDTERM 3), the Variance Inflation Factor (VIF) was estimated for the respective variables. All the estimated values for VIF is less than two (2), indicating that there is no problem of multicollinearity

The dependent variable is normalized performance as constructed using model one (1). Two Tobit models in model (3) were estimated, using similar explanatory variables, except APLIADUMMY and APLIASCORE. The SAS program procedure was used with upper (100) and lower (0) ceiling values. The estimated coefficients of the Tobit models and the average marginal effects are presented in Table 3. The marginal effects in this model are interpreted as the impact of a percentage change of an independent variable on the dependent variable (in percentages), while other variables remain constant.

Table 3: Tobit Model Estimated Coefficients and Marginal Effects with PERFORMANCE as dependent variable**

Model 1			Model 2		
Variable	Coefficient	Marginal Effects	Variable	Coefficient	Marginal Effects
Intercept	-9.553 (20.230)		Intercept	-1.406 (22.543)	
GENDER	1.837 (5.746)	1.492	GENDER	1.998 (6.356)	1.653
NOPRIOEC	-3.039 (5.920)	-2.469	NOPRIOEC	-3.063 (6.683)	-2.534
APLIADUM	-0.969 (6.372)	-0.787	APLIASCORE	0.091 (0.079)	0.016
CGPA	20.195* (5.279)	16.404	CGPA	16.351* (6.625)	13.526
CECH	-0.210 (0.135)	-0.171	CECH	-0.022 (0.152)	-0.182

(Value in parenthesis below are standard errors and * indicates significance at 5% level)

** Apla Dummy is included as an independent variable in the model.

The results in Tables 3 show that neither APLIASCORE nor APLIADUMMY variables are significant and that only CGPA variable have a significant effect on student's achievement, which is consistent with various related literature. Since, APLIADUMMY is not significant, our results suggest that those students who were required to do Apla online assignments did not have a significantly contribute to students' PERFORMANCE. Our results suggest that Apla assignments do not potentially improve students' achievement. These results were actually not expected considering the objectives of our research. This could possibly be explained by the fact that the benchmarking techniques used in the study do not adequately contribute to the assessment of student's achievement. For instance, we based students' PERFORMANCE on the difference between PRETEST and POSTTEST. But this approach to benchmarking students' achievement

or evaluating learning outcomes was found to have some wide ranging limitations as appropriate tools of assessment of students' achievement. Clearly, in a Brief Guide to Selecting and Using Pre-Post Test Assessments prepared by the National Evaluation and Technical Assistance Center for the Education of Children and Youth, report indicated that who are neglected, delinquent, and at-risk, fatigue effects, motivational effects and length of test were all found to have a significant impact on the pre-post test results (NETAC, 2006). Similarly, in a recent evaluation guide to data collections methods from pre-post test results prepared by the University of Illinois at Chicago document on student assessment, underscored the fact that performance tests using pre-tests and post-tests can be influenced by differences in individual participation in activities throughout the semester and that test scores may be influenced by factors such as literacy levels, language fluency, and negative attitudes towards school or tests (Zimmermann, 2006).

Considering the above-mentioned limitations resulting from using the difference between PRETEST and POSTTEST as a measure of PERFORMANCE, an alternative approach was adopted. In this study the POSTTEST is used as a measure of achievement (dependent variable), while at the same time, include the PRETEST and MIDTERM exams as independent variables in the Tobit model. Accordingly, Tables 4, 5, and 6 are each based on two sets of models specifications with the estimated coefficients using POSTTEST as a dependent variable and PRETEST as an independent variable. More importantly, one model includes APLIADUMMY as an independent variable (model 1 in tables 4, 5, 6) while the model 2 includes APLIASCORE. In addition, MIDTERM1, MIDTERM2 and MIDTERM3 are also included as independent variables in both sets of models with the results displayed in Tables 4, 5 and 6, respectively. Like we mentioned previously, test results can be influenced by differences in individual participation in activities throughout the semester. Using midterm results, therefore, adequately provides more depth on the student's learning curve and provides overall effectiveness of assessing changes to individual students' achievement during the semester.

Table 4: Estimated Coefficients and Marginal Effects

Model 1			Model 2		
Variable	Coefficient	Marginal effect	Variable	Coefficient	Marginal effect
Intercept	3.117 (8.640)		Intercept	1.812 (9.742)	
PRETEST	2.022* (0.454)	1.858	PRETEST	1.782* (0.507)	1.628
MIDTERM1	0.34* (0.083)	0.313	MIDTERM1	0.352* (0.095)	0.322
APLIADUMMY	-3.280 (3.162)	-3.013	APLIASCORE	0.159* (0.081)	0.145
CGPA	10.561* (2.641)	9.702	CGPA	7.213* (3.397)	6.593
CECH	-0.026 (0.063)	-0.024	CECH	-0.069 (0.073)	-0.063

Note: Figures in parentheses are standard errors and * indicates significance at 5% level

Table 5: Estimated Coefficients and Marginal Effects:

Model 1			Model 2		
Variable	Coefficient	Marginal effect	Variable	Coefficient	Marginal effect
Intercept	13.040 (8.316)		Intercept	11.567 (9.233)	
PRETEST	1.92* (0.459)	1.768	PRETEST	1.561* (0.521)	1.429
MIDTERM2	0.31* (0.080)	0.285	MIDTERM2	0.283* (0.089)	0.259
APLIADUMMY	-2.872 (3.152)	-2.644	APLIAScore	0.188* (0.081)	0.173
CGPA	8.608* (2.881)	7.924	CGPA	5.821 (3.606)	5.330
CECH	-0.013 (0.063)	-0.012	CECH	-0.041 (0.074)	-0.037

Note: Figures in parentheses are standard errors and * indicates significance at 5% level

Table 6: Estimated Coefficients and Marginal Effects:

Model 1			Model 2		
Variable	Coefficient	Marginal effect	Variable	Coefficient	Marginal effect
Intercept	10.100 (8.538)		Intercept	11.454 (9.727)	
PRETEST	1.893* (0.477)	1.742	PRETEST	1.725* (0.542)	1.578
MIDTERM3	0.223* (0.080)	0.205	MIDTERM3	0.128 (0.094)	0.117
APLIADUMMY	-2.485 (3.231)	-2.287	APLIAScore	0.185* (0.084)	0.169
CGPA	11.022* (2.795)	10.143	CGPA	8.841* (3.592)	8.086
CECH	0.013 (0.067)	0.012	CECH	-0.040 (0.078)	-0.037

Note: Figures in parentheses are standard errors and * indicates significance at 5% level

The level of significance of the APLIADMMY in Tables 4, 5 and 6 indicate that Aplia online assignments did not have a significant impact on students' POSTTEST performance. This result is very much consistent with the previous research findings, where use of technology does not contribute to student learning. However, PRETEST, MIDTERMS and CGPA are all significant in model 1. The results suggest that, students, in both groups, who were enrolled in the class with higher PRETEST score, higher CGPA and do better in their MIDTERMS are likely to score higher

on their POSTTEST exams. The interesting and important finding of the research is the significance of APLIASCORE in models 2, which are presented in tables 4, 5 and 6. The results indicate that Aplia assignments could potentially improve student's achievement in the POSTTEST. The APLIASCORE coefficients range from 0.159 to 0.188, which indicate that for each one percentage increase in the APLIASCORE for students in the treatment group the POSTTEST score is likely to improve by about 0.2 percentage point. More importantly, PRETEST, MIDTERMS and CGPA are significant but have slightly lower magnitude of their coefficients compared to the runs with Aplia Dummy. This study, therefore, demonstrates that the students performance in Aplia assignments have the potential to improve the student's learning outcomes. These results findings are significant as the analysis focus on learning assessment. Azevedo et al. (2008) argues that effective learning involves "analyzing the learning situation, set meaningful learning goals, determine which strategies to use, assess whether the strategies are effective in meeting the learning goal(s)." ELearning not only diversifies the options that are available for learning, but also provides a greater opportunity for self-learning as well. Prior to the completing the required online assignments, students were provided web-based practice problem sets, which were considered to be "Instructional scaffolding." There are many advantage of "Instructional scaffolding" particularly in an eLearning environment. The greater benefits to students stem from the opportunity for self-paced constructive learning with a feedback mechanism, where student has the option to master the material by repeatedly going over the practice problem sets and can spend longer time in completing the Graded web-based assignments.

Traditionally, CGPA has been used as a measure of academic achievement, where Latif et al. (2006) have found that higher GPA students are more likely to do better in the examination. The positive and significant coefficient of the CGPA variable indicates that students with higher CGPA are more likely to have higher POSTTEST scores. Higher CGPA students may possess some other traits that help them to do better in college. For example, Laidra et al., (2007) have found that intelligence is the best predictor (measured using Raven's Standard Progressive Matrices) of achievement, while Kobal and Musek (2001) reported a positive association between creativity and student achievement. Perhaps, these other traits explain, in part, the Posttest achievement in our macroeconomic classes.

We included the GENDER variable based on the findings of Ong and Lai (2004), where the authors have found that women employees' perception for usefulness of eLearning is higher than men and recommended the use of gender as a factor in the development and testing of eLearning theories. However, our initial research findings (see Tables 2) show that GENDER is not an important factor in student's achievement, given that GENDER variable was insignificant. This could possibly be due to the fact that our sections were gender-segregated, as required by Kuwaiti law. We also included CECH, as a measure of college experience, but given that it was insignificant in all the results for the different models indicates this is not an important factor in students' achievement.

Conclusion

Previous research findings with regard to use of eLearning as a useful tool to improve learning outcome are mixed. Most research articles focused on the integration of eLearning into traditional learning models, but few articles focused on the impact of eLearning on students'

achievement. In this study, we quantify the impact of eLearning on student learning outcomes using standardized exams. Our findings indicate that eLearning is less likely to contribute towards students' achievement in principles of macroeconomics. Use of e-learning technology is less effective in classrooms learning, yet the technology can be efficient in students' learning. Moreover, those who join the class with some level of macroeconomic knowledge, as indicated in the PRETEST score, are likely to do better on their MIDTERMS and are likely to attain higher score on their POSTTEST. Furthermore, our research confirms that the students with higher CGPA are likely to perform better, which is consistent with previous related studies.

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AI TRANSFORMS HEALTHCARE: DOES AI REPLACE DOCTORS OR AUGMENT THEIR ROLE

Rauf F.H.A.

*Department of Management
Faculty of Management and Commerce
South Eastern University, Sri Lanka
fharauf@seu.ac.lk*

Zeena A.R.F.

*Faculty of Medical Sciences,
University of Sri Jayewardenepura,
Sri Lanka
arfzeena@gmail.com*

Introduction

Artificial Intelligence (AI), which refers to the "ability of machines to simulate human intelligence", is rapidly advancing in the field of medicine. Its essential feature is its ability to process massive amount of data and automate of repetitive works. The speed of AI is much faster than speed of human.

There is a continuous debate about the possibilities of AI replacing human jobs. Technology is developing rapidly. Hence, public is more concern about losing employment opportunities. However, the question of whether AI will fully replace jobs is not simple. This question cannot be answered with simple 'yes' or "no".

AI has replaced many jobs. For example, Amazon and banks use AI in their business. However, AI has also created many jobs and new avenues. Further, AI has taken over the routine activities. Therefore, human is free for formulating strategies and innovation. For instance, healthcare professionals are now able to use AI to interpret medical images and forecast disease outbreaks. Therefore, they are able to invest their time on more productive activities such as direct patient care and complex decision in clinical works (Topol, 2019).

Medicine is a human-centered profession. It is based on empathy, instant clinical judgment, ethical responsibility and accountability. Health care field has been integrated with AI. Although AI enhance efficiency, it is a question that weather AI truly replace the complex, nuanced responsibilities inherent in medical practice.

The objectives of this papers are:

1. To explore the nature of the medical profession
2. To explain how AI is transforming and supporting clinical practice
3. To highlight the limitations of AI in the medical profession
4. To indicate the emerging paradigm of 'augmented intelligence'.

Doctors and AI

As medical professionals are responsible for clinical diagnosis and critical decision making, they play complex role. They gather information from patients and integrate the information. They perform clinical examination and combine diagnostic tests to reach accurate conclusions.

Success in this process depends heavily on the ability of making decisions in uncertain situations and the level of experience of medical professionals. When planning treatment, doctors consider patient preferences and potential risks. They may decide to treat the patient through medications, surgical procedures, or lifestyle changes. Before taking such decision, doctors communicate diagnoses and discuss prognoses. They are concerned about empathy and clarity when they handle emotionally sensitive conversations. They follow a holistic approach collaborating with nurses, specialists, pharmacists, therapists, and administrative staff to reach all inclusive decisions and actions. Moreover, they shoulder substantial ethical and legal responsibilities. As medicine is a constantly evolving discipline, doctors must remain updated with new research findings, clinical practices. Therefore, they have to continuously develop their professional expertise.

AI has improved efficiency in clinical activities. It processes and interprets large volume of lab results and histories of patients. Natural Language Processing (NLP) and telemedicine have reduced the time consumption for administration and documentation. Smart wearable devices powered by AI now monitor vital signs such as heart rate, blood pressure and glucose levels. AI consider the patient's genetic profile, lifestyle and health data and AI supports personalized treatment. Predictive models can anticipate individual responses to medications. AI can identify conditions such as pneumonia, breast cancer, and retinal diseases (Topol, 2019). Google Health's AI accurately detect diabetic retinopathy (Gulshan et al., 2016). Google's DeepMind can accurately diagnose breast cancer (McKinney et al., 2020). AI is capable of analyzing electronic health records (EHRs) and describe patients risk for sepsis, heart failure, or hospital re-admission, facilitating timely interventions (Rajkomar et al., 2018). Similarly, AI powered Clinical Decision Support Systems (CDSS) provide real time evidence based recommendations for treatment. IBM Watson suggests suitable cancer therapies and supports oncologists (Jiang et al., 2017). Moreover, virtual health assistants and chatbots improve administrative efficiency by providing health guidance and scheduling appointments.

Does AI Fully Replace Doctors?

Medical AI is rapidly improving. Many argue about the future of doctors. However, experts are of the view that AI can support to enhance productivity, but it cannot replace the doctors. While AI has significant capabilities, it lacks the ability to replace a human doctor. AI lacks empathy, compassion and emotional intelligence. These are essential traits for caring patient. Healthcare is intrinsically human for a patient. AI cannot create trust. As Dr. Eric Topol writes (2019), "Patients don't want a cold diagnosis, they want to be heard and understood."

Doctors make decisions based on their clinical experience, intuition, and a deep understanding of a patient's unique circumstances. Doctors generally consider social, cultural, and ethical dimensions when recommending treatments. These "soft" factors are not possible with AI. When AI is integrated into healthcare, human judgment is necessary. Because, ethical and legal challenges with regard to data privacy, algorithmic bias and accountability. Therefore, there is an urgent need for regulations and ethical guidelines (Morley et al., 2020). AI is struggling with complex, rare, or unpredictable medical cases. Patients value the empathy and reassurance given by human doctors, especially when facing serious or emotionally sensitive health concerns. Another critical issue with AI is accountability. What will happen, if an AI system makes an error? Who will be responsible? Is it the doctor using it? Is it the AI developer

who built it? Or the institution which uses it? According to the current system, doctors are legally and ethically responsible, reinforcing the need for them to remain central in decision making. In addition to that, the quality of the data determines the effectiveness of AI. Biased, incomplete, or lack diversity dataset will results in inaccuracies (Obermeyer et al., 2019). Another significant issue is the problem of the "black box". AI lacks explainability. Often, the reasoning behind AI outputs is not transparent. But the medical field requires trust, clarity, and accountability (Samek et al., 2017).

Conclusion

AI plays dual roles; while it functions as a disruptive force, it also functions as a driver of innovation in the job market. It ideally replace jobs which are repetitive, manual. However, AI can only reshape other jobs like doctors. We should not view AI as a threat. AI can be a valuable collaborator with doctors to improve their productivity and quality care. As AI has ability to analyze massive volume of patient's records, doctors can detect disease early. Doctors are able to initiate earlier interventions. When administrative activities are automated, doctor burnout will be reduced. Therefore, doctors have more time to intervene in patients directly. Further, doctors can make faster and evidence-based decisions with the support of AI-powered clinical decision support systems.

Doctors deal patient as human and take decision in complex situations. AI serves with transformation for healthcare. However, it has no inherent characters of human such as interpersonal and ethical elements. Ability to response to a situation is possible with human which is necessary for medical practice. AI can be leveraged to support, but it cannot replace doctors (WHO, 2021). While AI interpret scans in a few seconds, doctors should integrate them within the clinical context. AI can propose many possible diagnoses, but doctors have to judge them from the viewpoint of patient preferences. They assess all other coexisting conditions and practicality. AI can propose drugs, but finally doctors analyze the side effects, monitor adherence, and ensure patient understanding. Brynjolfsson and McAfee (2014) emphasized that synergy created between human and technology will increase performance. As medicine is a high stakes field, machines or automation are not trust worthy.

Doctors should actively contribute in designing regulations on how to use AI and ensure new AI technology support healthcare and not replace human caregivers. The knowledge of AI literacy and importance of collaboration among disciplines should be given to doctors and prepare them to shape for the future. This will lead to harmonious work between technology and human empathy. Medical community should not fear about AI. Rather, they should accept it as a great collaborator to enhance patient care and contribute towards progressing global health. D'Adderio said, "AI is not infallible; we still need clinicians to verify its accuracy retrospectively." Dr. Jesse Ehrenfeld stated that "AI won't replace doctors," he says, but doctors who use AI will replace those who don't. AI is not a replacement. But, AI should be considered as a valuable contributor in delivering enhanced healthcare. This is the concept of "augmented intelligence", not just artificial intelligence.

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INFLUENCE OF SOCIAL MEDIA AND DIGITAL TECHNOLOGY ON MEDIA TRIALS: MANAGING FAIRNESS AND JUSTICE IN THE DIGITAL AGE

Ms. Sornalakshmi R.R

*Research Scholar, Saveetha School of Law
Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai
sornalakshmiravi@gmail.com*

Dr.Sailaza

*Professor, Research Supervisor, Saveetha School Of Law
Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai*

Dr.S.Thangamayan

*Associate Professor, Saveetha School Of Law
Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai*

Abstract

This paper aims at studying the impact of the media trial in social platforms on the Indian judiciary. The current trend of media on reporting cases commonly known as "Trial by media" has witnessed the sensation of self-manifested stories, half-baked truth resulting in the violation of the right of individuals, resulting in media reporting transforming into a media circus. In India, media trials have assumed significance. There have been several cases where the media had taken the case into their own hands and declared judgement against an accused contrary to fair trials in court. An empirical research is done with a sample size of 200. The sample frame is Chennai, Tamil Nadu. The main aim of the study is to find out the impact of media trial on Indian judiciary. The independent variables are age, gender, marital status, educational qualification and occupation. The dependent variables are the awareness of media trials, its effect on judges, and independence of judiciary, contempt of court and implications of media trial on judiciary. The advent of social media and digital technology has revolutionized the dissemination of information, significantly impacting the dynamics of media trials. This study explores the dual-edged influence of these technologies on justice and fairness within the judicial process. While social media platforms enable real-time public discourse and democratize access to information, they also risk undermining the presumption of innocence by fostering widespread prejudice. This research critically examines how digital narratives shape public opinion, potentially influencing judicial outcomes and compromising fairness. The statistical tools used in the study are graphical representation and correlation analysis. The media trial has a negative impact on the judiciary. The media trial has a subconscious effect on the judge's decision. The findings underscore the need for regulatory measures that uphold the integrity of legal proceedings in the digital age, ensuring that the pursuit of justice remains untainted by external pressures.

Keywords: Media trial, Indian judiciary, Effects, Independence judiciary, Judgement.

Introduction

Media is very essential for democracy. It serves the purpose of 'gatekeeper' and a 'watchdog' of the society. The media acts as a multifaceted institution with multiple activities. It takes the message simultaneously from all the parties involved and builds the opinion on an issue, which definitely threatens the establishment from violating rights with the growth of the number of

news channels and in increasing popularity of "breaking news." Electronic Media has come to play a major role in stirring public opinion and consciousness. Public advocacy outside the court through a well- established mechanism like lobbying, negotiations and mobilisation of public opinion has been effectively undertaken by the media. Freedom of media is the flexibility of individuals to be educated on on-going issues. Unlike the U.S. Constitution, Article 19(1)(a) does not expressly mention the liberty of the press i.e. freedom to print and to publish what one pleases without prior permission.

The current trend of media on reporting cases commonly known as "Trial by media" has witnessed the sensation of self-manifested stories, half-baked truth resulting in the violation of the rights of individuals, resulting in media reporting transforming into a media circus. It is often seen that media houses are acting as "public court" and are starting to interfere with the proceedings of the court which completely overlooks the vital gap between an "accused" and a "convict" keeping at stake the golden principles of "presumption of innocence until proven guilty" and "guilt beyond a reasonable doubt". "Freedom of Speech and Expression" is provided through various processes; however, this right is not completely unrestricted and as already mentioned certain "reasonable restrictions" can be imposed. Like the need for maintaining and preserving "freedom of speech and expression" in a democracy. It is also important to put some restrictions on that freedom for the purpose of maintaining the social order.

In India, media trials have assumed significance. There have been several cases where the media had taken the case into their own hands and declared judgement against an accused contrary to fair trials in court. There have been quite infamous cases as well that outraged the public and impacted the Judiciary such as The Jessica Lal case, 2010, where the media rejoiced over their efforts in bringing justice to Jessica Lal and the trial court had acquitted the accused of all the charges. The Priyadarshini Mattoo case, 2006 where a law student was raped and murdered, and the judgment of this case was suspected to have been influenced by Media Trial. The Bijal Joshi rape case and Nitish Katara murder case gave credits to media where the accused would have gone unpunished if media would not have intervened. But on the other side, the media also pinpointed innocent people in the Malegaon blast and Maria Susairaj case ignoring the importance of accuracy.

Media trial in Digital Age

In the contemporary digital age, the intersection of social media, digital technology, and media trials has profoundly reshaped the landscape of justice and fairness. Media trials, traditionally defined as high-profile cases extensively covered by the media, have evolved significantly with the advent of social media and digital technology. What was once predominantly the domain of traditional media outlets has now expanded to include instantaneous and widespread coverage on platforms like Twitter, Facebook, and YouTube. The immediacy and reach of digital platforms allow trial proceedings, evidence, and opinions to be disseminated globally in real-time, shaping public perception and potentially influencing judicial processes.

Literature Review

A K Mittal (2016) focuses on the history of freedom of press and the trial by the media and its impact on the judicial trial. It further discusses the need for a regulatory measure to stop the

media trials. The 200th report by the Law Commission of India on Trial by Media discusses the Human Rights Convention, the Madrid Principles, The Constitution of India and the Contempt of Court Act; it also states how the publications in the media are affecting the judges' decisions.

Arunav Talukdar (2018) focuses on all the aspects of media trial, freedom of speech and expression and freedom of press in India. Starting from the role of media in a democratic country like India and its status in the country and then the misuse by the trial by the media. It further discusses the impact of trial by the media on the public minds of the Judges as well as the administration of justice in the country.

Anil Kumar (2021), discusses the freedom of press and how this freedom was included under the Constitution of India. Thereafter, the situation of media trials in India is also explained and how these trials are violating the rights of the accused as well as the victims of any case.

Objectives of the Study

To study the consequence of trial by media and its impact on Indian judiciary.

To analyse the legal implications of media trials in these digital platforms.

Statement of the Problem

The advent of social media and digital technology has transformed the landscape of media coverage, particularly in the context of high-profile legal cases. Traditionally, media trials were primarily conducted through print and broadcast outlets, with journalists shaping public perceptions of guilt or innocence. However, in the digital age, platforms like Twitter, Facebook, and Instagram, along with blogs and online forums, have democratized content creation and dissemination. This shift has led to a more immediate, widespread, and often unregulated influence on public opinion, which can compromise the fairness of legal proceedings. The problem lies in the fact that social media allows for the rapid spread of information often without verification which can result in the public forming biased opinions before a court trial even begins. This phenomenon, commonly referred to as "trial by media," can place undue pressure on the judicial process, potentially leading to miscarriages of justice. Jurors, judges, and even legal professionals are not immune to the pervasive influence of social media narratives, which can subtly or overtly sway their decisions.

Methodology

The type of research adopted here is empirical research. A total of 202 samples have been collected. The samples have been collected through a random sampling method. The sample frame taken here is through online, in and around Chennai, Tamil Nadu. The independent variables are age, gender, marital status, educational qualification and occupation. The dependent variables are the awareness of media trials, its effect on judges, and independence of judiciary, contempt of court and implications of media trial on judiciary. The statistical tools used in the study are graphical representation and correlation analysis.

Research Design

There are various research techniques that can be employed to conduct research studies. Qualitative and quantitative approaches are sometimes not adequate to offer a comprehensive examination of a phenomenon. The mixed-methods design was appropriate because it suits a comprehensive examination of the influence of media trials on court determinations.

Research Questions

Is there a positive correlation between court verdicts and media trials in India?
 What is the effect of media trials on the Indian criminal justice system?

Hypothesis

Ho: There is no positive correlation between court verdicts and media trials in India and media trials do not affect the Indian criminal justice system.

H1: There is a positive correlation between court verdicts and media trials in India and trials interfere with the provision of justice in the Indian criminal justice system.

Analysis

Figure 1

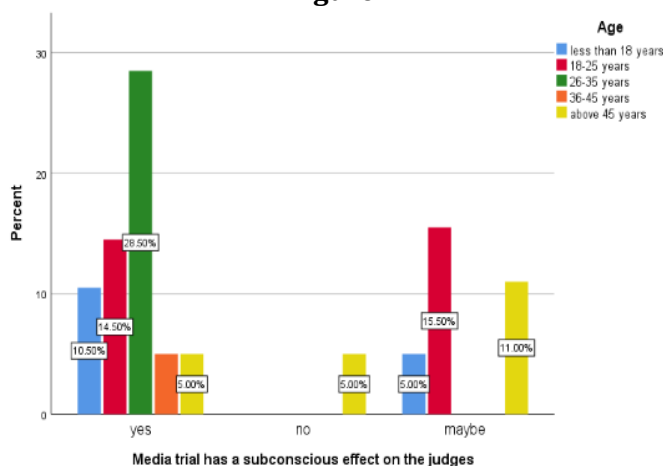
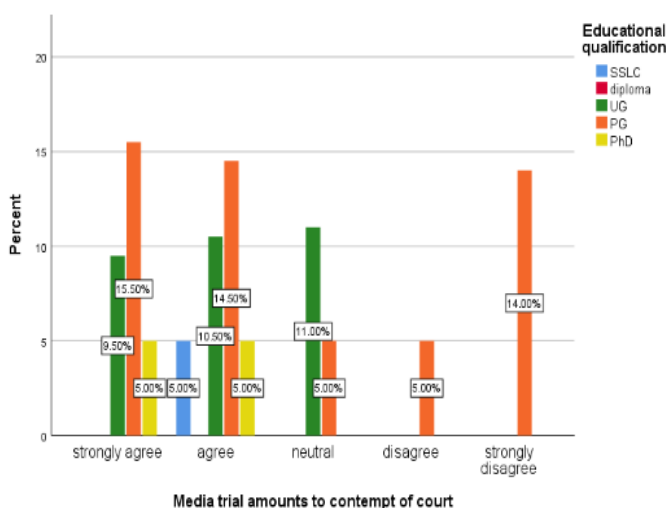


Figure 1 shows the age distribution of the respondents and their opinion on the subconscious effect of media trial on judges.

Figure 2



Legend:

Figure 2 shows the educational qualification of the respondents and their opinion on media trials amounting to contempt of court.

Figure 3

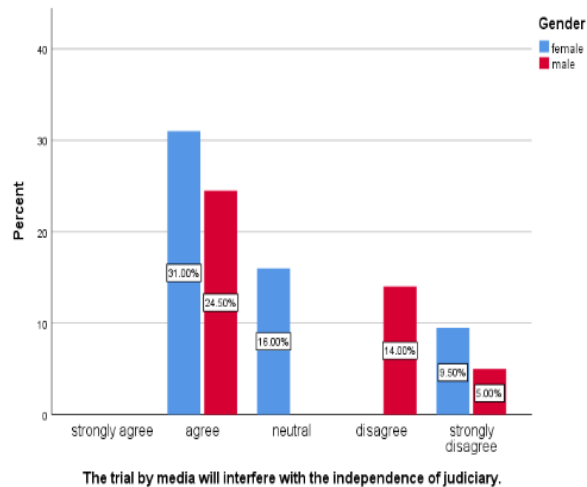


Figure 3 shows the gender distribution of the respondents and their opinion on the interference of media trials on independence of judiciary.

Figure 4

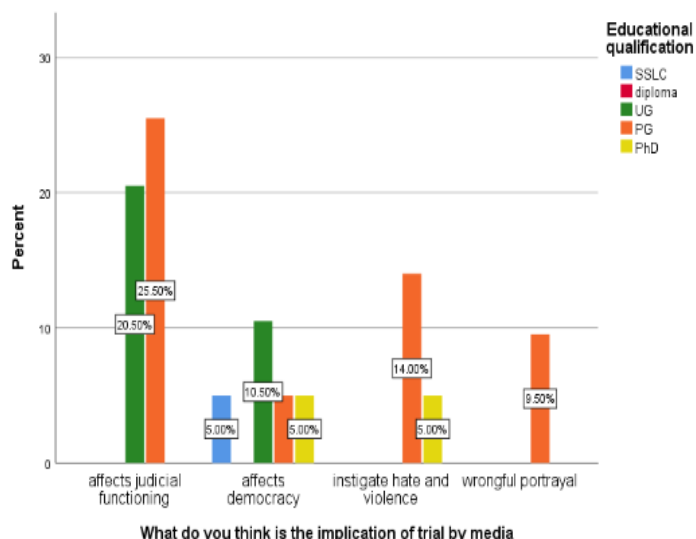


Figure 4 shows the educational qualification of the respondents and their opinion on the implication of media trial.

Figure 5 The Trial by Media will interfere with the Independence of Judiciary

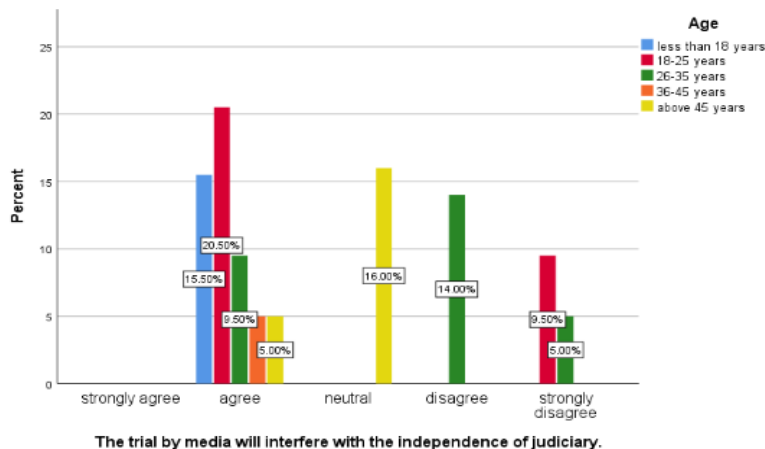


Figure 5 shows the age distribution of the respondents and their opinion on the interference of media trials on independence of judiciary.

Figure 6

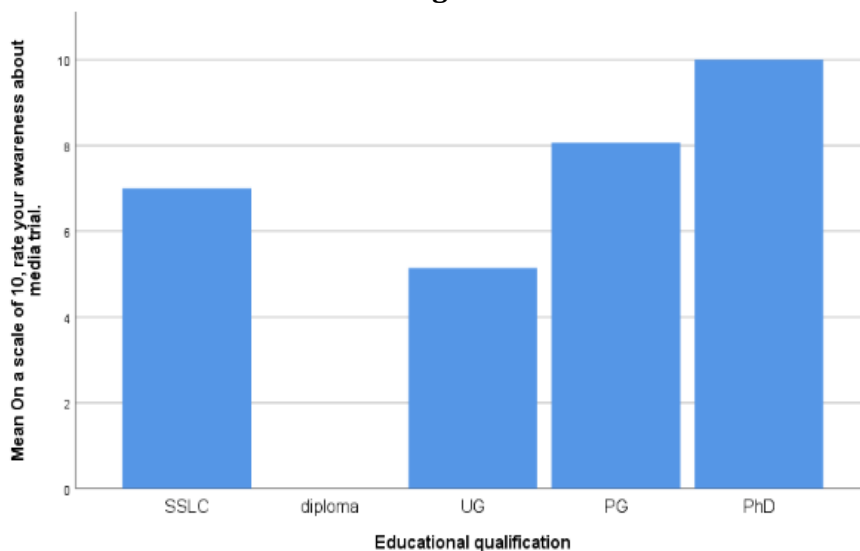


Figure 6 shows the educational qualification of the respondents and their level of awareness about media trial.

Table 1

Null Hypothesis: There is no significant relationship between the educational qualification of the respondents and their opinion on the subconscious effect of media trial on judges.

Alternate Hypothesis: There is a significant relationship between the educational qualification of the respondents and their opinion on the subconscious effect of media trial on judges.

Correlations

		Educational qualification	Media trial has a subconscious effect on the judges
Educational qualification	Pearson Correlation	1	-.350**
	Sig. (2-tailed)		.000
	N	200	200
Media trial has a subconscious effect on the judges	Pearson Correlation	-.350**	1
	Sig. (2-tailed)	.000	
	N	200	200

** . Correlation is significant at the 0.01 level (2-tailed).

Legend

Table 1 shows the relationship between the educational qualification of the respondents and their opinion on the subconscious effect of media trial on judges.

Table 2

Null Hypothesis: There is no significant relationship between the educational qualification of the respondents and their opinion on media trials amounting to contempt of court..

Alternate Hypothesis: There is a significant relationship between the educational qualification of the respondents and their opinion on media trials amounting to contempt of court.

Correlations

		Educational qualification	Media trial amounts to contempt of court
Educational qualification	Pearson Correlation	1	.063
	Sig. (2-tailed)		.375
	N	200	200
Media trial amounts to contempt of court	Pearson Correlation	.063	1
	Sig. (2-tailed)	.375	
	N	200	200

Legend:

Table 2 shows the relationship between the educational qualification of the respondents and their opinion on media trials amounting to contempt of court.

Table 3

Null Hypothesis: There is no significant relationship between the educational qualification of the respondents and their opinion on interference of media trials on independence of judiciary.

Alternate Hypothesis: There is a significant relationship between the educational qualification of the respondents and their opinion on interference of media trials on independence of judiciary.

Correlations

		Educational qualification	The trial by media will interfere with the independence of judiciary.
Educational qualification	Pearson Correlation	1	-.031
	Sig. (2-tailed)		.660
	N	200	200
The trial by media will interfere with the independence of judiciary.	Pearson Correlation	-.031	1
	Sig. (2-tailed)	.660	
	N	200	200

Table 3 shows the relationship between the educational qualification of the respondents and their opinion on interference of media trials on independence of judiciary.

Table 4

Null Hypothesis: There is no significant relationship between the educational qualification of the respondents and their opinion on the implication of media trial.

Alternate Hypothesis: There is a significant relationship between the educational qualification of the respondents and their opinion on the implication of media trial.

Correlations

		Educational qualification	What do you think is the implication of trial by media
Educational qualification	Pearson Correlation	1	.262**
	Sig. (2-tailed)		.000
	N	200	200
What do you think is the implication of trial by media	Pearson Correlation	.262**	1
	Sig. (2-tailed)	.000	
	N	200	200

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows the relationship between the educational qualification of the respondents and their opinion on the implication of media trial.

Results

In figure 1, most of the respondents of the age 18-25 years (28.50%) have agreed that media trial has a subconscious effect on judges. In figure 2, most of the PG respondents (15.50%) agreed that media trial amounts to contempt of court. In figure 3, most of the female respondents (31%) agreed that media trials will interfere with the independence of the judiciary. In figure 4, most of the PG respondents (25.50%) felt that media trials affect judicial functioning. In figure 5, most of the respondents belonging to the age group 18-25 years (20.50%) agreed that media trials will interfere with the independence of the judiciary. In figure 6, on a scale of 10 an average score of 4 was given by the respondents showing the lack of awareness on media trials. In table 1, the correlation coefficient is less than 1 showing that there is a negative correlation and it is weakly correlated. In table 2, the correlation coefficient is less than 1 showing that there is a positive correlation and it is weakly correlated. In table 3, the correlation coefficient is less than 1 showing that there is a negative correlation and it is weakly correlated. In table 4, the correlation coefficient is less than 1 showing that there is a positive correlation and it is weakly correlated.

Discussion

Most of the respondents of the age 18-25 years have agreed that media trials have a subconscious effect on judges. Trial by media can have an effect on the subconscious psyche of a judge trying the particular case. In *P C Sen (In Re)*, the SC clearly stated that "an action which tends to influence a jury can also influence a judge." Moreover, this can be attributed to the classic case of *K M Nanavati* where the media had sensationalised the story and portrayed the accused as the victim instead. This narrative had a lot of influence on the jury members which led them to decide in the favour of the accused. Thus, media trials do have an impact on the functioning of the adjudicatory authority and can be held guilty of colouring the opinion of a judge in the sensationalized matter (**Figure 1**). Most of the PG respondents agreed that a media trial amounts to contempt of court. Section 2 defines civil and criminal contempt of court. Clause (c) of the said Act specifically mentions the guidelines for publication i.e. publications that scandalize, prejudice, or interfere with the judicial proceedings or administration of justice will amount to contempt of the court. Section 3, 4, 5 further clarifies and gives additional guidelines that can be interpreted to differentiate between a fair publication and a prejudicial publication (**Figure 2**). Most of the female respondents (31%) agreed that media trials will interfere with the independence of the judiciary. In *MP Lohia Vs. State of West Bengal*, that the SC observed that biased material published by the media paints the accused in a bad light without appreciating the efforts of the court in deciding the matter critically, analysing all documents submitted by both parties; it certainly interferes with the course of administration of justice. Further, the court cautioned the press against indulging in a trial of their own when the matter is sub judice. The digital platform being accessible to everyone and having an enormous reach among the public by interfering in the judicial process will not only tamper the opinion of the public but also the independence of judiciary. (**Figure 3**). Most of the PG respondents (25.50%) felt that media trials affect judicial functioning. Media trials exert a profound influence on judicial functioning, significantly impacting various aspects of the legal process, from pre-trial proceedings to the final verdict. This phenomenon refers to the extensive and often sensationalized coverage of high-profile cases by media outlets, both traditional and digital. Understanding how media trials affect judicial functioning requires examining their implications on procedural fairness, public perception, and the broader administration of justice. (**Figure 4**). Most of the respondents belonging to the age group 18-25 years (20.50%) agreed that media trials will interfere with the independence of the judiciary. In the case of *Sidhartha Vashist @ Manu Sharma Vs. State (NCT of Delhi)* the SC took into account the danger of serious risk of prejudice if the media exercises unregulated freedom. Moreover, the freedom of speech under Article 19(1) must be carefully and cautiously used, so as to prevent any hindrance or interference with the administration of justice; which may lead to undesirable results in matters sub judice before the courts. Social media effects on Media trials profoundly affect judicial functioning by influencing procedural fairness, shaping public perception, and presenting challenges to legal professionals and institutions. While Social media and digital platform coverage plays a crucial role in promoting transparency and accountability, its potential to distort legal processes underscores the importance of balancing media freedoms with the principles of fair and impartial justice. (**Figure 5**). On a scale of 10 an average score of 4 was given by the respondents showing the lack of awareness on media trials. Trial by media is a phrase popular in the late 20th century and early 21st century to describe the impact of

television and newspaper coverage on a person's reputation by creating a widespread perception of guilt or innocence before, or after, a verdict in a court of law. In recent times there have been numerous instances in which the media has conducted the trial of an accused and has passed the verdict even before the court passes its judgement (**Figure 6**). The correlation coefficient is less than 1 showing that there is a negative correlation and it is weakly correlated. There is a significant relationship between the educational qualification of the respondents and their opinion on the subconscious effect of media trial on judges. Thus the alternate hypothesis is accepted (**Table 1**). The correlation coefficient is less than 1 showing that there is a positive correlation and it is weakly correlated. There is a significant relationship between the educational qualification of the respondents and their opinion on media trials amounting to contempt of court. Thus the alternate hypothesis is accepted (**Table 2**). The correlation coefficient is less than 1 showing that there is a negative correlation and it is weakly correlated. There is a significant relationship between the educational qualification of the respondents and their opinion on interference of media trials on independence of judiciary. Thus the alternate hypothesis is accepted (**Table 3**). The correlation coefficient is less than 1 showing that there is a positive correlation and it is weakly correlated. There is a significant relationship between the educational qualification of the respondents and their opinion on the implication of media trials. Thus the alternate hypothesis is accepted (**Table 4**).

Limitations

The study was carried out in Chennai limits and the results cannot be generalized to the rest of the population. The sample is not balanced as regards gender, because it was incidental, which means that our interpretation of this variable is limited.

Conclusion

From the above analysis it can be concluded that the media trial has a negative impact on the judiciary. The media trial has a subconscious effect on the judge's decision. The media also hampers the independence of the judiciary and affects judicial functioning. Media should only engage in acts of journalism and not act as a special agency for the court. Though the media acts as a watchdog and brings us a platform where the people can know about the things happening in a society, it is important to know that this has only led to the whole of the world being biased against one community or a single person. Media should understand that its role is to raise issues which the public is facing. Media can be a voice for those who can't speak for themselves. Media should not deliver judgement because in India we have a judiciary for this purpose. Media should maintain its code of laws and ethics, social responsibility and credibility by not interfering in the matters of court so early. Social media platforms serve as catalysts for public discourse, enabling unprecedented levels of engagement and interaction regarding legal cases. This phenomenon amplifies both the positive and negative aspects of media trials:

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DETERMINANTS OF POVERTY ALLEVIATION THROUGH MICROFINANCE: EVIDENCE FROM AMPARA DISTRICT, SRI LANKA

MIM. Riyath & A. Jahfer

*Department of Accountancy and Finance
Faculty of Management and Commerce
South Eastern University of Sri Lanka
riyath@seu.ac.lk & jahfer@seu.ac.lk*

Abstract

This study investigates how microfinance influences poverty alleviation in Sri Lanka's Ampara District by modeling the relationships among loan amount (LA), interest rate (IR), accessibility of obtaining loans (AL), savings (S), and repayment ability (RA) as predictors of self-reported poverty alleviation (PA). Employing a quantitative design, primary data were collected via structured questionnaires and analyzed using a regression framework consistent with the study's conceptual model and hypothesis set. The analysis indicates that S, LA, and RA are positively and significantly associated with PA, IR exhibits a negative but statistically insignificant association, and AL shows a positive but also insignificant association with PA. The study's originality lies in its district-specific, mechanism-oriented specification that jointly estimates all program levers against a unified PA score derived from multiple questionnaire items capturing income, consumption, education, investment, assets, personal saving, lifestyle, and perceived community impact. Policy implications emphasize pairing calibrated loan sizing with savings mobilization and repayment scaffolds, while treating price adjustments as second-order within the observed environment and improving access where capability supports are present. The principal contribution is a hierarchy-of-effects clarifying that savings (S) play the most decisive role in poverty alleviation, followed by loan amount (LA) and repayment ability (RA), with access (AL) enabling but contingent, and price (IR) often secondary. Claims are framed associationally in line with the observational design. The model explains approximately 20.9% of the variance in poverty alleviation outcomes, offering decision-ready guidance for microfinance program design in Ampara and analogous Sri Lankan settings.

Keywords: *microfinance, loan amount, interest rate, repayment ability, rural development, poverty alleviation.*

Introduction

Poverty is one of the most crucial transnational issues faced by humankind. It is estimated that roughly 3 billion people, or about 40 percent of the developing-world population, live on less than \$2 per day and are unable to meet basic needs. To this effect, the United Nations Organization (UNO) came up with the Millennium Development Goals (MDGs), which expressed the aim of eliminating poverty by 2015. In that regard, microfinance stood out as one of the main policy tools, providing resource-starved societies with financial capital (Sharma, 2017). This strategy was rallied by governments, donors, and non-governmental organizations across the continents as microfinance was shown to have a proven effect in reducing poverty. The UNO therefore declared the year 2005 to be the Year of Microcredit to highlight the relevance of the approach in alleviating hunger and impoverishment, especially in developing countries. Ever since, microfinance has been one of the tenets of global anti-poverty infrastructures, enabling people and driving sustainable developmental trajectories (Verma, 2024).

The dire consequences of poverty have long been faced by Sri Lanka, which in the past has registered relatively low rates of extreme deprivation. However, recent trends are troubling: Sri Lanka's poverty rate surged from 13.1 to 25 percent between 2021 and 2022, marking a doubling in a distressingly short period (Vipulaguna et al., 2025). At the same time, the local microfinance industry has been growing actively. Sri Lanka has traditionally relied on informal means of mobilization, even though the country has been historically described as having a comparatively modest framework, including the Cheetu. This savings club is communal and was established in the early twentieth century, and is suited to the development of capital formation among the low-income groups. Over the past few decades, there has been a diversification of the field, which has brought about a wide variety of new products and services.

Sri Lanka has increasingly used microfinance as a key tool of poverty alleviation, relying on a large ecology of institutions licensed banks, finance companies, co-operative rural banks, thrift and credit co-operative societies, Samurdhi banks, and community-based organizations to discharge this mandate (Badullahewage, 2020). Regulatory powers are vested in three main agencies: the Central Bank is in charge of licensed banks and finance companies; the Department of Co-operative Development continues to exercise regulatory powers over co-operative rural banks and thrift and credit co-operative societies; and the Department of Samurdhi Development regulates Samurdhi Banks. Moreover, there are many suppliers who are beyond direct statutory control. All these institutions give out loans that are meant to aid the well-being of households and their economic status. However, in spite of such efforts, the existence of pockets of poverty still prevails in the country.

A turning point in this system was when the Sri Lankan parliament enacted the Microfinance Regulatory Act in 2015. This law simplified the regulatory framework, allowed the involvement of the private sector and allowed more institutions of microfinance to participate in the development activities of the government. The post-enactment era has been marked by an impressive growth of providers and each of them has been pursuing unique market share positioning. Before 2015, most organizations were unregulated, a situation that the act directly aimed at overcoming: it created a solid institutional and legal environment in which qualified microfinance professionals could operate, and which can be seen as a key reorganization of the Sri Lankan microfinance sector (Rajapakshe, 2021).

Wijewardana and Dedunu (2017), Kaluarachchi and Jahfer (2014) and Navirathan (2018) reveal that microfinance has significantly contributed to reducing the level of poverty. Additionally, several other researchers have also provided supportive findings (Abdallah Ali et al., 2022; Ismail et al., 2024; Makara et al., 2024; Nizami & Hizam, 2023). However, it is argued that microfinance alone does not fully address the economic roots of poverty. While microfinance is often touted as a means to lift people out of poverty, the evidence remains mixed. Furthermore, the existing literature on this subject tends to narrowly focus on microfinance and its role in poverty alleviation especially, considering the dimensions of microfinance such as loan amount, interest rate, Accessibility of getting loan, savings and repayment ability. Some previous studies have examined the influence of microfinance on poverty alleviation in districts such as Polonnaruwa, Kegalle, Trincomalee, Batticaloa, Anuradhapura and Polonnaruwa. Therefore, this study aims to address this research gap by investigating the relationship between microfinance and poverty alleviation in the Ampara District of Sri Lanka.

Literature Review

Theoretical Foundations of the Study

Microfinance is best understood as a spectrum of financial services—not merely micro-credit—extended to low-income clients who are typically excluded from formal banking; canonical definitions (Armendáriz & Morduch, 2010; Ledgerwood, 1998) emphasize credit, savings, payments, transfers, and insurance as instruments for income generation and resilience among the poor. In this study, the operative levers are Loan Amount (LA), Interest Rate (IR), Accessibility of getting loan (AL), Savings (S), and Repayment Ability (RA); they are modeled as proximate determinants of Poverty Alleviation (PA) in the Ampara context. Conceptually, LA relaxes liquidity constraints that impede lumpy investment and working-capital smoothing; IR captures the user cost of capital under informational and enforcement frictions; AL indexes participation barriers (distance, paperwork, eligibility) that shape entry on the extensive margin; S functions as buffer-stock and commitment, enabling intertemporal smoothing and asset formation; and RA reflects cash-flow discipline and reputational capital within dynamic lending relationships. These channels are mutually conditioning: the return to additional liquidity is plausibly higher when households hold precautionary balances (S) and sustain on-time repayment (RA), while AL governs who enters the market and IR shapes intensive-margin take-up within the observed price range (Dupas & Robinson, 2013). The Sri Lankan institutional setting—multi-tier oversight of banks, finance companies, co-operative entities, and Samurdhi banks, alongside the Microfinance Regulatory Act—provides the policy infrastructure within which these mechanisms operate and scale. Taken together, the theoretical architecture predicts that microfinance yields the largest welfare payoffs when liquidity (LA) is paired with low entry frictions (AL), economically comprehensible pricing (IR), and client capabilities (S, RA) that mediate sustained, shock-robust improvements in PA—precisely the structure operationalized in this study's empirical model.

Global and Sri Lanka Evidence (APA style)

The empirical studies on microfinance's welfare effects are positive but design- and context-contingent. Within Sri Lanka, district studies consistently associate microfinance levers with multidimensional poverty alleviation, while also indicating that capability channels—savings and repayment discipline—often dominate price sensitivity within the observed range of interest rates. This pattern underwrites the present study's specification that models Loan Amount (LA), Interest Rate (IR), Accessibility of getting loan (AL), Savings (S), and Repayment Ability (RA) jointly against Poverty Alleviation (PA).

Evidence from Anuradhapura shows that LA, RA, and AL are positively associated with PA, whereas IR is negatively associated, implying that capital and borrower discipline outweigh loan price in explaining welfare variation among beneficiaries (Wijewardana & Dedunu, 2017). In **Polonnaruwa**, microfinance initiatives significantly improved the lives of the poor, again aligning with a liquidity-plus-capability account (Kaluarachchi & Jahfer, 2014). In **Batticaloa**, participation is associated with higher income, better living conditions, and improved access to basic needs (Navirathan, 2018), reinforcing the multi-domain construct of PA adopted here.

Program-level studies corroborate these district patterns. An evaluation of Samurdhi in Kegalle reports sustained livelihoods, client progression to larger loans, increased employability, and a positive link between women's participation and household living

standards (Jayasuriya, 2007). In Trincomalee, 39.5% of respondents reported higher income and 14.2% reported increased private savings following microfinance participation (Thilepan & Thiruchelvam, 2011), an explicit savings-led mechanism. The SEEDS program in Kegalle increased household income, savings, investment, and consumption—gains attributed to complementary training and insurance—again suggesting that non-credit complements potentiate credit's returns (Kumari, 2021). Province-wide, bank- and NBFi-delivered microfinance in the Northern Province is positively related to poverty alleviation when products balance interest cost, credit availability, and appraisal quality (Sivatheepan & Peter, 2015). Finally, Samurdhi micro-credit has been linked to women's entrepreneurial empowerment, emphasizing gendered capability channels (Gamage, 2019).

Mechanisms: From Credit Access to Capability

The study's levers—Loan Amount (LA), Interest Rate (IR), Accessibility of getting loan (AL), Savings (S), and Repayment Ability (RA)—operate through distinct channels that jointly condition Poverty Alleviation (PA). LA relaxes liquidity constraints for lumpy investment and working capital; Sri Lankan district evidence shows that larger loans are associated with improved welfare outcomes, consistent with scale and smoothing effects (Kaluarachchi & Jahfer, 2014; Wijewardana & Dedunu, 2017). In the present study, LA exhibits a positive but smaller association than capability variables, indicating that liquidity is supportive rather than dominant when modeled alongside S and RA.

IR represents the user cost of capital and should depress intensive-margin investment where price salience is high. Observational evidence from Anuradhapura reports a significant negative association between IR and PA, aligning with that theoretical prediction (Wijewardana & Dedunu, 2017). In contrast, the present study finds a negative but imprecise estimate for IR, suggesting muted price sensitivity within the observed product range and borrower attention to pricing.

AL aggregates participation frictions—distance, documentation, eligibility, and time costs—that govern entry on the extensive margin. District studies report that higher AL co-moves with higher PA, implying that lower fixed access costs broaden reach and improve matching (Kaluarachchi & Jahfer, 2014; Wijewardana & Dedunu, 2017). In the present model, however, AL's bivariate association attenuates once S and RA are included, indicating that access translates into durable gains chiefly when borrowers possess the behaviors that sustain productive use of credit.

S and RA constitute the capability pathway that mediates the conversion of liquidity into resilient welfare. Trincomalee evidence documents increases in income and private savings following microfinance participation, directly highlighting the savings channel (Thilepan & Thiruchelvam, 2011). Program evaluations in Kegalle show that bundled interventions (e.g., SEEDS) raise household income, savings, investment, and consumption, underscoring the role of capability complements (Kumari, 2021). Samurdhi studies report sustained livelihoods, graduation to larger loan tranches, and improved living standards—with women's participation associated with stronger household welfare—consistent with repayment discipline and reputational capital as transmission mechanisms (Gamage, 2019; Jayasuriya, 2007). In the present study, S is the largest correlate of PA and RA is positive and significant, reinforcing this capability-anchored transmission. These reveals that the Sri Lankan literature and the Ampara

estimates point to a hierarchy of mechanisms: capability (S, RA) is primary; liquidity (LA) is supportive; access (AL) is enabling but contingent on capability; and price (IR) is second-order within the observed ranges (Gamage, 2019; Jayasuriya, 2007; Kaluarachchi & Jahfer, 2014; Kumari, 2021; Thilepan & Thiruchelvam, 2011; Wijewardana & Dedunu, 2017). This structure justifies the study's single-equation specification of PA on LA, IR, AL, S, and RA and motivates an empirical focus on capability-anchored pathways in Ampara.

Methodology

The research on the impact of microfinance on poverty alleviation in Ampara District adopts a quantitative approach. The study has devised a conceptual framework (Figure 1) through an in-depth review of existing literature. This framework identifies several independent variables, including loan amount, interest rate, Accessibility of getting loan, savings, and repayment ability, while poverty alleviation is considered the dependent variable. Drawing from this framework and the empirical evidence highlighted in the literature review, the study has formulated five hypotheses to address its research objectives.

H1: Loan amount has an impact on poverty alleviation.

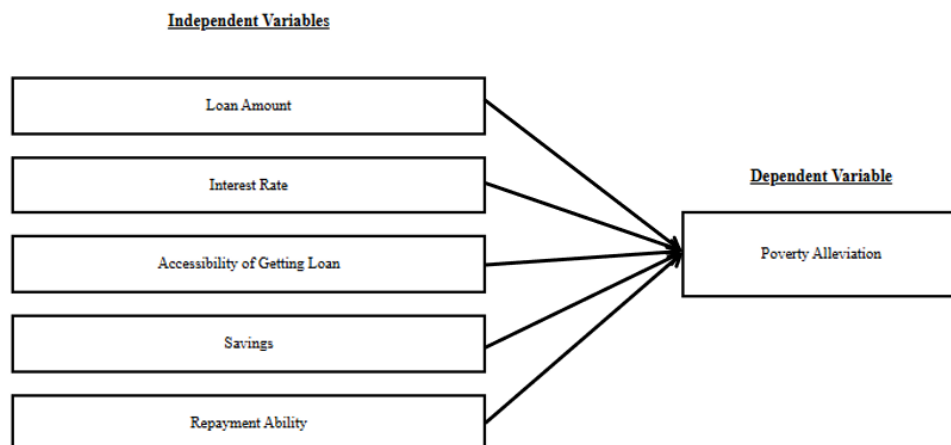
H2: Interest rate has an impact on poverty alleviation.

H3: Accessibility of getting loan has an impact on poverty alleviation.

H4: Savings has an impact on poverty alleviation.

H5: Repayment ability has an impact on poverty alleviation.

Figure 1: Conceptual framework



The population for this study comprised all microfinance beneficiaries in Ampara district, from which a sample of 200 microfinance holders was selected using a simple random sampling method. This approach aligns with the methodology employed in numerous prior studies that utilized random sampling techniques to select samples from the population. It is noteworthy that the beneficiaries of Microfinance Institutions (MFIs) are typically households with low incomes and in economically disadvantaged circumstances. The microfinance institutions primarily rely on these individuals. Data collection was conducted via a questionnaire, designed

based on insights from previous literature, featuring 30 questions divided into two main sections: Section 01 for demographic information and Section 02 for independent and dependent variables assessed using the Likert scale. The questionnaire included multiple-choice, and Likert scale questions, with the Likert scale ranging from one to five points, where one represents the strong disagreement level and five represents the strong agreement level. The data gathered from the self-assessment questionnaires underwent assessment through the analysis of reliability. The researcher utilized the Statistical Package for Social Science (SPSS) 20.0 to streamline the analysis process for this study. Considering independent variables and dependent variable employed in the study, the researcher modeled the study as follows,

Model - 01

$$PA_{it} = \beta_0 + \beta_1 LA_{it} + \beta_2 IR_{it} + \beta_3 AL_{it} + \beta_4 S_{it} + \beta_5 RA_{it} + \varepsilon_{it}$$

Where:

PA_{it} = Poverty Alleviation

β_0 = Intercept

LA = Loan amount

IR = Interest rate

AL = Accessibility of getting loan

S = Savings

RA = Repayment ability

ε_{it} = Error term

Data presentation and analysis

The research focused on individuals benefiting from microfinance across various divisions in Ampara District, constituting the study population. To gather data, 200 questionnaires were dispersed among microfinance beneficiaries in the district. However, only 195 respondents completed and returned the questionnaires. Five of these were excluded due to incomplete responses. Thus, the study considered 190 respondents, resulting in a commendable response rate of 95%.

4.1 Reliability Analysis

According to the Creswell (2008), Cronbach's Alpha value is 0.7 or higher to be acceptable, so that both dependent and independent variables in this study are valid and reliable. Using Cronbach's coefficient α , independent variables estimated as 0.715 for Loan Amount (LA), 0.923 Interest Rate (IR), 0.734 for Accessibility of getting loan (AL), 0.734 for Savings, 0.863 for Repayment Ability, 0.712 for Poverty Alleviation (PA) estimated as 0.718.

Table 1: Reliability Analysis

Variables	No. of scale items	Cronbach’s Alpha value
Loan Amount	5	0.715
Interest Rate	4	0.923
Accessibility of getting loan	4	0.734
Savings	4	0.734
Repayment Ability	5	0.863
Poverty Alleviation	8	0.712

4.2 Descriptive Analysis

The first independent variable, “Loan Amount,” was assessed through a series of five questions. Descriptive statistics reveal that the mean value of loan amount is 4.0653 and the standard deviation of 0.42057. This indicates that respondents generally agree with the loan amount they received as microloans. This agreement could be attributed to the swift disbursement of the loan within a period of less than one month. Additionally, respondents concur that receiving a lower amount than applied for has adversely affected their ability to fulfill their intended financial objectives.

Table 2: Descriptive Statistics

Variables	N	Min	Max	Mean	Std. Deviation
Loan Amount	190	3.60	5.00	4.0653	0.42057
Interest rate	190	1.00	5.00	1.9934	1.07258
Accessibility of getting loan	190	3.50	5.00	4.1026	0.48862
Savings	190	3.50	5.00	4.2276	0.47472
Repayment Ability	190	3.50	5.00	4.2702	0.49612
Poverty Alleviation	190	3.50	5.00	4.4202	0.31180

Overall mean of “interest rate” is 1.9934 and the standard deviation of 1.07258 which was measured through four items, indicates level of disagreement of respondents about loan interest rate. Delving deeper into this variable reveal that a significant portion of respondents lacked clarity on loan interest rates, including their calculation methods and the total interest payable. The “Accessibility of getting loan” variable is one of the independent variables in this study, assessed through four items. Descriptively, the overall mean Accessibility of getting loan is 4.1026 and the standard deviation of 0.48862. It indicates that respondents agree on the Accessibility of microloans for the poor. Upon closer examination, it becomes evident that individuals can secure a microloan with minimal documentation requirements, including a loan application and a copy of their national identity card. Additionally, the current level of income does not appear to be a decisive factor in the application process.

The overall mean “savings” score stands at 4.2276 and the standard deviation of 0.47472, derived from four measured criteria. These metrics, drawn from four distinct criteria, suggest a consensus among respondents regarding the role of savings in poverty reduction. Moreover, microfinance initiatives have been identified as instrumental in fostering savings behavior

among poor. According to the descriptive statistics, the overall mean value of "Repayment ability" stands at 4.2702 and the standard deviation of 0.49612. This suggests that respondents in the study generally agree on the loan repayment and associated services. Further analysis reveals that repayment regulations are considerably more flexible compared to formal financing processes. Consequently, candidates have the ability to tailor their loan repayment schedules based on their receivable income.

The study concluded by analyzing poverty alleviation among microloan holders using eight specific criteria. The descriptive tables revealed an overall mean score of 4.4202 for poverty alleviation and the standard deviation of 0.31180, suggesting respondents generally agree on its level. However, further examination of the construct suggests uncertainty among respondents regarding the extent of income, consumption expenses, education expenses, investment, property ownership, personal savings, and lifestyle improvements during the period.

4.3 Correlation Analysis

The table represents the Pearson Correlation coefficient value of Loan Amount is 0.228, which is significant at 0.002 ($p < 0.01$) thus, it indicates that there is a positive relationship loan amount and poverty alleviation. Pearson correlation coefficient between Interest rate and poverty alleviation is -0.007 which is insignificant at 0.923 ($p > 0.01$), it indicates that there is a negative relationship between Interest rate and poverty alleviation. Pearson correlation coefficient between Accessibility of getting loan and poverty alleviation is 0.154 which is significant at 0.034 ($p < 0.05$), it indicates that there is a positive relationship between Accessibility of getting loan and poverty alleviation. Pearson correlation coefficient between savings and poverty alleviation is 0.403 which is significant at 0.000 ($p < 0.01$), it indicates that there is a positive relationship between Accessibility of getting loan and poverty alleviation. According to the table, Pearson correlation coefficient between Repayment Ability and poverty alleviation is 0.197 which is significant at 0.006 ($p < 0.01$), it indicates that there is a positive relationship Repayment Ability and poverty alleviation.

Table 3: Correlation analysis

Variable	Poverty Alleviation (r)	Sig. (2-tailed)
Loan Amount	0.228	0.002
Interest Rate	-0.007	0.923
Accessibility of Loan	0.154	0.034
Savings	0.403	0.000
Repayment Ability	0.197	0.006

4.4 Regression Analysis

Model summery is presented in the above Table 4. In terms of the table, R is the Multiple correlation coefficient which represents all variables together ($R = 0.457$). Adjusted R square is 0.187. It explains approximately 18.7% of variance in poverty alleviation has been significantly explained by 1% change in the combination of five independent variables (Loan Amount, Interest Rate, Accessibility of getting loan, Savings and Repayment Ability).

Table 4: Regression output summary of model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.457 ^a	0.209	0.187	0.28113	9.696	0.000 ^b

a. Predictors: (Constant), S, IR, RA, LA, AL

b. Dependent Variable: PA

In terms of the statistics of ANOVA charted in the above Table 5, The F value is 9.696 it is significant at 1% because significant value (P=0.000) is lesser than the tested value (0.01), which suggest that the indicators (independent variables) that have strong significant impact on Poverty Alleviation. And also indicate the model is good fit for the data.

Table 5: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.832	5	.766	9.696	0.000 ^b
Residual	14.543	184	.079		
Total	18.374	189			

According to the above tabulated table, it can be observed that all the tolerance values are higher than 0.1 which is generally considered as the cut off of multi-collinearity. In addition, all the VIF values are below the general cut-off of 10. Therefore, these statistics show that there are no multi-collinearity issues among the independent variables of the study. According to the table 6, the resulting regression equation is: $PA = 2.551 + 0.109 LA - 0.002 IR + 0.020 AL + 0.234 S + 0.084 RA$, the constant value is 2.551 indicators, where the regression line intercepts the PA axis, representing the amount the dependent PA will be when all the independent variables are 0.

Table 6: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	2.551	.307		8.319	.000		
LA	.109	.050	.148	2.193	.030	.949	1.053
IR	-.002	.019	-.008	-.116	.907	.995	1.005
AL	.020	.044	.032	.462	.644	.925	1.082
S	.234	.045	.356	5.202	.000	.920	1.087
RA	.084	.042	.134	2.002	.047	.965	1.036

Based on the regression coefficient, Loan Amount has a value of 0.109 with a significance level of 0.030. This coefficient indicates a positive and statistically significant relationship between loan amount and poverty alleviation. Specifically, a one-unit increase in the loan amount variable leads to a 0.109 unit increase in poverty alleviation, holding other factors constant. Therefore, the study accepts Hypothesis One, concluding that loan amount has a significant positive influence on poverty alleviation. The regression coefficient for Interest Rate is -0.002, with a significance value of 0.907, indicating an insignificant and negligible negative

relationship with poverty alleviation. Although the direction is negative, the result is not statistically meaningful. Consequently, the study rejects Hypothesis Two, concluding that interest rate does not have a significant effect on poverty alleviation.

According to Table 6, the regression coefficient for Accessibility of Getting a Loan is 0.020, with a significance value of 0.664. Although the coefficient indicates a positive relationship, it is statistically insignificant. This means that when controlling for other factors, accessibility does not have a meaningful impact on poverty alleviation. Specifically, a one-unit increase in accessibility is associated with only a 0.020-unit increase in poverty alleviation. Therefore, the study rejects Hypothesis Three, concluding that accessibility of getting a loan has an insignificant positive relationship with poverty alleviation.

The regression coefficient for Savings is 0.234, with a p-value of 0.000, indicating a strong and statistically significant positive relationship with poverty alleviation. A one-unit increase in savings corresponds to a 0.234-unit increase in the poverty alleviation score, when other variables are held constant. Accordingly, the study accepts Hypothesis Four, concluding that savings play a significant role in enhancing poverty alleviation.

The coefficient for Repayment Ability is 0.084, with a significance value of 0.047, which is significant at the 5% level. This result shows a statistically significant positive relationship between repayment ability and poverty alleviation. A one-unit increase in repayment ability leads to a 0.084-unit increase in poverty alleviation, controlling for other predictors. Therefore, the study accepts Hypothesis Five, concluding that repayment ability has a significant positive influence on poverty alleviation.

Conclusion and recommendation

The primary objective of this study was to investigate the impact of microfinance on poverty alleviation among beneficiaries in the Ampara District of Sri Lanka. Drawing on data collected from 190 microfinance participants, the findings revealed that a significant portion of microfinance clients were low-income earners, with a notable proportion being women. The demographic profile indicated widespread participation across age groups, with middle-aged individuals being particularly active. In addition, the majority of participants reported low educational attainment, suggesting that individuals with limited formal education are more inclined to seek support through microfinance services.

The results of the correlation and regression analyses provided empirical evidence on the nature and strength of the relationships between key microfinance factors and poverty alleviation. The correlation analysis revealed that loan amount, savings, accessibility of obtaining loans, and repayment ability were positively associated with poverty alleviation, while interest rate exhibited a negative association. The regression analysis further confirmed that loan amount, savings, and repayment ability had statistically significant positive effects on poverty alleviation. Conversely, interest rate demonstrated a negative but statistically insignificant effect, while accessibility of obtaining loans, although positively related to poverty alleviation, did not exhibit statistical significance.

These findings suggest that microfinance plays a crucial role in advancing poverty alleviation efforts in the Ampara District. In particular, mechanisms such as offering higher loan amounts, promoting savings behaviour, and supporting repayment ability appear to be the most effective levers for reducing poverty. In light of these findings, it is recommended that

microfinance institutions and policymakers implement strategies to ensure that interest rates are kept at manageable levels so as not to impede borrowers' financial progress. Furthermore, enhancing savings opportunities and providing tailored repayment support—such as flexible schedules aligned with income cycles—may improve client outcomes. Improving the accessibility of microfinance, particularly for rural and underbanked populations, may also amplify its poverty-reducing effects, even though this factor was not statistically significant in the regression model. The findings of this study are consistent with previous research conducted in the Sri Lankan context (Gamage, 2019; Jayasuriya, 2007; Kaluarachchi & Jahfer, 2014; Kumari, 2021; Thilepan & Thiruchelvam, 2011; Wijewardana & Dedunu, 2017), all of which affirm the important role of microfinance in reducing poverty and promoting socioeconomic development among vulnerable communities.

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GENDER DIVERSITY IN LEGAL PROFESSION: CHALLENGES OF WOMEN LAWYERS

Dr P. Priyadarsini

*Prof & Head, Management Studies
Tagore Engineering College, Chennai
hod.mba@tagore-engg.ac.in*

Ms Kamatchi

*Assistant Professor
Tagore Engineering College, Chennai*

Ms Devipriya

*Assistant Professor
Tagore Engineering College, Chennai*

Introduction

Legal profession is perceived as prestigious profession and the present young generation prefer to choose the profession which is been evident by the increased number of enrollment in law schools Inclusion of women in legal profession has seen a notable change. Women are found to be successful lawyers overcoming the challenges of internal factors and external factors. Numerous aspects of the feminization of the legal profession have been studied by experts in legal history, sociology, economics, organizational behavior, and law. Inequality and integration in the legal profession's. This paper analyses the current challenges of women lawyers.

Despite the fact that more women are graduating from law schools than ever before, they either choose not to practice law after receiving their degrees or quit within a short period. The fact that individuals experience discrimination and gender bias in the workplace is demonstrated by this. In India, the legal field has traditionally been dominated by men, as have many other professions, and this appears to be the reason why society has been slow to embrace women as judges, lawyers, and other legal professionals. Whether India gained its independence, the Indian Constitution granted its citizens the right to equality, which includes protection from gender-based discrimination whether pursuing their desired careers or pursuing an education. Despite this advantage, women have not chosen to work in the legal field more frequently, and more career breaks are reported with report to women lawyers.

Women in Legal Profession

Kay, F. M. (2007) stated that first Women Lawyers makes significant contributions to our understanding of the history of women in the legal professions and their struggles against male exclusivity. Mossman's outstanding work clarifies why women were successful in gaining entrance to the legal professions at the end of the nineteenth century, a goal that has generally eluded historians. Their research also displayed a theoretical sophistication that results from daring comparative scholarship combined with steadfast investigation of the point at which a person's biography meets their context in terms of history, politics, and society. The Author

emphasized that the efforts of the first female lawyers to end male dominance in the legal profession "remain profoundly significant for contemporary women solicitors."**Rikleen, L. S. (2015)**. Women have performed better than women equity partners in law. The findings showed that, particularly with regard to equity partner promotions and salary, the gender gap is far more accurately described as a gender gulf.

Less Women in Higher Positions

Hon'ble Ms. Justice Gita Mittal, Chief Justice, High Court of Jammu & Kashmir in her speech at key note address for in the Constitution Day Forum stated that glass ceiling exists in the legal profession and she mention that there are only 73 women judges among 673 sitting judges in High court and she was the only women chief justice among 28 High courts of India. In her speech she stated that in 70 years of establishment of supreme court there has been only 8 women judges, source Hindustan Times June (2023).

Challenges of Women Lawyer

Gender Discrimination and Glass Ceiling

In the legal profession high level profile are constituted by male than female. Women break the invisible challenges to attain higher position. Male-oriented professional ideology is commonly perceived as a reason for women lawyers to occupy higher positions. **Maria Pabon Lopez (2008)** examined the causes of glass ceiling in legal profession; The author in their paper analysed the challenges of women in legal profession. The history of women in the legal profession was examined in order to provide a foundation from which measures the advancement of women in the field they compared Indiana's gender bias incidents and women's experiences in the legal field to those in other regions of the nation using comparative data from those other areas. **Wald, E. (2009)** stated despite to the career advancement, the glass ceiling effect exists. They inferred that as more female associates were hired and later promoted, the underrepresentation of women attorneys among large law firm partners would progressively decrease.

Wage Discrimination

Wage discrimination describes the difference in pay with respect to gender. Dinovitzer, R (2009) they did pinpoint the causes of the gender pay disparity among women lawyers. They did infer that minimal of 10 % disparity prevails and identified the gap results from the differential valuation of women's endowments and determined the effects of different endowments for men and women; and third, we evaluate both of these possibilities.

Work Life Balance

Legal profession has long hours of work as extended meetings, difficulty in addressing clients demanding 24/7 service, many women lawyers feel unhappy because they are surviving but not living their life. Kannan (2013) stated that gender stereotype exists and women are expected to play the key role in rearing of child and family responsibilities, when women close their working hours earlier and avail leaves with regard to child rearing they are perceived as "Mom figure". Supportive policies can be implemented to support the work life balance of women.

Gender Stereotype

A gender stereotype is a generalized opinion or prejudice about the traits or qualities that women or men should or should not possess or exhibit, or the roles that they should or should not play. When a notion of gender restricts a person's ability to grow personally, pursue a career, or make decisions regarding their lives, it is damaging

Methodology

Procedure

This paper adopted qualitative research. Data collection was done through interview method among 10 women layer in Chennai district. Through digital communication, researchers have reached out to potential individuals (calls and whatsapp messages). The participants received a briefing on the subject, the research's objectives, and the researcher's intents before the interview procedure started. Participants received guarantees that their information wouldn't be disclosed for any other reason. Based on their availability, the participants set the interview's time, date, and location. Other than the time allowed by them, no Participant was bothered or solicited for the interview. The participants felt at ease speaking openly about their experiences with the researchers. The study's details were also made available to the participants.

Each participant's interview lasted 30-45 minutes, and the researchers led the conversation with open-ended questions. This kind of interviewing is thought to be the most successful at eliciting open-ended responses while also giving directions to participants on how to respond (Oparaocha & Pokidko, 2013). After obtaining the participants' consent, the interview's data was captured. All the participants were appreciated for taking part in the research.

The factors identified through the reviews of literature. The responses are recorded, inferred and interpreted. The researchers have interviewed the women lawyers based on identified six variables which challenges the women in legal profession they are Gender Discrimination, Gender stereotype, work-life balance, family cooperation, Emotional Management and Wage discrimination

Respondents

10 women lawyers were selected as respondents

S.No Lawyer	Age	Years of experience	Marital status	Number of Children
1	28	2	Single	-
2	42	19	Married	2
3	45	19	Divorced	1
4	31	5	Single	-
5	27	2	Single	-
6	36	9	Married	1
7	37	10	Divorced	2
8	35	5	Married	1
9	31	3	Married	1
10	51	25	Married	1

Findings

The interview results enabled the researchers to understand the challenges faced by women layers

Respondent's opinion towards the Gender Discrimination

Gender discrimination is considered as distinguishing jobs given to men and women. It is notably found in legal profession. Younger women lawyers expressed that they were given undemanding jobs, made to accept lesser professional fees than their male counterparts, denied opportunities, and denied other types of support. Most of the women lawyers stated that the non-legal office housework is disproportionately assigned to female lawyers. Office housekeeping consists of chores like setting up meetings, organizing events, and performing basic housework like cleaning up the leftovers from a meeting. The current study also reveals that female lawyers are much more likely than their male counterparts to be responsible for the bulk of this office cleaning. Because it is socially acceptable for women to be helpful, they frequently experience pressure to volunteer for these jobs. Women are also more likely to accept these assignments from organizations because they are more willing to do so. In the interview, a female lawyer disclosed that the office employees had a misogynistic attitude towards women and a bias in favor of male lawyers. Another female lawyer disclosed that she and the majority of other female attorneys have endured sexual harassment at some point throughout their legal careers.

Respondent's opinion towards Gender Stereotypes

In the interview process, the researchers observed that the women lawyers expressed reasonable concerns about the repercussions of speaking out against it. The interview was primarily on discrimination against women, therefore on the other hand, there is always a chance that a social desirability bias will influence participants' answers. Senior lawyers mentioned that they did face the stereotype and it was tough journey in overcoming it. Both the senior and junior lawyers expressed that the stereotype exists more from the client perspective in the way they talk, handling them with patience.

Respondent's opinion towards Work life balance

All the participants stated that there was challenge in keeping up the Work life balance. The middle aged lawyers stated that long hours of preparation for cases, extended meeting with clients, handling office work affect their planning of time and they did miss the opportunity to attend family functions, friends get together and difficult in child rearing. Few women lawyers stated they had career break which did freeze their career growth and find it difficult to get back to the competitive environment. The young lawyers stated they did need to spend more time in supporting their senior and they are expected to be available on all days which gives less time for pursuing their hobbies, taking care of their self.

Respondents opinion towards Family Cooperation

The women lawyers expressed that they the family cooperation is expected in the form of moral and understanding the job roles by the family members. Most of the married respondents said that they receive very minimal cooperation is showed by their spouse and children. Two of the respondents are divorced as there was difference of opinion with spouse in understanding their job role. Distribution and division of their domestic duties, which are customarily seen as

the woman's domain in India and the family expected more from women. From the respondents opinion it could be understood that only 2% of them received support and other lacked very much in family support.

Respondents opinion towards Emotional Management

Most of the women lawyers stated that there is peer pressure and perceptions that male lawyers can exhibit their assertiveness where female lawyers are expected to be less assertive. Senior women lawyers expressed that they were expected to hold their anger, emotions and handle the tone of the voice when they deal with weird victims.

Respondents opinion towards Wage Discrimination

Most of the respondents expressed that despite asking for raises and promotions just as frequently as men, women are less likely to receive them. They added that clients are less likely to choose woman lawyer and paying less also. Females in legal occupations earn 62 rupees for every 100 Rs earned by males. This disparity likely has to do with the fact that males dominated higher-paying judicial positions, while women dominate lower-paying legal assistant positions.

Conclusion

Women advance to best position breaking the gender discrimination on the other perspective women in law, medicine and business are quitting the jobs at higher rates. Younger generation of women are willingly taking up the legal profession but 30% of female lawyers are not employed and in the middle career many women drop the career. There are less policies to support women leave, wage and maternal benefits. They receive less support from family and spouse and societal perception on lawyers is also challenging. Policies can be implemented and awareness on importance of legal profession could be created to enhance better career advancement for women lawyers.

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BLUE ECONOMY INVESTMENT BEHAVIOUR: THE ROLE OF ORGANISATIONAL FACTORS, INNOVATION, AND TRADE OPENNESS. EVIDENCE FROM THE EASTERN PROVINCE OF SRI LANKA

M. Siraji & AR. Fathima Najafa

*Department of Accountancy and Finance
Faculty of Management and Commerce
South Eastern University of Sri Lanka
sirajim@seu.ac.lk*

Abstract

The purpose of the research is to investigate the role of organisational factors, innovation, and trade openness in shaping blue economy investment behaviour in the Eastern Province of Sri Lanka. As the blue economy gains increasing attention as a driver of sustainable development, understanding the factors that influence investment in this sector is essential. The study identifies organisational factors and trade openness as significant determinants of investment behaviour in the blue economy, while innovation was found to have no statistically significant effect. Quantitative approach was adopted, and a survey questionnaire was provided to various stakeholders who are involved in the blue economy sectors. The findings reveal that the drivers include organisational factors and trade openness positively and significantly influence investment behaviour; however the innovation is not significant with the investment behaviour. The study highlights the opportunities for stakeholders who are willing to invest in blue economy sectors, including access to blue bonds, improving organisational strengths, and integration with international trade agreements to create a more conducive investment environment. This research provides valuable insights. The study concludes with recommendations for government, policy makers, financial institutions, and stakeholders, emphasising the importance of investment decisions towards blue economy sectors by enhancing financial incentives, capacity building programs to attract the stakeholders and developing organisational practices, improving technological advancement and developing a policy framework. These measures are crucial for promoting blue economy investment decisions.

Keywords: *Blue Economy, Blue Economy Investment Behaviour, Drivers, Organisational Factors, Innovation, Trade Openness*

1.0 Introduction

The blue economy includes all economic activities related to the ocean and coastal areas, such as fishing, shipping, tourism, and energy production. Evidence indicates that the Blue Economy is now considered one of the most vital sectors for achieving sustainable development goals and conserving natural resources. Issues like hunger, climate change, and poverty can be addressed through the sustainable use and management of marine resources. In this context, the blue economy is recognised as a key strategy for sustainable development. Thus, all stakeholders, regardless of their age, gender, or social status, should participate in the blue economy. The Blue Economy (BE) involves the sustainable use of marine resources for economic growth, better livelihoods, and job creation while ensuring the marine ecosystem remains healthy. The United Nations states that over three billion people rely on marine and coastal biodiversity for their survival. BE refers to the sustainable use of marine resources to promote economic growth, improve living conditions, create jobs, and protect the health of the

marine ecosystem (World Bank 2013; Zhao, Guan, and Sun 2019; Li et al. 2021; Kedong et al. 2022; Xu and Gao 2022; Ozili 2022).

The potential impact of the blue economy on Sri Lanka's economic and social development is considerable, especially in coastal communities where employment and livelihood opportunities are scarce (World Bank, 2022). The blue economy presents various opportunities for sustainable growth, such as expanding the fisheries sector, promoting marine tourism, and generating renewable energy from the ocean (SLEDB, Fishery Products-Industry Capability Report, 2019). The Eastern Province comprises three districts: Ampara, Batticaloa, and Trincomalee. The land area of the province covers approximately 9,996 square kilometres, about 15.24% of Sri Lanka's total land area. The topography is relatively flat along the coast and undulating towards the west of the province. The landscape features a variety of environments, including paddy fields, forests, scrublands, wetlands, and lagoons. The population of the province is around 1.97 million, representing approximately 8.76% of the national population. The presence of major ethnic groups—namely, Sinhalese, Tamils, and Moors—adds a significant characteristic to the region. The area is rich in natural resources such as forests, wetlands, lagoons, bays, and beaches. Numerous ancient water bodies scattered across the landscape indicate extensive development since historic times, further supported by the existence of many old structures of historical interest. The region's prominent natural harbours and well-connected road networks by land and air give the province a distinctive identity. Its diverse natural resources provide a great opportunity to leverage the enormous potential for implementing large-scale development projects. The area is abundant in natural resources, fostering development initiatives, particularly in commercial agriculture, tourism, and fisheries, which exhibit characteristics distinct from other parts of the island. These features are reinforced by the presence of many ancient historical structures. Blue Economy Investment (BEI) behaviour is rooted in pre-investment decision-making, involving qualitative and quantitative factors such as previous experiences, personal preferences, and beliefs about a product before making an actual decision. Therefore, positive investment behaviour towards the blue economy is crucial for the sustainable development and growth of each country (Mahon, McConney, and Oxenford 2020; Voyer et al. 2021; Amuhaya and Degterev 2022). Industry players, including local investors, entrepreneurs, and sector experts, are vital to the development of the blue economy. Their perceptions reflect real conditions on the ground and offer insights into what fosters or hinders investment. Over time, we aim to identify the most accurate variables that predict the drivers and barriers to blue economy investments. Consequently, research studies investigating these drivers focus on stakeholders involved in blue economy sectors. Understanding stakeholders' perceptions and experiences is essential for optimising blue economy investments, particularly in regions like Sri Lanka, where coastal communities can significantly benefit from sustainable practices.

This study provides an Investigation of how the industry views the factors that we need to transform the broad problem into a feasible research topic by a) making it more specific, and b) setting. Clear boundaries. Finally, we should select a c) perspective from which to examine the subject (Machi and McEvoy, 2012). Sri Lanka has historically shared a close bond with the ocean, but the potential of the country's Blue Economy is yet to be fully realised. Sri Lanka stands to benefit from exploring the ocean frontier by carefully planning activities that balance both economic and environmental objectives. Utilising the country's vast ocean resources to develop

'blue industries' that supply goods and services to 'blue value chains' offers an innovative pathway to improve Sri Lanka's external and trade balances. Despite the significant opportunities that BEI presents for sustainable economic growth, improved livelihoods, job creation, and marine ecosystem preservation, its development remains limited in many countries. Uses include fisheries and aquaculture, maritime transport, coastal tourism, renewable energy sources, and biotechnology, which contribute substantially to the economy while promoting environmental sustainability. However, despite these opportunities, notable challenges are hindering sustainable investment. This paper addresses this gap by focusing on Sri Lanka's blue economy sectors, exploring the drivers, barriers, and potential solutions for investment within the Blue Economy framework, particularly in the Eastern Province. Overall, this research examines how industry stakeholders perceive the factors that encourage and hinder blue economy investments in Sri Lanka, with a specific focus on evidence from the Eastern Province. There is a lack of empirical data concerning the drivers and barriers to blue economy investments in the Eastern Province of Sri Lanka. Therefore, this study aims to fill that gap by investigating how these factors influence investment and providing a foundation for future research. A key challenge remains in assessing the adequacy of current blue economy investment products relative to the needs of various stakeholders, and in identifying what contours a blue finance mechanism should have to accelerate investments from diverse groups. This research seeks to be a comprehensive study of all existing knowledge regarding drivers and barriers to blue economy investment. Blue economy investment involves influencing decision-making, increasing self-confidence, and enhancing status and roles in investment decisions. By analysing these factors, the study aims to inform the development of effective policies and management practices that promote sustainable sector development, contributing to economic growth, better livelihoods, and marine ecosystem preservation. Encourage and hinder blue economy investments in Sri Lanka's Eastern Province, and suggest ways to improve sustainable investment prospects. The objectives of the research are:

- To examine the impact of organisational factors on blue economy investment behaviour in the Eastern Province of Sri Lanka.
- To assess the role of innovation in driving blue economy investments in the Eastern Province of Sri Lanka.
- To evaluate the influence of trade openness on blue economy investment behaviour in the Eastern Province of Sri Lanka.

2.0 Literature review

2.1. The blue economy concept

BE stands for Blue Economy. It is about using ocean resources in a way that helps the economy grow, supports people's well-being, and protects the environment (UNEP, 2012). The Blue Economy is important for countries with coastlines and islands, especially those with low to middle incomes. These countries see the ocean as a source of opportunities and a part of their territory, as well as the high seas (World Bank Group, 2016). The Blue Economy includes different activities like harvesting living resources, extracting non-living resources, creating new resources, trading around oceans, and addressing ocean health issues related to sustainable development (World Bank Group, 2016). Recently, the Blue Economy has gained

attention because it links global issues like climate change, resource depletion, and food security with growth (Ki-Hoon Lee, 2020). It stresses the importance of working together and involving all stakeholders in managing ocean resources sustainably. When making ocean policies, the Blue Economy considers the interests of everyone involved, including local communities, government, and businesses (Voyer & van Leeuwen, 2019; Islam & Mostaque, 2016; Patil et al., 2018; Sarker et al., 2019; Bari, 2017). In Sri Lanka, the Blue Economy is very relevant. Sri Lanka is an island with 103 rivers, and 90% of the land is covered by these rivers (S.A.M., 2011). The coastal area covers 14 districts, which is about 23% of the total land area. About 25% of Sri Lanka's population lives in coastal areas and depends on ocean activities for their jobs. So, developing the ocean sustainably is crucial. The Blue Economy is important for Sri Lanka because of the growing demand for seafood, sustainable energy, and tourism (Ranasignhe, 2017). It takes a holistic approach, considering economic, social, and environmental factors (United Nations, 2014). In Sri Lanka, the Blue Economy can help with economic growth and job creation, especially in coastal areas. Sri Lanka is well-positioned geographically by the Bay of Bengal, making the Blue Economy significant for its people and economy (Senaratne & Melegoda, 2022).

2.2. Empirical Review and Hypothesis Development

Studies have reported on BE (Caferra and Falcone, 2022; Daly et al., 2021; Wenhai et al., 2019; Fusco et al., 2022; Qi, 2022; Thompson, 2022). This review looks at important studies related to the current research. These include BE investment plans, adoption, policy actions, environmental, organisational, and technological factors, investment costs, and environmental awareness. For example, Alharthi and Hanif (2020) studied how BE factors affect economic growth in South Asian countries. They found that BE factors are important for economic growth and help achieve UN Sustainable Development Goal 14, which is about using ocean resources sustainably. Benzake et al. (2022) say the 'blue economy' is now a key idea worldwide. It focuses on developing oceans while keeping them healthy, especially with rising demand for ocean resources, pollution, and climate change. Although BE offers a policy framework for sustainable ocean development, there are few real-world examples of its use. Challenges include keeping political support, engaging stakeholders, and coordinating institutions. Silvestri et al. (2023) add to the literature on BE and aquaculture as challenges for sustainable development and a circular economy. Wuwung et al. (2022) note that BE is now part of policy discussions, but there is no standard definition. BE is based on economic growth, social justice, and environmental protection.

Yoshioka et al. (2020) said that human actions like climate change, plastic waste, extreme weather, and rising sea levels are harming the oceans. These problems make it hard for vulnerable areas, like coastal regions and small islands, to get enough money to support their ocean-based economies. Global funding, led by development banks and international groups, focuses on ocean sustainability. Martinez-Vasquez et al. (2021) mentioned that the 'blue economy' is a new area of study about economic activities that rely on the oceans, such as tourism, shipping, and energy, and is connected to other sectors like fishing. Blue growth is crucial for the sustainable development of the maritime sector and freight transport, as the ocean drives the global economy and has potential for growth and innovation. Lee et al. (2020) noted that the idea of the blue economy has caused conflicts between growth and conserving

marine resources. Solutions are needed to address these conflicts while taking advantage of the marine economy opportunities. The United Nations Sustainable Development Goals offer a possible global solution. Tirumala and Tiwari (2022) estimated that investments in blue economy projects are far less than needed to meet the UN Sustainable Development Goals. These projects usually get funding from traditional government and development sources, but more funding is needed beyond these traditional methods. Auad and Fath (2022) discussed the need for a sustainable blue economy to support measures against climate change. However, there is still a lack of clear principles for sustainable development in all sectors. Louey (2022) highlighted the need for sustainable blue economic policies to anticipate innovations in shipping and maritime businesses. These results can guide innovation planning and policy, and reflect public expectations. Niner et al. (2022) argued that the blue economy is based on international sustainable development and aims to create economic and social opportunities while protecting the marine environment. So far, there has been no analysis of how this broad SDG has helped the rapid development of blue economy policies at the national and regional levels.

This study is one of the few that examines the intersection of blue economy (BE) investment, policy, economy, technology, organisation, trade, and innovation in Sri Lanka's Eastern Province. Investigating the factors that influence BE investment in this region is crucial, as this area has not been previously studied in depth. Small-scale fisheries (SSFs) face challenges such as limited resources, lack of influence in decision-making, and insufficient access to modern technology, which makes them more vulnerable. The government and policymakers need to recognise these issues, as SSFs play a critical role in providing livelihoods for many fishers and contributing to food security (Ibrahim, 2020). Furthermore, harmful practices such as bottom trawling by Indian fishermen have detrimental effects on the marine ecosystem, exacerbating these challenges (Goonetilleke & Colombage, 2017).

2.2.1. Blue economy investment (BEI)

According to the European Commission (2018), Wenhai et al. (2019), and Jouffray et al. (2020), blue economic activities are making waves. These investments are not just rising; they're on a steady upward tide, expected to swell in value by 2030 (OECD, 2016). Hudson and Glemarec (2012) emphasised that to combat issues like overfishing, coastal hypoxia, and ocean acidification, we need to unlock hundreds of billions in new public and private funding. Such investments could reel in net socioeconomic gains exceeding US\$1 trillion annually. With a keen eye for diversification, investors are hungry for growth in novel asset classes—if only they can navigate the turbulent waters of risk management. The private sector serves as a treasure trove of investment capital. Yet, the windfall requires the steady backing of donors and government support to catalyse funding. With ample private capital afloat, investors are ready to leap into new horizons—assuming risks can be tamed.

2.2.2 Organisational factors and BEI

Pramono and Susanty (2015), Kedong et al. (2022), and Xu and Gao (2022) spotlighted the role of organisational factors, such as managerial influence and culture. Managerial influence means enabling training, delivering positive feedback, and optimising resource use. Research indicates that organisational factors significantly affect BEI. These elements intertwine with conditions and events within an organisation, revealing strengths and weaknesses (Ghobakhloo

et al., 2012). Organisational factors illuminate the strengths and weaknesses of an entity, shaping decision-making. They encompass structure, leadership style, culture, and resource capability to bolster collaboration. Consequently, the study purports the following hypothesis: H1: Organisational factors significantly impact Blue Economy Investment.

2.2.3 Innovation and BEI

Sigwart et al. (2021) unearthed a connection between innovative structures and blue growth. This underscores innovation's vital role in nurturing sustainable economic progress within ocean-centric industries like aquaculture. It enables efficient resource utilisation, green technologies, a circular economy, and robust business models that champion regional cohesion. Strategies igniting creative specialisation can supercharge blue development. Innovation is the lifeblood of sustainable advancement. The traditional resource-driven growth model, which leans heavily on resource inputs, is unsustainable for the long haul (Li et al., 2020b). Therefore, innovation must lead the charge for economic transition and transformation (Guo et al., 2022). Within the marine economy milieu, enhanced innovation capacity unlocks greater developmental potential, self-reliance, and improved foreign trade standings. Recent years have safeguarded increased investment in marine innovation research across coastal realms. Research confirms that innovativeness amplifies business performance (Hoq and Ha, 2009). Various studies validate that a firm's innovation prowess correlates positively with performance (Jong and Vermeulen, 2003). Noruzy et al. (2013) revealed that organisational innovation uplifts business performance. Samad (2012) also highlighted innovativeness' beneficial impact on the performance of Malaysian logistics firms. Earlier studies (Carboni & Medda, 2021; Donkor et al., 2018; Hoffman & Broekhuizen, 2010) have established that firm innovativeness enhances business concepts and performance, spurring investment intentions. Thus, innovation becomes a magnet, attracting investors to the blue economy by amplifying business effectiveness. The surge of innovation creates a fertile environment for business performance, accelerating blue economy investments. Hence, we propose the following hypothesis:

H2: Innovation significantly impacts Blue Economy Investment.

2.2.4 Trade openness and BEI

Trade openness has unleashed a wave of blue economy investments, enhancing market access, financial inflows, and sustainable development. Trade liberalisation positively propels the blue economy, potentially igniting economic growth and welfare. Simulations reveal that trade liberalisation fortifies imports and overall well-being along the Indian Ocean Rim ("Analysis of Trade Liberalisation of the Blue Economy in Indian Ocean Rim Association", 2022). It correlates with surging FDI inflows and government revenues, both crucial for financing blue economy projects (Brun & Gnanon, 2017).

Chen et al. (2022b) and Hdom and Fuinhas (2020) observed that trade openness fosters technology transfer, market expansion, and optimal resource exploitation, fueling economic growth. Trade openness empowers fisheries enterprises to harness advanced technologies and access global markets, urging investments. Thus, it is the key that unlocks blue economy investment potential. Murshed (2020) noted that the ramifications of trade openness can display phase-specific characteristics. Dou et al. (2021) argued that low trade openness results

in market closures, confining marine fisheries products to local demands, which dampens investment motivation. Most empirical research has documented a positive relationship between trade openness and FDI inflows (Makoni, 2018; Sahoo, 2006; Zaman et al., 2018). However, some studies revealed a negative relationship (Adow and Tahmad, 2018; Cantah et al., 2018; Khan and Hye, 2014). Ho et al. (2013) and Wickramarachchi (2019) found negligible impacts of trade openness on FDI inflows in BRICS nations. Therefore, Blue Economy Investments flourish through FDI inflows propelled by trade openness. According to Geng et al. (2024), trade openness profoundly shapes the blue economy by facilitating the exchange of goods and services, including marine products. Studies indicate that increased trade openness enhances the blue economy's viability by granting broader market access for fisheries and aquaculture offerings. This demonstrates a positive correlation between trade openness and blue economy investments. Thus, the following hypothesis is articulated:
H3: Trade openness significantly influences Blue Economy Investment.

2.3 Conceptual Framework

Based on the literature review, this study proposes a framework comprising independent variables—Organisational Factors, Innovation, and Trade Openness—and the dependent variable, Blue Economy Investment (BEI). The framework demonstrates how these independent variables influence BEI, with a focus on the Eastern Province of Sri Lanka. The following diagram presents the conceptual framework of the study.

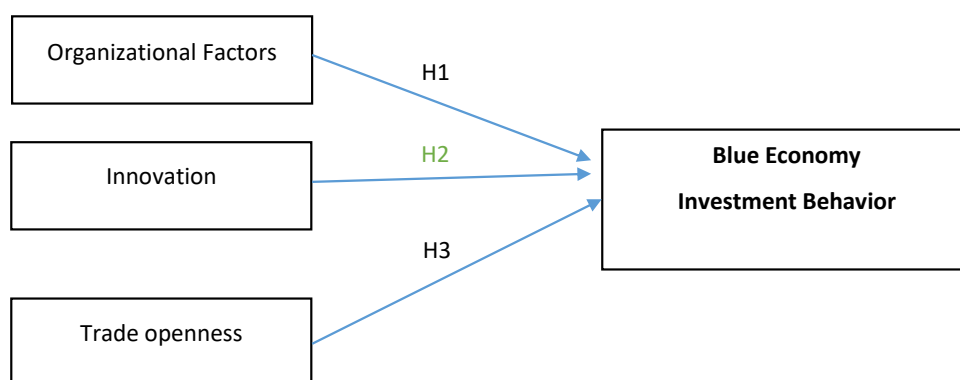


Figure 3. 1 Conceptual framework.

3.0. Methodology

3.1. Measure, sampling, and data collection

The study area selected is the Eastern province of Sri Lanka. There are several blue economic sectors in this region. The study focuses on all stakeholders directly or indirectly involved in the sectors of the blue economy, including fisheries, marine tourism, and aquaculture. The main idea behind this research is to find out the barriers and drivers of blue economy investments in the eastern province of Sri Lanka. The researcher has selected a sample size of 174 stakeholders involved in the blue economy sectors. A sample was selected who are involved in the blue economy in the eastern province of Sri Lanka.

Convenience sampling techniques are to be adopted because potential respondents will be readily accessible. Data on the maritime sector is normally fragmented and scattered between

many stakeholders, especially shipping companies, ports, and some regulatory bodies, which was the other reason for using convenience sampling. Convenient sampling is a non-probability sampling method in which individuals are selected based on their convenience and availability to the researcher (Farrokhi and Mahmoudi Hamidabad, 2012). To the researchers, due to a busy people it is impossible to reach them and reserve time for the least expensive, least time-consuming of all sampling techniques.

A questionnaire provides a respondent with several questions and requests their responses. Randomly selected stakeholders were given questionnaires to complete for this study. The respondents were informed that their information was gathered based on their remarks and that this was the real purpose of the study. This research study has been conducted in the Eastern province of Sri Lanka.

3.2. Data Analysis and Techniques

The investigation of primary data collected through the online structured questionnaire, carried out by using IBM Statistical Package for the Social Sciences (SPSS), the analysis provides insights into the dynamics of this relationship within the context of the selected study area.

The relationship among variables in simple regression is expressed in an equation as given below. This model involves a single dependent variable and two or more independent variables.

$$Y = \beta_0 + \beta_1 (X_1) + \beta_2 (X_2) + \beta_3 (X_3) \varepsilon$$

4.0. Data presentation and analysis

4.1 Demographic Profile

The demographic characteristics of this study, which include gender, Age, District, the blue economy sector of the organisation operates, type of organisation, and number of years in operation, are described by frequency analysis. Frequency procedures can generate frequency tables, pie charts, and bar charts as summary metrics for demographic variables.

Table 4.1: Summary of personal demographic Profile in the study

Category	Frequency	Percentage (%)
Gender		
Male	150	86.2
Female	24	13.8
Total	174	100.0
Age		
Under 25	3	1.7
25 - 30	20	11.5
31-35	22	12.6
36-40	53	30.5
Above 40	76	43.7
Total	174	100.0
District		
Ampara	66	37.9
Batticaloa	52	29.9
Trincomalee	56	32.2
Total	174	100.0

Type of Organization		
Government Agency	39	22.4
Private Sector	82	47.1
Non-Governmental Organization (NGO)	9	5.2
Academic/Research Institution	7	4.0
Local Communities	29	16.7
Financial Institutions	1	.6
other	7	4.0
Total	174	100.0
Sector of operation in the blue economy		
Fisheries	46	26.4
Tourism	61	35.1
Aquaculture	41	23.6
Shipping	7	4.0
renewable marine energy	1	.6
other	18	10.3
Total	174	100.0
Number of Year Operation		
Less than 1 year	20	11.5
1-3 years	28	16.1
3-5 years	19	10.9
5-7 years	70	40.2
7 years or more	37	21.3
Total	174	100.0

[Source: Survey Data 2025]

Table 1 presents the demographic and organisational characteristics of the study participants. The majority of respondents were male (86.2%), while females made up 13.8% of the sample. In terms of age, the largest group was aged above 40 (43.7%), followed by those aged 36-40 (30.5%). District-wise, the sample was fairly evenly distributed across Ampara (37.9%), Batticaloa (29.9%), and Trincomalee (32.2%). Regarding organisational affiliation, most respondents were from the private sector (47.1%), followed by government agencies (22.4%) and local communities (16.7%). Fewer participants were from NGOs (5.2%) or academic/research institutions (4.0%). The respondents represented various sectors of the blue economy, with tourism being the most common (35.1%), followed by fisheries (26.4%) and aquaculture (23.6%). In terms of years of operation, the majority of respondents had been operating for 5-7 years (40.2%), with a significant number also having been in operation for 7 or more years (21.3%)

4.2 Reliability Test

Reliability tests were conducted by researchers to test the internal reliability of the constructs. Cronbach's Alpha was used to measure the internal consistency of the measurement items. The respective Cronbach's Alphas are reflected in Table 4.2. According to Table 4.2, Reliability statistics as per total variables, the Cronbach's Alpha is 0.656.

Table 4. 2 Reliability statistics

Reliability Statistics

Cronbach's	
Alpha	N of Items
.656	4

[Source: Survey Data 2025]

4.3 Validity Test

Table 4. 3 Validity Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.657
Bartlett's Test of Sphericity Approx. Chi-Square	97.020
df	21
Sig.	.000

[Source: Survey Data 2025]

According to Table 4.3, KMO and Bartlett's test value for knowledge is calculated as 0.657, which exceeds the rule value of 0.5 and the chi-square value resulting in 97.020 at the significant level of 0.000

4.4. Descriptive Statistics

A descriptive statistic is a tool used by researchers to summarise the frequency table. According to Robert and Richard (2008), statistical techniques which are used to describe data are referred to as descriptive statistics, which summaries sets of numerical data. Descriptive statistics will be instrumental in helping to interpret and understand the sample data and provide the first step in the data analysis (Aaker et al., 2007). Descriptive statistics include frequencies, measures of central tendency (mean, median, and mode), and measures of dispersion (range, standard deviation, and coefficient of variation).

In this research, descriptive statistics have been measured on the independent variables and dependent variables, which consist of Organizational factors, Innovation, Trade openness, Technological factors, Regulatory Framework, Economic factors, and Blue economy investment behaviour.

Table 4. 4 Descriptive statistics

	Descriptive statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Organizational factor	174	3.33	5.00	4.2203	.35389
Innovation	174	3.00	5.00	4.2433	.37273
Trade openness	174	3.33	5.00	4.1111	.32521
Blue economy investment behaviour	174	4.00	5.00	4.4770	.23864

[Source: Survey Data 2025]

According to Table 4.4, Blue economy investment behaviour has the highest mean of 4.4770, whereas Trade openness r has the lowest mean of 4.1111. Even though mean & standard deviation are at the same level among all the constructs, approximately.

4.5. Pearson Correlation Analysis

Correlation analysis is related in the sense that it deals with relationships among variables. The correlation between two variables can be measured with a correlation coefficient (r), which can range between -1 to +1. To find the significant relationship between variables, correlation analysis was carried out.

Table 4. 5 Pearson Correlation Analysis

	Organizational factor	Innovation	Trade openness	Blue economy investment
Organizational factor	1	.166*	.205**	.277**
Innovation	.166*	1	.173*	.117
Trade openness	.205**	.173*	1	.207**
Blue economy investment	.277**	.117	.207**	1

[Source: Survey Data 2025]

Table 4.5 presents the Pearson correlation coefficients among the key variables of the study: Organisational Factor, Innovation, Trade Openness, and Blue Economy Investment (BEI). The results show that Organizational Factor is significantly correlated with Innovation ($r = .166, p < .05$), Trade Openness ($r = .205, p < .01$), and BEI ($r = .277, p < .01$). Trade Openness also shows significant positive relationships with Innovation ($r = .173, p < .05$) and BEI ($r = .207, p < .01$). However, the correlation between Innovation and BEI is not statistically significant ($r = .117, p > .05$). These findings indicate meaningful associations among the independent variables and the dependent variable (BEI), supporting the proposed conceptual framework.greater than 0.05 error value. The result does not give the strong position of the model.

4.6 Multiple Regression Analysis

The objective of multiple regression analysis is to predict a single dependent variable by a set of independent variables (Heppner and Heppner, 2004). In this study, drivers and barriers are considered as independent variables or predictor variables, and the blue economy investment is considered as a dependent variable.

Table 4.6 Model summary of impact of drivers on blue economy investment behavior

Model Summary ^b					
Model	R	R Adjusted	R Std. Error of Square	Square the	Durbin-Watson
1	.321 ^a	.103	.087	.22802	2.064

a. Predictors: (Constant), trade openness, innovation, organizational factor

b. Dependent Variable: blue economy investment behaviour

[Source: Survey Data 2025]

Table 4.6 illustrates the model summary of this study. That indicates that R is the multiple correlation coefficients, which show the relationship between the study variables. R can be one measure of the quality of the prediction of the dependent variable. According to this study, R is 0.321. Hence, it could be concluded that there is a positive linear correlation between drivers and blue economy investment behaviour.

R-squared (R²) is the coefficient of determination, which tells us about the variation in the dependent variable due to the changes in the independent variables. R² is the proportion of variance in the dependent variable that can be explained by the independent variables. The value of R-squared is 0.103 implies that 10.3% of the variance in blue economy investment behaviour is explained by the variation in all selected independent variables. The remaining 89.7% variance of Blue economy investment behaviour is attributed to other variables which can influence Blue economy investment behavior. Therefore, these coefficients statistically concluded that the selected three independent variables have a lower impact on Blue economy investment behaviour.

A rule of thumb is that Durbin-Watson test statistic values in the range of 1.5 to 2.5 are relatively normal. According to the result of the research, it is 2.064, which is in the range of 1.5 to 2.5 and therefore relatively normal.

Table 4. 7 ANOVA Table in regression analysis

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.014	3	.338	6.499	.000 ^b
	Residual	8.839	170	.052		
	Total	9.852	173			

a. Dependent Variable: blue economy investment behaviour

b. Predictors: (Constant), trade openness, innovation, organizational factor

[Source: Survey Data 2025]

From the table 4.7, ANOVA Table in regression Analysis, Significant P value is 0.000. It is less than the significant level 0.05 (P< 0.05).

Table 4. 8 Coefficient table in regression analysis

Table 10. Coefficients table in regression analysis							
Model	Coefficients ^a				Sig.	Collinearity Statistics	
	Unstandardized Coefficients		Standardized Coefficients			Tolerance	VIF
	B	Std. Error	Beta	t			
(Constant)	3.208	.309		10.382	.000		
organizational factor	.160	.051	.238	3.176	.002	.941	1.063
innovation	.033	.048	.052	.700	.485	.952	1.050
Trade openness	.109	.055	.149	1.989	.048	.938	1.066

a. Dependent Variable: blue economy investment behaviour

[Source: Survey Data 2025]

If two variables are highly correlated with each other, multicollinearity is said to be present. The rule of thumb to check the multicollinearity by using the VIF value is that the VIF value of all the independent variables should be less than 5. According to Table 4.14, all the VIF values of the independent variables are less than 5. Therefore, we can conclude that there is no multicollinearity issue between dependent and independent variables. Hence, it is statistically concluded that the model is fit for further analysis.

The coefficient of the organizational factor is 0.160. It means that the blue economy investment behavior will increase 0.160 units when organisational factors increase by 1 unit while others remain. Furthermore, the regression coefficient of innovation is 0.033. It means that Blue economy investment behaviour will increase 0.033 units when innovation increases by 1 unit, while others remain the same. In addition, the regression coefficient of trade openness is 0.109. It means that the Blue economy investment behaviour will increase 0.109 units when trade openness increases by 1 unit, while others remain.

In addition, from Table 4.14: Coefficients table in the Regression analysis, the Beta value between blue economy investment and other predictor variables as organisational factor and trade openness, is 0.238, 0.149, respectively. These are in significant at the 0.05 level ($P < 0.05$). Furthermore, the Beta value between innovation and blue economy behavior is in the lowest level. However, all the predictor variables have a positive trend towards the dependent variable. Organizational factors and trade openness contribute significantly to blue economy investment behavior. And also, innovation is not contribute significantly to Blue economy investment behaviour.

$$Y = 3.208 + 0.160 \beta_1 + 0.33 \beta_2 + 0.109 \beta_3$$

According to the output, the following equation is formed.

$$\text{Blue economy investment behavior} = 3.208 + 0.160 (\text{organizational factor}) + 0.33 (\text{Innovation}) + 0.109 (\text{Trade openness})$$

4.7. Hypothesis Testing

Table 4. 9 Results of hypothesis testing

	Hypothesis	Calculated significant value	Accept/ reject
H1	There is a significant impact between organizational factors and Blue Economy Investment behavior.	0.002 ($p < 0.05$)	Accepted
H2	There is a significant impact between innovation and Blue Economy Investment behavior..	0.485 ($p > 0.05$)	Rejected
H3	There is a significant impact between Trade openness and Blue Economy Investment behavior..	0.048 ($p < 0.05$)	Accepted

Source: Developed by Researcher

5.3. Discussion and conclusion, and limitation

The primary objective of this research study is to examine the impact of various determinants—drivers and blue economy investment behaviour. To analyse these

relationships, Pearson correlation coefficients and multiple regression parameters were computed. As shown in Table 4.5, the correlation analysis revealed significant positive relationships between organisational factors ($r = 0.277$), trade openness ($r = 0.207$), and blue economy investment behavior, with significance levels at 0.05. However, the relationship between innovation and blue economy investment behaviour was not significant ($r = 0.117$, $p > 0.05$), indicating a weak position for the model. Multiple regression analysis, conducted in the previous chapter, tested the relationship between independent variables and blue economy investment behavior. The multiple correlation coefficient ($R = 0.321$) indicates a positive linear relationship between the drivers and blue economy investment behavior. This relationship is statistically significant ($F = 6.499$, $p < 0.05$). The coefficient of determination ($R^2 = 0.103$) suggests that 10.3% of the variance in blue economy investment behavior can be explained by the selected independent variables. Therefore, it can be concluded that the selected independent variables have a relatively low impact on blue economy investment behavior.

Hypothesis Testing

The research hypotheses were tested with the following results:

Hypothesis 1: The beta coefficient for organisational factors is 0.238, with a p-value of 0.002 ($p < 0.05$). This supports the acceptance of H1, indicating a significant impact of organisational factors and blue economy investment behavior. This finding aligns with Ghobakhloo et al. (2012), who found that organisational factors influence blue economy investments by shaping decision-making and revealing strengths and weaknesses within organisations.

Hypothesis 2 : The beta coefficient for innovation is 0.052, with a p-value of 0.485 ($p > 0.05$), indicating an insignificant relationship. Hence, H2 is rejected. This result contrasts with studies by Sigwart et al. (2021) and Guo et al. (2022), which emphasized the role of innovation in driving blue economy growth. Our findings suggest that innovation does not predict blue economy investment behavior, differing from previous research.

Hypothesis 3 : The beta coefficient for trade openness is 0.149, with a p-value of 0.048 ($p < 0.05$). This supports the acceptance of H3, showing a significant impact between trade openness and blue economy investment behavior. Studies by Chen et al. (2022b) and Brun and Gnangnon (2017) underscore that trade openness facilitates technology transfer, market expansion, and enhanced economic growth, particularly in blue economy sectors.

5.4. Conclusion, recommendation, implication

This study aimed to examine the impact of various determinants, including organisational factors, innovation, and trade openness, on investment behaviour in the blue economy in the Eastern Province of Sri Lanka. The multiple regression analysis revealed that organisational factors and trade openness significantly influenced blue economy investment behaviour, while innovation did not have a statistically significant impact. In a developing country, the level of investment is crucial for future economic growth. When investments are strategically directed toward profitable sectors that are essential for economic growth, the country's development can be achieved more desirably. Based on the findings, it can be concluded that technological factors and regulatory frameworks should be reframed as drivers rather than barriers to investment in the blue economy. The results underscore the importance of adopting new

technologies, establishing favorable regulatory environments, and strengthening economic factors to foster sustainable investment in blue economy activities.

In a developing country, the amount of investment is the key to the future economic growth of the country. So, when the investment is made accurately on a profitable sector which are given an important position for the growth of the economy, the development of the country will be achieved desirably. Policy makers need to focus on improving access to advanced technology, including ICT and digital platforms, to support investment in the blue economy. Government institutions and private players need to collaborate to provide training programs and capital to small and medium-sized enterprises (SMEs) in the blue economy sector. Governments need to have strong, clear, and consistent policies to draw investment into blue economy activities. Simplification of regulatory processes and transparency in policies can help to mitigate investor uncertainty and support long-term investment. Strengthening the enforcement of environmental and sustainability regulations to engage socially responsible investors. Financial institutions need to come up with differentiated financial products, such as low-cost loans or investment subsidies, to assist businesses in blue economy industries. Incentives need to be established by governments for investors, e.g., tax advantages or subsidies, to make the sector more economically viable and encourage investments. Promoting public-private partnerships to ease the development of infrastructure and create a facilitating environment for investment expansion.

5.6. Implications

This research will add to the growing body of knowledge on the blue economy and help fill the literature gap concerning the blue economy sector in Sri Lanka. The findings of this study provide a theoretical basis for policymakers, investors, and other stakeholders to develop more effective policies and programs to promote the sector's sustainable investment. Additionally, the study contributes to the theory of the Blue Economy by providing empirical evidence of the potential for economic development through the sustainable use of marine resources. This research also highlights the importance of taking a holistic approach to utilize marine resources. Managerial Implications Based on the analysis of opportunities and challenges associated with expanding blue economy in Sri Lanka, several crucial managerial implications come to the forefront. Firstly, the development of essential infrastructure such as ports, marinas, and cruise terminals are of paramount importance, as it serves as a cornerstone for the growth of this sector, attracting more investors to make investment decision in blue economy.

Secondly, ensuring sustainability in this industry is imperative due to its potential environmental impact. Managers should prioritize implementing sustainable practices, which encompass promoting responsible tourism, waste reduction, pollution control, and the preservation of delicate marine ecosystems. Moreover, fostering collaboration between the private sector, government, local communities, and stakeholders is a key driver for sustainable investment. In addition, financial institutions can utilise these findings to develop specialized financial products that benefit blue economy enterprises. The study also demands openness in trade and organizational resilience in shaping the investment behaviour, and thus necessitating collective efforts among the government agencies, private sector players, and international stakeholders to ensure sustainable development. Ultimately, these results can contribute to blue economy industries' long-term economic viability and environmental resilience,

particularly in nations like Sri Lanka, where ocean industries hold a vast potential for economic development. Sri Lanka's unique natural beauty and rich cultural heritage, managers should focus on enhancing the skills and knowledge of their workforce to ensure a high-quality, thereby contributing to the industry's overall growth and investment behavior.

The main limitation of the study of s the scope, which was very broad. BE encompasses field like fisheries, marine tourism, shipping, marine renewable energy and aquaculture. These data are thus based on self-reporting, so it could be the case that some data have been affected by bias or are not completely honest. This could potentially affect the accuracy and reliability of the survey results. It was found that in addition to the six factors investigated in this study, some other factors have a significant impact on the intention of investment in the blue economy. So, many other factors have hampered stakeholders in the past that were not included in this study. Another limitation is that using a survey as a quantitative research method gives limited depth to the insights obtained. Another limitation is that the research is specifically focused on Sri Lanka, which may limit the generalizability of the findings to other countries or regions with different socio-economic and environmental contexts. The unique characteristics of Sri Lanka's blue economy investments may not be applicable elsewhere, potentially reducing the broader relevance of the conclusions drawn.

This study may be very useful for investors who desire to invest in the blue economy sectors. Furthermore, there is clearly enormous scope for more research work in the present study. Therefore, the Researcher suggests the following for further research. The very broad scope. BE encompasses fields like fisheries, marine tourism, shipping, marine renewable energy and aquaculture. It is suggested that future studies should limit their focus to a specific field of the BE. The study may have yielded significantly different results if a different sampling procedure had been utilised. Therefore, further research is recommended to incorporate different sampling methods. Future research can examine other determinants that may influence blue economy investment, such as environmental sustainability strategies and socio-political stability, to further analyse this new sector. Moreover, a study could be carried out in other parts of Sri Lanka since this involved the Eastern province only. This will create more factors that influence the blue economy investment behavior.

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THE IMPACT OF MOBILE APPLICATIONS ON THE DAILY LIVES OF SCHOOL STUDENTS: A DESCRIPTIVE STUDY

AMM. Mustafa

*Professor in Business Economics, Faculty of Management and Commerce
South Eastern University of Sri Lanka, Sri Lanka, Oluvil, # 32360# Sri Lanka
amustafa@seu.ac.lk*

Mohamed Mustafa Mohamed Minash

minashmustafa005@gmail.com

Abstract

This qualitative study talks about the effect of mobile applications on day-to-day life among Sri Lanka's Technology Stream Advanced Level (A/L) students. With increased smartphone usage, these students will likely utilize study and recreational applications. A cross-sectional survey was conducted among 100 students through a structured questionnaire to examine patterns, frequency, and perceived effects of app usage. Research indicated the most accessed learning apps to be Google Classroom, YouTube, and WhatsApp, and TikTok and Instagram as the most accessed entertainment applications. Despite most students reporting increased access to education and digital literacy, adverse effects such as distraction, sleep loss, and reduced exercise levels were also experienced. The report urges additional encouragement for the wise use of mobile apps and embedding digital literacy into practice. Such outcomes may guide parents and educators in guiding learners toward better and more balanced exploitation of mobile technology.

Keywords: Mobile applications, A/L students, Technology Stream, education, smartphone use, digital literacy, Sri Lanka.

1. Introduction

With the emergence of the current digital transformation era, mobile technology has become a vital component of day-to-day life. With the innovation in smartphones and the unpredictable escalation in the evolution of mobile applications, mobile users now have access to instruments that aid communication, learning, leisure, health, and productivity. Among the worst-hit user communities are school-going students, who regularly utilize mobile apps for personal and educational purposes. This study intends to identify the influence of mobile apps in the everyday life of school students, particularly those studying under the Technology Stream of Sri Lanka's A/L syllabus.

Smartphone applications, or "apps" as they are commonly known, have changed how one utilizes technology. While they bring many benefits, their inappropriate or excessive use also leads to unwanted impacts such as distraction, addiction, and poor time management. This descriptive study aims to explain the types of smartphone applications used by students, frequency of usage, reasons for usage, and the positive and negative impacts.

Teenagers highly utilize cell phones, and technology-stream students are more exposed to digital tools because they study technical subjects. Google Classroom, Zoom, WhatsApp, YouTube, Duolingo, and learning games are some of the common apps utilized. Entertainment applications such as TikTok, Instagram, and mobile games compete for students' attention.

The study is relevant in Sri Lanka, where students' use of mobile applications grew significantly during and after the COVID-19 pandemic with the onset of online learning. As students depend increasingly on digital learning and communication tools, it is essential to assess how this influences their behavior, learning patterns, productivity, and interactions with people. Teachers, educationists, and parents can make evidence-based decisions about integrating mobile technology in learning by examining students' usage patterns and perceptions.

2. Literature Review

Recent research on using mobile apps in learning presents positive and negative indicators for students' learning. The research spans various environments, from elementary school to higher education, and it offers valuable information regarding how mobile apps are affecting educational performance, motivation, and online behavior.

Demir and Akpınar (2018) conducted a quasi-experimental study involving Turkish undergraduates and concluded that mobile learning apps significantly influenced academic performance and attitudes towards mobile learning. The experiment group reported more optimal achievement scores and better motivation regarding the use of mobile technology for learning.

Guerrero et al. (2024) conducted an experiment with engineering students under controlled conditions and found that mobile phone use via Socrative enhanced classroom engagement. This proves that interactivity facilitated through applications enhances active learning and engagement.

Chen et al. (2021) also studied persuasive design elements in mobile apps. They showed that design factors in social media, video, and learning apps boosted problematic smartphone use among 25% of the students who experienced multiple problematic behaviors and distraction due to the app design.

Giunchiglia et al. (2020) employed student social media use logs and correlated them with grades. They found a negative relationship between social media use and grades and called for controlling smartphone-mediated distraction.

Laurente et al. (2023) examined reading mobile apps among tenth-grade Filipino students. They discovered a positive correlation between reading-app usage and the development of critical thinking skills, suggesting that apps could help develop stronger analytic skills when used appropriately.

Combined, these five studies illustrate that mobile apps can enhance academic performance, motivation, engagement, and cognitive capacity—when developed or implemented carefully. However, they also recognize threats such as patterns of addictive use and distraction from studies. This balance between opportunities and disadvantages is especially pertinent for Sri Lanka's A/L students in the Technology Stream, who use learning and entertainment apps extensively. These findings can be used in interventions that reap rewards from learning through apps without maximum harm.

3. Research Aims

The main aim of this descriptive study is to explore how mobile applications affect the academic and personal lives of A/L students studying the Technology Stream. The specific aims of the research are:

1. To identify the most common mobile applications among students.
2. To explore the trend and purpose of using such apps.
3. To examine the perceived strengths and weaknesses of mobile app use.
4. To recommend ethical and optimal use of mobile applications in university life.

4. Methodology

This was a descriptive study with a quantitative design. A systematic questionnaire was administered to 100 A/L students in the Technology Stream from a sample of schools in the Kandy District. The questionnaire contained three sections: demographic details, patterns of mobile app usage, and students' impressions of the effects of app usage. Data were analyzed using simple statistical methods, which include frequency distribution and percentage analysis.

Sample Profile:

- Overall Respondents: 100
- Gender: 55% Male, 45% Female
- Age Group: 17-19 years
- Stream: Technology Stream (ICT, Engineering Tech, etc.)

5. Key Findings

5.1. Mobile Application Usage Patterns

Table 1: Most Commonly Used Applications and Usage Patterns

Category	Applications	Usage Rate (%)
Educational Apps	YouTube	90%
	Google Classroom	82%
	Zoom	65%
	Quizlet	28%
Communication Apps	WhatsApp	95%
	Messenger	52%
Entertainment Apps	TikTok	60%
	Instagram	55%
	Mobile Games	47%
Utility Apps	Notes	45%
	Google Translate	38%
Time Spent Using Apps	Over 3 hours per day	74%
Use During School/Study Time	Educational apps	60%
Use of Entertainment Apps	During free time or class time	65%

The majority of students used mobile applications heavily, with 74% spending over three hours daily. Educational platforms like YouTube and Google Classroom showed high

engagement, indicating their value in learning. Communication through WhatsApp was nearly universal, while entertainment apps also had strong usage, often encroaching on study time.

5.2. Perceived Benefits and Drawbacks

Table 2: Perceived Benefits and Drawbacks of Mobile Application Usage

Aspect	Key Findings	Reported by (%)
Benefits	Improved access to learning (e.g., YouTube, apps)	70%
	Convenience in learning and communication	68% (approx.)
	Skill development (IT, English, typing)	40%
Drawbacks	Distraction from studies	58%
	Reduced physical activity	45%
	Poor sleep due to late-night usage	30%
	High data costs are limiting app access	35%

Students found mobile apps helpful for learning and skill development, particularly in English and IT. However, over half reported being distracted by non-educational apps, and a significant portion experienced adverse lifestyle effects like reduced physical activity and sleep disturbances. The cost of internet access also emerged as a barrier to practical usage.

6. Discussion

The results indicate that mobile apps play dual roles in students' lives. On the one hand, they offer improved learning opportunities, simpler communication with teachers and classmates, and simpler access to international information. On the other hand, overusing or underusing entertainment and social network applications can lead to less academic focus and unhealthy lifestyle habits.

This two-sided application of technology has a bearing on self-control and digital literacy. Students should be instructed to distinguish between productive and unproductive use of cell phone applications. Instructors and educational institutions can do this by adding mobile-based learning to the curriculum, with regulations restricting off-task applications. Offering computer literacy classes and instructing students on the ethical use of technology are also options.

7. Recommendations

From the evidence, the research recommends the following measures:

1. **Parental Supervision and Guidance:** Parents must know which apps their children are using and guide them in balancing study time with screen time.
2. **Teacher Training:** Teachers must be trained to effectively use mobile applications in instruction and suggest good educational mobile apps.
3. **School Policies:** Schools can adopt a mobile device policy that allows educational usage but avoids unnecessary entertainment during school hours.
4. **Digital Literacy Campaigns:** Conduct workshops to improve students' awareness of safe, ethical, and productive mobile app usage.
5. **Promoting Balance:** Involve students in a healthy balance between digital and physical activity through extracurricular activities.

9. Conclusion

Mobile apps are embedded in school children's everyday lives, with possibilities and hazards. For students of the Technology Stream, these apps can reinforce technical competencies and academic involvement if they are used wisely. However, the risk of distraction and addiction to online media must not be underestimated. The study confirms the importance of building awareness for students, parents, and educators towards the prudent use of mobile apps. With controlled guidance and a structured method, the mobile app can be a valuable learning resource, rather than a distraction.

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AI TRANSFORMS HEALTHCARE: DOES AI REPLACE DOCTORS OR AUGMENT THEIR ROLE

Rauf F.H.A.

*Department of Management, Faculty of Management and Commerce
South Eastern University, Sri Lanka
fharauf@seu.ac.lk*

Zeena A.R.F.

*Faculty of Medical Sciences,
University of Sri Jayewardenepura, Sri Lanka
arfzeena@gmail.com*

Introduction

Artificial Intelligence (AI), which refers to the "ability of machines to simulate human intelligence", is rapidly advancing in the field of medicine. Its essential feature is its ability to process massive amount of data and automate of repetitive works. The speed of AI is much faster than speed of human.

There is a continuous debate about the possibilities of AI replacing human jobs. Technology is developing rapidly. Hence, public is more concern about losing employment opportunities. However, the question of whether AI will fully replace jobs is not simple. This question cannot be answered with simple 'yes' or 'no'.

AI has replaced many jobs. For example, Amazon and banks use AI in their business. However, AI has also created many jobs and new avenues. Further, AI has taken over the routine activities. Therefore, human is free for formulating strategies and innovation. For instance, healthcare professionals are now able to use AI to interpret medical images and forecast disease outbreaks. Therefore, they are able to invest their time on more productive activities such as direct patient care and complex decision in clinical works (Topol, 2019).

Medicine is a human-centered profession. It is based on empathy, instant clinical judgment, ethical responsibility and accountability. Health care field has been integrated with AI. Although AI enhance efficiency, it is a question that weather AI truly replace the complex, nuanced responsibilities inherent in medical practice.

The objectives of this papers are:

1. To explore the nature of the medical profession
2. To explain how AI is transforming and supporting clinical practice
3. To highlight the limitations of AI in the medical profession
4. To indicate the emerging paradigm of 'augmented intelligence'.

Doctors and AI

As medical professionals are responsible for clinical diagnosis and critical decision making, they play complex role. They gather information from patients and integrate the information. They perform clinical examination and combine diagnostic tests to reach accurate conclusions. Success in this process depends heavily on the ability of making decisions in uncertain situations

and the level of experience of medical professionals. When planning treatment, doctors consider patient preferences and potential risks. They may decide to treat the patient through medications, surgical procedures, or lifestyle changes. Before taking such decision, doctors communicate diagnoses and discuss prognoses. They are concerned about empathy and clarity when they handle emotionally sensitive conversations. They follow a holistic approach collaborating with nurses, specialists, pharmacists, therapists, and administrative staff to reach all inclusive decisions and actions. Moreover, they shoulder substantial ethical and legal responsibilities. As medicine is a constantly evolving discipline, doctors must remain updated with new research findings, clinical practices. Therefore, they have to continuously develop their professional expertise.

AI has improved efficiency in clinical activities. It processes and interprets large volume of lab results and histories of patients. Natural Language Processing (NLP) and telemedicine have reduced the time consumption for administration and documentation. Smart wearable devices powered by AI now monitor vital signs such as heart rate, blood pressure and glucose levels. AI consider the patient's genetic profile, lifestyle and health data and AI supports personalized treatment. Predictive models can anticipate individual responses to medications. AI can identify conditions such as pneumonia, breast cancer, and retinal diseases (Topol, 2019). Google Health's AI accurately detect diabetic retinopathy (Gulshan et al., 2016). Google's DeepMind can accurately diagnose breast cancer (McKinney et al., 2020). AI is capable of analyzing electronic health records (EHRs) and describe patients risk for sepsis, heart failure, or hospital re-admission, facilitating timely interventions (Rajkomar et al., 2018). Similarly, AI powered Clinical Decision Support Systems (CDSS) provide real time evidence based recommendations for treatment. IBM Watson suggests suitable cancer therapies and supports oncologists (Jiang et al., 2017). Moreover, virtual health assistants and chatbots improve administrative efficiency by providing health guidance and scheduling appointments.

Does AI Fully Replace Doctors?

Medical AI is rapidly improving. Many argue about the future of doctors. However, experts are of the view that AI can support to enhance productivity, but it cannot replace the doctors. While AI has significant capabilities, it lacks the ability to replace a human doctor. AI lacks empathy, compassion and emotional intelligence. These are essential traits for caring patient. Healthcare is intrinsically human for a patient. AI cannot create trust. As Dr. Eric Topol writes (2019), "Patients don't want a cold diagnosis, they want to be heard and understood."

Doctors make decisions based on their clinical experience, intuition, and a deep understanding of a patient's unique circumstances. Doctors generally consider social, cultural, and ethical dimensions when recommending treatments. These "soft" factors are not possible with AI. When AI is integrated into healthcare, human judgment is necessary. Because, ethical and legal challenges with regard to data privacy, algorithmic bias and accountability. Therefore, there is an urgent need for regulations and ethical guidelines (Morley et al., 2020). AI is struggling with complex, rare, or unpredictable medical cases. Patients value the empathy and reassurance given by human doctors, especially when facing serious or emotionally sensitive health concerns. Another critical issue with AI is accountability. What will happen, if an AI system makes an error? Who will be responsible? Is it the doctor using it? Is it the AI developer who built it? Or the institution which uses it? According to the current system, doctors are

legally and ethically responsible, reinforcing the need for them to remain central in decision making. In addition to that, the quality of the data determines the effectiveness of AI. Biased, incomplete, or lack diversity dataset will results in inaccuracies (Obermeyer et al., 2019). Another significant issue is the problem of the "black box". AI lacks explainability. Often, the reasoning behind AI outputs is not transparent. But the medical field requires trust, clarity, and accountability (Samek et al., 2017).

Conclusion

AI plays dual roles; while it functions as a disruptive force, it also functions as a driver of innovation in the job market. It ideally replace jobs which are repetitive, manual. However, AI can only reshape other jobs like doctors. We should not view AI as a threat. AI can be a valuable collaborator with doctors to improve their productivity and quality care. As AI has ability to analyze massive volume of patient's records, doctors can detect disease early. Doctors are able to initiate earlier interventions. When administrative activities are automated, doctor burnout will be reduced. Therefore, doctors have more time to intervene in patients directly. Further, doctors can make faster and evidence-based decisions with the support of AI-powered clinical decision support systems.

Doctors deal patient as human and take decision in complex situations. AI serves with transformation for healthcare. However, it has no inherent characters of human such as interpersonal and ethical elements. Ability to response to a situation is possible with human which is necessary for medical practice. AI can be leveraged to support, but it cannot replace doctors (WHO, 2021). While AI interpret scans in a few seconds, doctors should integrate them within the clinical context. AI can propose many possible diagnoses, but doctors have to judge them from the viewpoint of patient preferences. They assess all other coexisting conditions and practicality. AI can propose drugs, but finally doctors analyze the side effects, monitor adherence, and ensure patient understanding. Brynjolfsson and McAfee (2014) emphasized that synergy created between human and technology will increase performance. As medicine is a high stakes field, machines or automation are not trust worthy.

Doctors should actively contribute in designing regulations on how to use AI and ensure new AI technology support healthcare and not replace human caregivers. The knowledge of AI literacy and importance of collaboration among disciplines should be given to doctors and prepare them to shape for the future. This will lead to harmonious work between technology and human empathy. Medical community should not fear about AI. Rather, they should accept it as a great collaborator to enhance patient care and contribute towards progressing global health. D'Adderio said, "AI is not infallible; we still need clinicians to verify its accuracy retrospectively." Dr. Jesse Ehrenfeld stated that "AI won't replace doctors," he says, but doctors who use AI will replace those who don't. AI is not a replacement. But, AI should be considered as a valuable contributor in delivering enhanced healthcare. This is the concept of "augmented intelligence", not just artificial intelligence.

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ECONOMIC STABILITY PERCEPTIONS AMONG KERALITES IN GULF COUNTRIES: A COMPARATIVE STUDY OF SAUDI ARABIA AND OMAN

Shemeem K.H.

*Research Scholar, Department of Economics
Vels Institute of Science, Technology, and Advanced Studies, Chennai*

Dr. V. Bala Ruby, M.A., M.Phil., Ph.D., SET

*Research Supervisor, Department of Economics
Vels Institute of Science, Technology, and Advanced Studies, Chennai*

Abstract

This study examines the economic stability perceptions of Indian expatriates from Kerala state work in Saudi Arabia and Oman, comparing their experiences during expatriation and prospects after repatriation. Using survey data from 152 participants (76 from each country), the study analyzes differences in economic satisfaction through descriptive statistics, reliability analysis, and multivariate tests. Results indicate that while both groups prospectsignificant declines in economic stability post-repatriation, Saudi-based migrants report marginally higher satisfaction levels during expatriation. Gender disparities persist across both contexts, with women facing greater economic instability after return. The findings highlight the need for destination-specific reintegration policies for returning Indian migrants.

Keywords: *Expatriates, Economic Stability, Repatriation, Keralite Migrants*

1. Introduction

The Population of Non Resident Indians, according to the Ministry of External Affairs, is 32 million and 2-5 million Indians migrate every year. India's geographical pattern of migration has been ever dominated by GCC countries while the other regions like US, the UK, Canada, and South Africa has been around 30%. According to the Ministry of External affairs, India'semigration to the GCC region in the year of 2020 is 0.90 Lakhs.

Kerala accounts for over 30% of India's Gulf migrants, with Saudi Arabia and Oman being major destinations. While existing research has explored remittance patterns and employment conditions, few studies have compared how economic stability perceptions vary between these Gulf countries. This paper addresses this gap by analyzing survey data from returnees to Kerala, focusing on two key questions:

1. How do economic stability perceptions differ between Keralites in Saudi Arabia and Oman?
2. What factors explain the post-repatriation satisfaction gap between genders and destination countries?

2. Review of Literature

2.1. Job Nationalization Policies and Expatriates

To reduce the expatriate labour force replacing the nationals, both Oman and Saudi Arabia adopted different policies like other Gulf Co-operation Council (GCC) Countries.

Oman

To reduce the number of expatriates in the job market, Oman conducted Amnesty campaign in 2016. Due to the program 115,000 expats left the country during 2016 to 2018, meanwhile many commercial property owners became bankrupt as their major source of income from building rent was lost. ¹

In 1999 Oman introduced Sector-specific "Omanization" quotas to generate additional job opportunities for nationals in specific activities. Due to this in banking sector the Omanization ratio was hit 92.5% in 2016. Automotive sector was also affected much as the jobs in this sector need more training and qualification. This policy was blamed for phantom employment. ²

Public sector reforms were programmed in 2011, aiming to restructure and redefine the functions of public jobs. Government announced USD.390/= per month as unemployment benefits for natives and 35,000 new government jobs were created. Due to this program, 37,000 private sector labors quit their jobs in the same year. ³

Kingdom of Saudi Arabia

To make the Saudization program more practical and successful, Saudi Arabia introduced a new policy named *Nitaqat* (means Ranges in Arabic) in 2011. According to Nitaqat System as explained by the **Ministry of Human Resources and Social Development**, Kingdom of Saudi Arabia, the firms in the country are classified in to five categories on the basis of their Saudization Rate. They are:

- 1) Platinum Range: They can apply for new expatriate worker visas and can change expatriate worker's occupations. They can also renew the expatriate worker's work permit. This range of companies can transfer expatriate workers' sponsorship to other companies each other.
- 2) High Green Range: This range of companies also can enjoy the same things as the platinum range.
- 3) Medium Range: This range of firms is also same as that of the above two groups.
- 4) Low Green Range: This group of companies can neither apply for new expatriate worker visas nor change expatriate workers' occupations. They can renew the existing expatriate workers' work permit.
- 5) Red Range: This group of companies cannot apply for new expatriate worker visas and they cannot apply to renew the existing expatriates' work permits. They cannot change the expatriate workers' occupations and cannot transfer their sponsorship also. Further they cannot issue work permit for new expatriate workers. ⁴

Within two years duration (2011-2013) around 500,000 Saudi nationals were hired for jobs which constituted a 70% of increase. ⁵

The nationalization programs (such as *Saudization* in Saudi Arabia and *Omanization* in Oman) and the introduction of levies on expatriates have contributed to feelings of job insecurity and economic uncertainty among foreign workers in the GCC. While these policies aim to boost local employment and reduce dependency on expatriate labour, they have also led to concerns about job stability, increased living costs, and financial preparedness for repatriation. Saudi Arabia and Oman, in particular, have implemented stringent regulations to accelerate workforce localization, which has left some expatriates anxious about their long-term prospects in the region.

2.3 Migration System and Gulf Countries

In the GCC countries Guest worker system is prominent. The migrated workers scarcely obtain permanent residency or citizenship. So it becomes compulsory for the labour to return to the home country after certain duration. (Hvidt, 2016)⁶

The empirical studies show that after repatriation the returned expatriates generally make investments in real estate, purchasing consumer durables etc. which do not lead to a productive wealth (Athukorala, 1990)⁷ and so they are forced to migrate again to the same GCC country or other Gulf countries.

From the existing studies, it is very evident that the expatriates prospect an unstable economic life after their repatriation. Further they experience job inconsistency and financial instability due to the daily reforming nationalization programs and rules of levies, and other financial burdens to the labours.

3. Methodology

3.1 Sample Characteristics

In cases where accessing samples with the desired characteristics is challenging, the snowball sampling method can be applied (Naderifar et al., 2017)⁸. Given that the target population in this study is widely dispersed and conducting a direct study of the entire population would be cost-prohibitive, the snowball sampling technique was deemed appropriate. For data collection, private social organizations operating in GCC countries were selected as initial contacts ("seeds") for the snowball sampling process. These organizations facilitated access to their members and broader networks, enabling the recruitment of additional participants through referrals. 152 Indian (Keralite) expatriates are obtained as a snowball sample for the study as detailed in the Table 1.

Table1. Sample Demographics

	Women	Men
Age Group		
22-30	18	26
31-40	24	26
41-50	16	22
51-60	14	6
61 and Above	0	0
Total	72	80
Education		
Doctoral Level	0	0
Postgraduate Level	20	24
Graduate Level	40	38
Technical / Professional Level	12	12
HSC/Lower	0	6
Total	72	80

Job Class		
White Collar	60	44
Blue Collar		
Professionals	12	34
Business Men		2
Total	72	80
State		
Kerala	72	80
Total	72	80
Country of Residence		
Saudi Arabia	36	40
Oman	36	40
Total	72	80

3.2 Demographic Overview

The sample consists of **152 respondents** (72 women, 80 men) from Kerala, residing equally in Saudi Arabia and Oman.

1. Age Distribution:

- Majority are aged **22–40** (68% of women, 65% of men).
- No respondents are above 60.

2. Education:

- Most hold **graduate/postgraduate degrees** (83% women, 78% men).
- **No doctoral-level** education reported.

3. Employment:

- **White-collar jobs dominate** (83% women, 55% men).
- More men are in **blue-collar/professional roles** (43% vs. 17% women).

4. Gender Differences:

- Women are **more concentrated in white-collar jobs**, while men show **greater diversity in roles**.
- **6 men** reported only HSC/lower education vs. **none among women**.

This data reflects trends in education, gendered job preferences, and the expatriate workforce from Kerala in GCC countries.

3.3 Measures

A questionnaire was prepared with 8 questions apart from 13 questions for getting the demographics of the population.

- **Economic Stability Scale:** 4-item Likert scale (1 = "Very Unsatisfactory" to 4 = "Excellent").
- **Statistical Tools:** Descriptive analysis, MANCOVA, PCA, reliability testing (Cronbach's α).

4. Results

Table 1 Descriptive Statistics of Economic Stability During and After Expatriation by Gender

Variable	Men (N = 40)	Men (N = 40)	Women (N = 36)	Women (N = 36)
Time Period	During Expatriation	After Repatriation	During Expatriation	After Repatriation
Mean	12.40	9.38	11.90	8.94
Median	13.00	9.00	12.00	9.00
Standard Deviation (SD)	2.12	2.56	1.91	2.00
Minimum	7.00	4.00	7.00	4.00
Maximum	16.00	15.00	16.00	13.00
Missing	0	0	4	4

The descriptive statistics present the economic stability scores for men and women during expatriation and after repatriation. For men ($N = 40$), mean economic stability was higher during expatriation ($M = 12.4$, $SD = 2.12$, $Mdn = 13.0$) compared to after repatriation ($M = 9.38$, $SD = 2.56$, $Mdn = 9.00$). Similarly, women ($N = 36$) reported higher economic stability during expatriation ($M = 11.9$, $SD = 1.91$, $Mdn = 12.0$) than after repatriation ($M = 8.94$, $SD = 2.00$, $Mdn = 9.00$). The data suggest a decline in economic stability post-repatriation for both genders, with men showing slightly higher variability (larger SD s) than women. No missing data were reported for men, whereas four cases were missing for women.

Table 2. Comparative Economic Stability Scores

Phase	Saudi Arabia (Mean)	Oman (Mean)	Difference
Men - During Expatriation	12.4	12.1	+0.3
Men - After Repatriation	9.38	8.70	+0.68
Women - During Expatriation	11.9	11.0	+0.9
Women - After Repatriation	8.94	8.25	+0.69

- Saudi-based migrants reported **higher satisfaction during expatriation**, likely due to better wages and job security.
- Post-repatriation, **Oman returnees faced sharper declines** (-3.4 for men vs. -3.02 in Saudi Arabia).

4.1 Gender Disparities

- **Women in both countries** reported lower satisfaction post-return (Oman: -2.75 ; Saudi: -2.96).
- **Saudi women** had higher expatriation satisfaction ($+0.9$ vs. Oman), possibly due to more professional roles (e.g., nurses).

4.2 Reliability and Factor Analysis

- **Cronbach's α** : 0.627 (Saudi) vs. 0.608 (Oman) – indicating moderate consistency is acceptable for exploratory research but borderline low. Hair et.al. (2010) state that Cronbach's α as low as 0.6 is acceptable for new scales and for exploratory research.⁹

Table 2 Shows Principal Component Analysis

Component	Oman (Variance %)	Saudi Arabia (Variance %)
Factor 1 (Expatriation)	48.9%	48.9%
Factor 2 (Repatriation)	45.2%	45.2%

4.3 Consistency

Both datasets revealed **identical variance structures**, confirming the stability of the two-factor model (expatriation vs. repatriation).

- **Factor 1:** Expatriation stability (48.9% variance in both).
- **Factor 2:** Repatriation stability (45.2% variance in both).

4.4 MANCOVA Results

Table 3 Showing Multivariate Tests

		value	F	df1	df2	p
Economic Stability After Repatriation (Men)	Pillai'sTrace	0.122	2.22	2	32	0.126
	Wilks'Lambda	0.878	2.22	2	32	0.126
	Hotelling'sTrace	0.138	2.22	2	32	0.126
	Roy'sLargestRoot	0.138	2.22	2	32	0.126
Economic Stability After Repatriation (Women)	Pillai'sTrace	0.144	2.69	2	32	0.083
	Wilks'Lambda	0.856	2.69	2	32	0.083
	Hotelling'sTrace	0.168	2.69	2	32	0.083
	Roy'sLargestRoot	0.168	2.69	2	32	0.083

A multivariate analysis of covariance (MANCOVA) was conducted to examine gender differences in perceptions of economic stability after repatriation, with economic stability during expatriation as a covariate. The multivariate tests revealed no statistically significant gender differences in economic stability perceptions after repatriation when controlling for economic stability during expatriation: Pillai's Trace = 0.122, $F(2, 32) = 2.22$, $p = .126$ for men; Pillai's Trace = 0.144, $F(2, 32) = 2.69$, $p = .083$ for women.

Table Showing Univariate Tests

	Dependent Variable	Sum of Squares	df	Mean Square	F	p
Economic Stability After Repatriation (Men)	Economic Stability During Expatriation (Men)	0.838	1	0.838	0.1731	0.680
	Economic Stability During Expatriation (Women)	2.102	1	2.102	0.5669	0.457
Economic Stability After Repatriation (Women)	Economic Stability During Expatriation (Men)	0.314	1	0.314	0.0648	0.801

	Economic Stability During Expatriation (Women)	3.847	1	3.847	1.0376	0.316
Residuals	Economic Stability During Expatriation (Men)	159.820	33	4.843		
	Economic Stability During Expatriation (Women)	122.356	33	3.708		

Follow-up univariate tests indicated that economic stability during expatriation did not significantly predict economic stability after repatriation for either men ($F[1, 33] = 0.17, p = .680$) or women ($F[1, 33] = 1.04, p = .316$). Similarly, cross-gender effects were non-significant, with men's economic stability during expatriation not predicting women's post-repatriation stability ($F[1, 33] = 0.06, p = .801$) and women's stability during expatriation not predicting men's post-repatriation stability ($F[1, 33] = 0.57, p = .457$).

The non-significant results suggest that perceptions of economic stability after returning home were not significantly related to economic stability during overseas employment for either gender in this sample. The model explained a small portion of variance in post-repatriation economic stability perceptions (partial $\eta^2 = .12$ for men, .14 for women).

5. Discussion

5.1 Why Do Saudi Returnees Report Higher Satisfaction?

1. **Higher Wages:** Saudi Arabia's oil-driven economy offers better salaries than Oman's diversified market.
2. **Job Security:** Saudi's Nitaqat system incentivizes formal employment for expatriates.
3. **Gender Dynamics:** More Saudi-based women work in healthcare (higher-paying vs. Oman's domestic/retail roles).

5.2 Post-Repatriation Challenges

- **Oman returnees** struggle with lower savings and weaker job networks.
- **Women universally face barriers** due to Kerala's limited high-paying opportunities for returnees.

5.3 Policy Recommendations

1. Destination-Specific Reintegration Programs:

- **Saudi returnees:** Focus on entrepreneurship leveraging their savings.
- **Oman returnees:** Skill-matching initiatives for local industries.

2. Gender-Responsive Support:

- Subsidized childcare for returning women professionals.
- Partnerships with IT/healthcare sectors to absorb skilled returnees.

6. Conclusion

This study reveals nuanced differences in how Keralite migrants perceive economic stability across Gulf destinations. While Saudi Arabia offers marginally better conditions, both groups face significant post-return declines. Policymakers must tailor reintegration strategies to migrants' destination-country experiences. Future research should explore longitudinal impacts of return migration on household economies.

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BRIDGING GAPS, BUILDING FUTURES: A MULTISECTORAL APPROACH TO MENTAL HEALTH IN INDIA

Dr. T. Ambika

*Assistant Professor of Political Science
School of Law, Sathyabama Institute of Science and Technology
dr.t.ambikasenthilvel@gmail.com*

S. Joshika,

*B.A.LL.B (Hons.)-4th year
School of Law, Sathyabama Institute of Science and Technology
sjoshika51@gmail.com*

Abstract

Mental health has become a pillar of individual well-being, business efficiency, and social cohesion in India's rapidly transforming socio-economic and cultural scenario. This article discusses the intertwined roles of law, management, and social sciences to construct mental health and social support systems with innovative solutions and resilient challenges.

The legal perspective is underpinned by the Mental Healthcare Act, 2017, which recognizes the right to access mental health care, ensures insurance cover for mental illnesses, and removes the criminalization of suicide. This rights model is an important shift in legislature towards dignity and accessibility but is let down by uneven implementation due to resource constraints, absence of trained staff, and inadequate public awareness.

In the corporate world, work mental health is now being increasingly regarded as a means to employee engagement and organizational success. Infosys, TCS, and Wipro are some of the large Indian companies that have implemented Employee Assistance Programmes (EAPs), stress management training, and flexible working policies. However, small and medium enterprises are typically constrained from implementing such interventions, and stigma around mental health is still affecting free discussion.

The social sciences approach highlights the role of cultural values, community organization, and socio-economic inequalities in shaping mental health. Community-based programs, support groups by peers, and culturally adapted counsellings have shown beneficial results. Teletherapy, mobile phone applications for mental health, and AI-powered self-help platforms are increasing reach, yet the digital divide threatens to completely leave out rural and marginalized groups.

This article contends that enduringly better mental health outcomes in India need cross-sectoral partnership, Legislation needs to ensure enforceable rights and accountability, management needs to develop psychologically safe environments, and social sciences need to provide culturally appropriate interventions. Innovations should also be based on values of empathy, ethics, and equity so that inequalities are not widened.

Finally, India's mental health is not a strictly medical issue but a social necessity. By incorporating legal protections, organizational methods, and community-based solutions, India can establish a mental health system that fosters resilience, inclusiveness, and dignity for all its people.

Keywords: *resilience, mental health, dignity, public awareness, socio-economic, cultural scenario*

Introduction

India's mental health exists at a crossroads of ancient beliefs and contemporary pressures. When cities expand and lifestyles become increasingly fast-paced, citizens are subjected to

increasing stress—from working long hours and intense competition to the fear of living up to family and societal expectations. These stresses are further exacerbated by ingrained cultural stigmas, so that conversations about mental health are still taboo and access to assistance is restricted.

While there has been advancement in economic and technological fronts, the mental health system of India is behind. Urban areas provide greater resources and experts, but rural and semi-urban zones are left with limited support, leaving major portions of the population exposed. A huge treatment gap exists: millions are in need of intervention, but only a few avail themselves of this even in time. The small pool of mental health professionals and poor infrastructure make this gap all the more pronounced.

Solving India's mental health emergency needs more than drugs. It needs legal changes guarding patient rights, stigmatization-fighting campaigns, work policies that prioritize well-being, and community-based solutions that promote acceptance and inclusion. Only by embracing mental health as a cornerstone of both individual happiness and national development can India promise a more resilient, caring future.

How Modernization Affects the Landscape of Mental Health

Urbanization in India has rapidly changed the landscape of mental health, bringing in new stressors that impact various segments of the population. With increasing numbers moving to urban areas, challenges in adjusting to high-speed, skyscraper cities have increased emotional and psychological difficulties. Urban life tends to be characterized by congestion, pollution, and incessant noise, wearing down mental strength bit by bit. Moreover, the disintegration of the conventional joint family system and the emergence of nuclear families have contributed to more fragile social support systems, which in turn amplify loneliness and alienation. These trends are particularly critical among susceptible populations like youth, women, and the elderly, who experience distinctive stressors such as technology overindulgence, gender-based violence, and social dislocation.

The urban grind of lengthy commutes, high expectations at work, and economic stress all lead to chronic stress, anxiety, and depression. With little time for relaxation or social engagement, many are left with mental fatigue and burnout. At the same time, urbanization is accompanied by economic possibilities, but also by increasing disparities, where those with lower socioeconomic status face worse living conditions, reduced mental health services, and increased exposure to environmental hardships. This cumulative effect of stressors is further linked with higher levels of substance abuse, self-injury, and other mental illness.

Cultural transformation makes it more complicated to adapt; individuals struggle to mediate pre-urban values with contemporary city lifestyles. The cultural mismatches between rural and urban environments may produce identity conflicts and emotional distress. Mental health in urban India therefore requires multi-level strategies—such as enhancing infrastructural facilities and access to healthcare, building support systems in communities, raising awareness to stem stigma, and incorporating workplace policies that address mental well-being. As modernization accelerates, promoting mental health requires holistic responses at both individual and systemic levels to build resilience, inclusivity, and sustained emotional well-being in India's cities.

Breaking the Silence: Attitudes, Myths, and Misconceptions

Social stigma and cultural barriers pose deep challenges to discussing mental health in India, where myths, misconceptions, and attitudes heavily impact public attitudes and help-seeking behaviours. Mental illnesses are usually masked by silence through universal stigma, whereby individuals with such conditions are unjustly portrayed as "weak," "crazy," or even "harmful." Indian families believe that admitting mental illness could shame them and affect their social standing, so they deny or hide them instead of seeking medical treatment. These beliefs stem from conventional assumptions that tend to place mental illness in supernatural realms like possession by demons, karma, or immorality, which creates fear and stigma. As such, patients often resort to spiritual healers or religious practices rather than seeking medical care, thereby hindering or postponing effective treatment.

This stigma is also heightened by gaps in education and awareness, with many people misinterpreting symptoms of mental health as flaws in character or individual weaknesses instead of treatable illnesses. The collectivist culture of Indian society prioritizes social harmony and family reputation, sometimes preventing individuals from freely discussing their problems or seeking therapy. The hierarchical family structure may also exert pressure to handle problems internally, perceiving outside assistance as failure or inadequacy.

Shattering such silence calls for collective efforts to reframe attitudes in society through education, destigmatization initiatives, and incorporating mental health promotion into schools, the workplace, and community programs. It is important to recast family support by fostering open discussion and openness with accepting that accessing mental health services reflects strength and active healing. Collaboration with community leaders and traditional healers can bridge cultural sensitivities and initiate empathetic, evidence-based care. By facing myths and altering perceptions, India has the ability to make a more inclusive setting that enables people to ask for help without shame or fear, ultimately leading to better mental health results and social well-being.

The Treatment Gap: Infrastructure, Professionals, and Access, unveiling the Challenge of Service Delivery and Accessibility

India also has a huge treatment gap in mental health services, which in turn challenges delivery and accessibility of services. Almost 14% of the population of India needs mental health intervention, but a shocking 80-85% of them do not benefit from appropriate treatment. This is a result of several factors, among which are poor infrastructure, lack of trained mental health workers, and socio-cultural obstacles to receiving care. India's healthcare infrastructure is frequently strained and geographically unbalanced, with mental health facilities and specialists overrepresented in urban centers at the expense of rural and hard-to-reach populations.

There are hardly enough mental health workers, including psychiatrists, psychologists, psychiatric nurses, and social workers, to cater to the population, with less than one psychiatrist per 100,000 persons. This shortage hinders early diagnosis, intervention, and subsequent treatment follow-up, especially for prevalent mental disorders such as anxiety and depression, which may not need extensive psychiatric treatment but still require psychosocial intervention. Also, stigma about mental illness keeps people from seeking assistance, adding to the gap.

Strategies to fill this gap involve adding mental health care to primary health through initiatives such as the District Mental Health Programme, with the aim of delivering community-

based interventions and early intervention. Lay health worker and counselor training for basic mental health services has been promising in increasing coverage and impact in low-resource contexts. Legal protections such as the Mental Healthcare Act, 2017, enshrine the right to receive mental health care, but enforcement is an issue.

Closing the gap in mental health treatment for India will demand a multi-pronged strategy: increasing infrastructure, reinforcing workforce capacity, increasing public awareness to alleviate stigma, and building engagement between non-governmental and governmental sectors. Technology-based solutions like telemedicine and web-based counseling platforms present promising means to enhance accessibility for remote locations. Closing the treatment gap is critical not just for alleviating individual distress but also for improving overall societal productivity and well-being, and mental health must be a core plank of public health policy in India.

The Effects of Work and Education, Pressures of the Workplace, Student Stress, and New Trends

Work and education settings in India place strong pressures that penetrate deeply into mental health, echoing overall societal and economic forces. Indian workplaces are marked by very high levels of stress, with recent accounts suggesting that as many as 30% of workers face daily stress and an astonishing 49% actively pursue new employment opportunities as a result of dissatisfaction. The excessive work hours, extreme rivalry, and relentless pressure to perform chip away at the mental health of employees, leading to burnout, anxiety, and reduced productivity. Cultural norms to put work and responsibility first, and economic insecurity, work against employees setting proper boundaries, leading to chronic stress and emotional exhaustion. The prevalence of post-work hour communications and the expectation of being available at all times also obscures the distinction between work life and personal life, accentuating stress levels.

Concurrently, Indian students experience increasing pressures linked to academic achievement, career ambiguity, and social expectations. The high-stakes exams and competitive education system create anxiety, lack of sleep, and fear of failure among young people. Mental health issues are exacerbated for law students and those in equally demanding disciplines by challenging curricula and cultural stigmatization of vulnerability, causing many to silently endure.

Rising trends underscore expanding awareness of these challenges, calling for changes at the systemic level in workplaces and schools. Mental health awareness, stress management education, and the incorporation of well-being into organizational cultures are increasingly promoted. Developments in flexible work schedules, counseling services, and peer support groups are starting to bring some relief, albeit patchy coverage.

Finally, alleviating workplace and student stress in India demands an integrated strategy that recognizes economic conditions, cultural norms, and individual requirements. Setting precedence for mental health at institutional levels, promoting open dialogue to alleviate stigma, and the balance are critical actions that can enhance well-being, increase productivity, and equip resilient, healthy future professionals. This shift not only benefits individuals but also contributes to broader societal progress by building a workforce and citizenry equipped to thrive amid ongoing change.

Policy Response and Legal Framework: Evolution of Mental Health Laws and Rights in India

The transformation of mental health legislation in India is a major paradigm shift towards a rights-based and participative system, focusing on dignity, autonomy, and protection of individuals with mental illness. The path-breaking Mental Healthcare Act (MHCA) of 2017 superseded the previous Mental Health Act of 1987, marking India's adherence to international human rights norms, specifically the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD). The MHCA 2017 focuses on mental health care as a right and requires the government to make available accessible, affordable, and quality mental health services in the country.

One of the most important provisions of MHCA 2017 is the decriminalization of attempted suicide as an act of extreme distress, not as a criminal act. This takes away the possibility of legal punishment for individuals in distress and compels the state to treat and rehabilitate them. The Act further provides for the right to give advance directives, where one can stipulate how one would like to be treated or not treated during mental health events in order to enhance patient autonomy.

The Act bans cruel, inhuman, and degrading treatment and restricts the administration of electroconvulsive therapy (ECT) with stringent precautions, specifically prohibiting it for children. It creates the district-level Mental Health Review Boards to monitor the safeguarding of patients' rights and handle complaints. Confidentiality and non-discrimination provisions also provide for persons with mental illness to be treated on the same level as individuals suffering from physical illness, promoting equality.

Governments have a responsibility to integrate mental health services with general health at all levels, ranging from primary levels to specialized institutions. The Act requires registration and regulation of mental health facilities to ensure uniformity in the quality of care. It also enhances public awareness, reduces stigma, and develops human resources through training and sensitization.

On the whole, the Mental Healthcare Act 2017 is a revolutionary mental health legislation in India that is centered on empowerment, protection, and accessibility, and aligns with international human rights principles to create a more humane and equitable mental health system. The Mental Healthcare Act (MHCA) 2017 brought some of the most important provisions that are central to learning about the development of mental health legislation in India and are most important for research on rights, protections, and service delivery:

1. **Right to Access Mental Healthcare (Section 18):** All individuals are entitled to receive mental health care services and treatment from funded or government facilities so that it is accessible, available, and affordable throughout India.
2. **Right to Community Living (Section 19):** The Act entitles individuals with mental illness to live and be part of the community and prohibits segregation or institutionalization against their will, ensuring social inclusion.
3. **Protection against Cruel, Inhuman, and Degrading Treatment (Section 20):** Mental health facilities are required to meet minimum standards of care that maintain dignity and humane treatment, and violation is punishable by law.
4. **Right to Confidentiality (Section 23):** Mental health data of patients is safeguarded, and it is disclosed only in exceptional situations, upholding confidence and confidentiality in treatment.

5. **Decriminalization of Attempted Suicide (Section 115 of the Indian Penal Code, amended by MHCA):** Attempted suicide is no longer a criminal act but is identified as an extreme stress manifestation that needs treatment and rehabilitation, diverting attention from punishment to care.
6. **Advance Directive (Sections 5-12):** One can define their desired treatment plan for future mental health episodes, increasing autonomy and informed consent.
7. **Mental Health Review Boards (Section 81):** Institutions tasked with the protection of rights, addressing grievances, and enforcing the Act compliance by mental health facilities.
8. **Regulation and Registration of Mental Health Establishments (Sections 65-72):** Sets standards for licensing, quality assurance, and accountability, with a goal to standardize mental health care services.

These sections together emphasize a rights-oriented, patient-centered, and ethical approach that enhances protection, stimulates autonomy, and imposes state obligation for mental healthcare. Knowledge of these provisions offers important insight into the prevailing legal regime defining mental health services and advocacy in India.

Digital Interventions and Telehealth: Opportunities and Risks

Digital interventions and telemedicine are transforming mental health treatment in India, bringing new hope to address the nation's large treatment gap. The accelerated growth in internet penetration and smartphone use has opened the door for cost-effective, convenient, and accessible provision of mental health treatment to hitherto underserved populations. Programs like the National Tele Mental Health Programme (Tele MANAS) provide round-the-clock counseling and psychiatric consultation via phone and video, supporting millions across diverse states and languages. Digital mental health apps are increasingly popular, offering psychoeducation, mood tracking, mindfulness exercises, and self-help plans, effectively reaching young and tech-savvy users. These tools enhance privacy and reduce stigma by allowing individuals to seek help anonymously and flexibly.

Yet, such advantages are accompanied by risks. Data privacy and security continue to be concerns, with sensitive mental health data being harvested and stored electronically, needing strong legal safeguards like India's Digital Personal Data Protection Act (DPDP) to protect user confidentiality. Furthermore, the efficacy of solely digital interventions is constrained by the absence of personalization and human interaction, which is paramount for engagement and treatment adherence. Significant dropout rates in app-based therapies confirm this problem, indicating the necessity for hybrid models integrating digital solutions with face-to-face consultation.

Access barriers remain in rural areas with low digital literacy and poor connection levels, hence potentially increasing inequities. In addition, ethical concerns involving informed consent, algorithmic bias, and quality control of mental health apps require continued focus and regulation. Despite those challenges, the ability of digital technology to scale and democratize mental health care in India is huge. Successful integration of digital technologies with current health systems, coupled with sound policy systems and community engagement, will enable these innovations to be harnessed responsibly, enhancing mental health outcomes and shaping a more equitable health environment for the future.

Conclusion

Constructing a robust and equitable mental health system for the future needs a comprehensive, multi-dimensional response that not just targets the clinical nature of mental illness but also the social, cultural, and legal factors that shape mental well-being. India has huge challenges, such as a huge treatment gap, stigma, insufficient mental health infrastructure, and inequity in access between rural and urban settings. In order to transcend these challenges, the next mental health system will have to become a unified ecosystem that integrates healthcare professionals, legal systems, schools, community centers, and technology.

Empowering communities lies at the heart of this change. Increasing access to mental health care by bringing it to people through trained community health workers and volunteers can dispel barriers of stigma and access. Programmes such as Atmiyata have shown that culturally appropriate, grassroots interventions can successfully provide psychosocial support and enable access to clinical care and social entitlements. This model points to the strength of empathy, trust, and local knowledge as the building blocks for sustainable mental health care.

Technology also presents unprecedented potential to expand reach and enhance quality. Tele-mental health websites and digital applications can link experts with distant groups, deliver timely advice, and provide mental health training. Technology needs, however, to be accompanied by tight controls around data privacy, equity of access to technology, and continued human care in order to have true effect.

Policy and legal frameworks must form the foundation of a rights framework, protecting the autonomy and dignity of individuals with mental illness. Education needs to be transformed to embed mental health literacy from the earliest stages, enabling young people to identify and cope with emotional distress while fostering caring environments within workplaces and schools.

Strong mental health treatment needs to address systemic discrimination and stigma by creating open discussion, community involvement, and culturally sensitive awareness initiatives. Sectoral collaboration is crucial — health, law, education, technology, and civil society need to collaborate to develop seamless care and advocacy networks.

By investing holistically in infrastructure, training, legal empowerment, and community action, India can lead the way to a mental health system that is fair, responsive, and humane. Such a system not only controls illness but fosters resilience and well-being, empowering people and communities to flourish in the face of change, ultimately leading to a healthier and more caring society for generations to come.

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THE COST OF INEQUALITY: INVESTIGATING SCHOOL EDUCATION REPEATERS, DROPOUTS & NON-TRANSITIONERS IN VIETNAM

Kasthuriraja R

*Research Scholar, School of Social Sciences and Languages
Vellore Institute of Technology, Vellore
kasthuriraja.r2024@vitstudent.ac.in*

Sahana M

*Research Scholar, School of Media, Arts and Technology
Vellore Institute of Technology, Vellore
sahana.m2024@vitstudent.ac.in*

Abstract

All countries around the world are developing policies and implementing policies to achieve the Sustainable Development Goals (SDGs). There are seventeen targets, each of which is interconnected. SDG 4, Quality Education, is an integrated goal that integrates all the goals. This study examines SDG4. Government schools continue to be the primary school education providers throughout Vietnam. Government schools offer a nationally standardized curriculum, minimal tuition fees, and wide access. However, students in rural and suburban areas face some challenges. This means crowded classrooms, teacher-centered teaching, limited technology, and outdated facilities often reduce deep learning and student engagement. In contrast, private schools in urban areas are outpacing government schools. That is, private schools attract students through the attention given by teachers, modern infrastructure, bilingual teaching, and modern resources. In this study, to explain the school dropout rate of Vietnamese students by socioeconomic, regional, and gender differences. To examine the school repeater rate of Vietnamese students by socioeconomic, regional, and gender differences. To analyze the school non-transitioners rate of Vietnamese students by socioeconomic, regional, and gender differences. The study will be conducted through a contextual analysis of policy documents and government reports. The significance of the study is that all countries are currently moving towards sustainable development globally. The United Nations created it for all countries to provide inclusive and equitable quality education and lifelong learning opportunities for all. Inclusive education is a much-needed goal in an unequal world. The high school dropout rate in Vietnam is affecting them. This study only considers school education. This study does not compare to any other country. This study uses the 2022 Viet Nam Sustainable Development Goal Indicators for Children and Women (SDGCW) survey data. These are all limitations of this study.

Keywords: *SDG 4, Social, Economics, Politics, Dropout, and Inclusion.*

Introduction

All countries around the world are developing and implementing policies to achieve the Sustainable Development Goals (SDGs). There are seventeen targets, each of which is interconnected. SDG 4, Quality Education, is an integrated goal that integrates all the goals. This study examines SDG4. The United Nations created it for all countries to provide inclusive and equitable quality education and lifelong learning opportunities for all. According to UNESCO, Quality education requires a holistic approach that goes beyond classrooms and textbooks to equip learners with the skills needed for life, work, and personal growth. UNESCO strives to provide inclusive education for all, promoting gender equality in education, and breaking down

barriers to education for socially and economically disadvantaged students (UNESCO, 2024). Inclusive education is a much-needed goal in an unequal world. Early childhood education refers to the education that begins at a young age. If everyone wants to receive a quality education, they must first receive a primary education. Primary education is the foundation for one's future education. The goal is to provide quality education to all levels of students (Singh, n.d.).

According to the UNESCO Director-General Audrey Azoulay, "Education is in crisis. Despite significant efforts over the past decade to ensure quality education for all, UNESCO data shows that the number of children dropping out of school is now increasing. States need to urgently restructure if they don't want to sell out the future of millions of children. To achieve Sustainable Development Goal 4, a new child must be enrolled in school every 2 seconds between now and 2030. For countries to achieve their goals, 1.7 million children must enroll in early childhood education each year by 2030. The primary education completion rates should be triple (UNESCO, 2023). Sushant Chandra argues that it is essential to recognize that primary education is a significant and crucial component, and should be treated differently from secondary or tertiary education. It implements the ethical foundation in educational values necessary to exercise choices consistent with the concepts of equality of opportunity and social justice. This aspect of primary education distinguishes it from secondary and tertiary education (Chandra, 2017).

Students who fail the end-of-term exam have to repeat the same class. These can be caused by the difficulty of the curriculum, inadequate teaching, lack of infrastructure, or student inattention. Non-transitioners refer to students who have passed a grade but have not progressed to the next grade. These can often be caused by financial circumstances, fear of the next level, and lack of awareness. The number of children dropping out of school is increasing day by day. Some children drop out of school voluntarily, while others are forced to drop out by others, even under terrible circumstances. They include poverty, lack of availability, an undesirable school and teacher, lack of interest in education, curriculum, and academic pressures, constant changing of schools, and teacher or parents' beatings, scolding, and many other reasons. Whatever the reason for a child dropping out of school, they are not virtuous. School education forms the foundation of a person's life. It makes them competent in various fields. Many children lose their lives and are transformed by school dropouts (Mathew, 2017).

Inequality is a long-standing epidemic in this world that will affect even the future. Educational inequality refers to a system in which all sections of society are not provided with equal opportunities to receive education. These are the result of changes in political, economic, and social life. Many people struggle to get an adequate education due to inequality, which keeps their situation unchanged and backward. It is a loss to society when children's talents are left untapped due to a lack of adequate support (Emma García, 2017). All children deserve the opportunity to attend school and learn. Despite the focus on inclusive and equitable education globally, many of the most marginalized learners, especially in low- and middle-income countries, are left behind. 244 million children and youth between the ages of 6 and 18 do not go to school, and many marginalized children face barriers to learning even when they are in school. As of 2020, only 10 percent of countries have enacted legislation to ensure full inclusion in education (Group, 2025). The purpose of the study is as follows:

- To explain the school dropout rate of Vietnamese students by socioeconomic, regional, and gender differences.
- To examine the school repeater rate of Vietnamese students by socioeconomic, regional, and gender differences.
- To analyse the school non-transitioner rate of Vietnamese students by socioeconomic, regional, and gender differences.

Theoretical Framework

In Vietnam, school education is divided into four levels. Since the 1990s, policymakers have been promoting curriculum development and active learning in Vietnam's national school education policies. However, the lecture style and rote learning are becoming more dominant. Teacher-centered teaching is defined in schools. Furthermore, students are conditioned to develop knowledge passively. Student-centered approaches are scarce in Vietnam. Recent focus groups and UNESCO youth opinion polls confirm the consistency of the theory and the lecture provided by the textbook. While many teachers understand the importance of active learning for student engagement and learning outcomes, it is said that there are insufficient facilities to utilize such an approach. Policymakers plan to bridge this gap with a new, aligned curriculum and ensure that textbooks and teaching materials are available to all (Network, n.d.). Parents across Vietnam are increasingly looking to gain knowledge beyond textbooks, and this has been reflected in major cities like Ho Chi Minh City. Vietnamese students are transitioning to a new international framework called the International Baccalaureate (IB). The IB program promotes critical thinking, self-reflection, and cultural understanding through education. Vietnamese children acquire basic knowledge in Vietnamese, mathematics, literature, science, history, and civics at the age of 6. Students must pass a standardized test at the end of 9th grade to move to upper secondary school. Then, to get higher education, you have to pass the 12th standard. While these contribute to high literacy rates, academic discipline, and culture, they often do not provide space for creative thinking, project-based learning, and exploring volunteerism (School, 2025).

Research Method & Materials

The study will be conducted through a contextual analysis of policy documents and government reports. The study tests the dropout rates of Vietnamese school students. Data were collected from the Viet Nam Sustainable Development Goal Indicators for Children and Women (SDGCW) Survey. Other data was collected through journals, newspapers, magazines, reports, books, and so on.

**Table 1. Profile of repeaters, dropouts, and non-transitioners, by gender
(Viet Nam SDGCW)**

	Male	Female
Repeaters	57%	43%
Dropouts	50%	50%
Non-transitioners	60%	40%

The table above illustrates the gender breakdown of Vietnamese school students, including repeaters, dropouts, and non-transitioners. The percentage of school repeaters is 57% for males

and 43% for females. More men are returning to school. The number of school dropouts is evenly split between the sexes, with 50% males and 50% females. The number of school non-transitioners is 60% for males and 40% for females. In all of the above, men are the most affected.

**Table 2. Profile of repeaters, dropouts, and non-transitioners, by area
(Viet Nam SDGCW)**

	Urban	Rural
Repeaters	38%	62%
Dropouts	33%	67%
Non-transitioners	17%	83%

The table above illustrates the rate of school repeaters, dropouts, and non-transitioners in Vietnam by geography. Vietnam’s school repeater rate is 38 percent in urban areas and 62 percent in rural areas. The school dropout rate is 33% in urban areas and 67% in rural areas. Of those who do not continue their education to the next level, 17 percent are in urban areas and 83 percent are in rural areas. Of all the above, those in rural areas are most affected.

**Table 3. Profile of repeaters, dropouts, and non-transitioners,
by wealth quintile (Viet Nam SDGCW)**

	Poorest	Second	Middle	Fourth	Richest
Repeaters	32%	15%	13%	15%	25%
Dropouts	29%	24%	33%	6%	8%
Non-transitioners	28%	17%	16%	30%	9%

The table above illustrates the rate of school repeaters, dropouts, and non-transitioners in Vietnam by wealth quintile. Among those who repeat the same grade in school, 32 percent are low-income students, 25 percent are high-income students, and 13 percent are middle-income students. The highest dropout rate is among middle-class students, at 33 percent, followed by poor students at 29 percent, and upper-middle-class students at 6 percent. Of those who did not pursue higher education (Next level), 30 percent were from the wealthy middle class, 28 percent from the poor class, and 9 percent from the wealthy class.

**Table 4. Profile of repeaters, dropouts, and non-transitioners, by
ethnicity (Viet Nam SDGCW)**

	Kinh and Hoa	Tay, Thai, Muong, Nung	Khmer	Mong	Other / Missing
Repeaters	81%	6%	1%	2%	10%
Dropouts	81%	4%	1%	2%	11%
Non-transitioners	83%	7%	1%	4%	5%

The table above illustrates the rate of school repeaters, dropouts, and non-transitioners in Vietnam by ethnicity. The Kinh and Hoa ethnic groups have the highest rates of school repeaters (81%), dropouts (81%), and non-transitioners (83%). The Khmer people make up about 1 percent of all these.

**Table 5. Profile of repeaters, dropouts, and non-transitioners, by level of education
 (Viet Nam SDGCW)**

	Primary	Lower Secondary	Upper Secondary
Repeaters	66%	18%	16%
Dropouts	25%	42%	33%
Non-transitioners	8%	26%	66%

The table above explains the rate of school repeaters, dropouts, and non-transitioners in Vietnam by level of education. Among those who repeat school, 66 percent are primary school students, 18 percent are lower secondary school students, and 16 percent are upper secondary school students. School dropouts include 42 percent of lower secondary students, 33 percent of upper secondary students, and 25 percent of primary students. Of those who did not pursue higher education (Next level), 66 percent were upper secondary students, 26 percent were lower secondary students, and 8 percent were primary students.

Discussion

This study examines three research questions. The first research question is to explain the school dropout rate of Vietnamese school students by socioeconomic, geographic, and gender differences. According to the above data, school dropouts are equal between males and females. These mostly happen in rural areas. Middle-class and poor students are more likely to drop out of school. Similarly, the Kinh and Hoa ethnic groups are in the highest proportion. The educational levels are also higher, from primary education to upper secondary education, by a small margin (from 25% to 42%). In all of the above, it is clear that the socially and economically backward people are the most affected.

The second research question is to explain the school repeater rate of Vietnamese school students by socioeconomic, geographic, and gender differences. In Vietnamese schools, 57% of boys repeat the same grade. Students in rural areas are most affected. The rich class is affected as well as the poor class. The Kinh and Hoa ethnic groups are in the highest proportion. Primary school students are increasingly repeating classes, unable to pass. In all of the above, it is clear that the socially disadvantaged and backward people are the most affected.

The third research question is to examine the school rate of non-transitioners among Vietnamese school students by socioeconomic, geographic, and gender differences. As mentioned above, men are less likely to pursue higher education (Next level). In rural areas, 83% of people are not interested in continuing their education beyond the next level. Mostly upper-middle-class (30%) and Poor (28%) school students do not take their school education to the next level. The Kinh and Hoa ethnic groups are in the highest proportion. About 66% of upper secondary students do not go on to higher education (University or College). In all of the above, it is clear that the socially disadvantaged and backward people are the most affected.

Inequality and the social and economic burden placed on students play a major role in all the above. Gender inequality leads to school dropouts, repeaters, and non-transitioners. This is because the social responsibilities imposed on men, family economic responsibilities, and social views restrict them within the social structure. Some children drop out of school because they are unable to receive quality education due to family poverty. Some people are stuck in rural

areas without knowing or understanding the necessary access. Awareness about education is very low in rural areas. Education is now essential for students at all levels. Compared to other groups of students, poor students have the highest dropout, repeatenrolment rates, and non-transitioners. It is noteworthy that the Kinh and Hoa ethnic groups are the most numerous of all. Vietnamese school children finish primary school at a low level. Educational dropout exists at all levels of education. The rate of admission to college or university from upper secondary school is very low.

Conclusion

This study has illustrated the multifaceted disparities in the educational trajectories of Vietnamese school students, particularly in terms of dropout rates, repeat rates, and non-transitioner rates. Studies reveal that educational disadvantage is not monolithic, with patterns being broken down by socioeconomic status, regional location, and gender, but is shaped by structural social factors. We must break down the collective barriers that prevent students from low-income families, rural areas, and marginalized ethnic groups from consistently learning, progressing, and succeeding within the school system. The government must create an environment for inclusive and equitable lifelong learning for all. Ultimately, I conclude that the government and society must come forward to fully reach all levels of education in Vietnam.

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A GREEN CRIMINOLOGICAL APPROACH TO CLIMATE POLICY: ENHANCING CRIMINAL JUSTICE FOR MEETING SDG-13 IN INDIA

Mr. Sri Kishor S M

*Assistant Professor, Department of Criminology
Nehru Arts and Science College, Coimbatore*

Ms. Thanusree S R

*III Yr Student, B.A Criminology
Nehru Arts and Science College, Coimbatore*

Abstract

One of the most urgent problems of the twenty-first century is climate change, which has detrimental effects on ecological health, human security, and socioeconomic balance. While most research studies are surrounding climate change are typically dominated by environmental science and policy concerns, the criminological aspects of the crisis remain to be comprehensively researched, especially in the Indian context. The emerging field green criminology, that examines environmental harms and its justice related responses provides a particular focus through which to explore the intricate interconnections between climate change, environmental degradation, and harm to society. This article tries to study and construct a framework of green criminology with special focus in alignment with Sustainable Development Goal (SDG) 13, Climate Action, with special reference to India.

Keywords: *Green criminology, climate change, environmental crime, SDG 13, environmental justice, India*

1. Introduction

Climate change often moved from the domain of a remote or hypothetical phenomenon to one of a concrete and immediate reality characterized by visible, measurable, and escalating effects. In the Indian context, the impacts are varied: rise in temperatures, erratic monsoon patterns, glacial melting in the Himalayas, sea level rise in coastal areas, and increased frequency of extreme weather events such as cyclones, floods, and droughts. Though there is an abundance of scientific, and policy literature on climate change, the criminological aspects of such environmental change are inadequately studied in India. The theory of green criminology, which addresses environmental damage, ecological justice, and criminalisation of harmful activities to the environment, provides a much-needed analytical tool to study and tackle this phenomenon.

Defining Environment Crime

Environmental crimes are defined by various international treaties and conventions as offenses committed against the environment, including the air, water, soil, flora, and fauna. These crimes include illegal dumping of hazardous waste, transportation of hazardous materials, pollution of the atmosphere, waterways, and land, destruction or alteration of protected habitats, and illegal trade of endangered species. *The United Nations Environmental Programme (UNEP)* defines environmental crime as: "Any conduct that violates international environmental law or domestic environmental laws with the intent to cause damage or harm to the environment.

Sustainable Development Goal (SDG – 13: Climate Action) and Green Criminology

The 2030 Agenda for Sustainable Development positions "Climate Action" (SDG 13) at the centre of international actions towards saving the planet mother Earth. An applied, policy-focused research agenda is produced by connecting green criminology to Sustainable Development Goal 13 (SDG 13: Climate Action). In order to address climate change and its effects, SDG 13 envisages immediate action that includes international collaborations, adaptation, mitigation, and resilience building. (United Nations, 2015) In order to contribute, green criminology (a) identifies and conceptualizes climate related harms that are not covered by traditional criminal codes; (b) examines how regulatory regimes, and corruption affects climate governance; and (c) suggests justice frameworks that are sensitive to vulnerable communities that are disproportionately impacted by climate impacts.

2. Determination of the Research Problem

The current legal frameworks do not categorize climate damage or harm as a criminal offense but use administrative sanctions that are ineffective in deterring such harms in India and globally. In India, achieving the SDG 13 have been obstructed by the weak legal codes, with inadequate regulatory frameworks and prioritization of economic development over ecological preservation. This disparity not only undermines India's ability to meet Sustainable Development Goal 13 (Climate Action) but also aggravates the problems suffered by marginal communities that are disproportionately exposed to environmental degradation. Without a common strategy that includes prevention, accountability, enforcement, and restitution, climate change will certainly become more virulent and result in a socio-legal crisis.

3. Research Objectives

1. To explore how green criminology can help us understand the impacts of climate change in India.
2. To assess the gaps in India's current legal and institutional response to climate related harm.
3. To propose a legal framework for treating major climate harms as crimes within India's justice system.

4. Literature Review

4.1 The Theoretical Bases of Green Criminology

Green criminology, previously referred to as such by Lynch (1990), was a critical criminology sub-discipline that examines environmental harm, ecological justice, and socio-political processes of environmental regulation. In contrast to mainstream criminology, which deals with crimes between human beings, green criminology expands the scope to include harm to ecosystems, biodiversity, and future generations. It addresses both legally criminalised crimes like crimes against environmental protection law and social harms that are perhaps not criminalised but have strong ecological consequences. South (2014) and White (2018) note that this approach recognises the state-corporate crime role, environmental victimisation, and skewing of climate harm across class, caste, and gender lines.

4.2 SDG 13 and the Global Justice Framework

The United Nations' Sustainable Development Goal 13, Climate Action, requires urgent action to address climate change and its effects. Green criminology keeps an eye on the processes by which legal regimes can impose this requirement, with a focus on duty by state and non-state actors. Globally, the Paris Agreement (2015) and the Escazú Agreement (2018) place the spotlight on transparency, public engagement, and access to justice for the environment.

4.3 Indian Legal and Institutional Context

India's constitutional foundation, in Article 21 (Right to Life), Article 48A (State duty to preserve the environment), and Article 51A(g) (Fundamental duty to preserve the natural balance), is the foundation of climate justice. The legislation like the Environment (Protection) Act 1986, the Wildlife Protection Act 1972, and the Energy Conservation Act 2001 are the legislative pillars of environmental protection. The enforcement gap, however, continues unabated due to weak legal codes, noncompliance to the judgements and weak enforcements under-funded regulatory institutions, and political prioritization of economic development over ecological preservation. The National Green Tribunal (NGT), instituted in 2010, has played a significant role in resolving environmental disputes, but been critiqued for having limited enforcement powers and sluggish compliance.

5. Methodology

This study uses a qualitative, doctrinal, and analytical research approach. It relies only on secondary data sources to explore the connection between green criminology and climate change within the framework of Sustainable Development Goal 13 (SDG 13).

5.1 Research Design

Theoretical Framework Analysis - The study uses theories from green criminology, environmental justice, and climate justice to redefine environmental harm as a key criminological issue. This approach connects ecological damage directly to questions of justice and accountability.

Legal-Institutional Mapping- This part involves a thorough examination of relevant international treaties, conventions, and national laws that focus on climate protection and preventing environmental crimes. It pays particular attention to compliance, enforcement, and the adequacy of legislation.

Policy and Enforcement Assessment -The research assesses the actions of government bodies, regulators, and the judicial system in responding to climate-related environmental crimes. It identifies strengths, gaps in enforcement, and key areas for legal and policy changes to boost climate action under SDG 13.

6. Case Presentations

Case 1: Kodungaiyur Dumping Ground, Environmental Harm, Climate Change, and Green Criminology Perspective

Historically, the Kodungaiyur Dumping Ground (KDG) in North Chennai was a marshy wetland. The wetland acted as a natural carbon sink, supported biodiversity, and regulated local microclimates. Over time, however, human activities turned the site into an ecological hazard.

Initially, local settlers filled the wetland with organic waste from the Kothavalchavadi Market to make space for housing. By the early 1980s, municipal solid waste (MSW) from all of Chennai was directed to this site, and this practice continues today. The waste stream now includes hazardous industrial refuse, biomedical waste, plastics, and construction debris. The lack of waste segregation at the source by municipal authorities has forced an informal workforce about 100 recyclers, mostly women to sort waste in high-risk conditions. They handle PET bottles, metals, rubber, and medical disposables, often with direct exposure to syringes, surgical gloves, and toxic chemicals. (Murugesan and Alagesan, 2021). This situation highlights both health injustices and the environmental risks that women face.

From a green criminology viewpoint, this case illustrates ecological harm and environmental injustice. State inaction and weak regulation enable damage to ecosystems and marginalized communities. The site's change from wetland to open landfill has added to methane emissions, groundwater pollution, and urban heat island effects.

Case 2: Perungudi Dumping Ground – Climate Change, Environmental Harm, and Green Criminology Analysis

The Perungudi Dumping Ground, set up by the Chennai Corporation in the late 1980s, is located directly on the Pallikaranai marshland. This area is one of the last natural wetlands in Chennai. It was once home to rich biodiversity and acted as an important carbon sink. However, the marsh has lost over 35% of its area due to waste dumping, and the landfill continues to grow despite exceeding its designed capacity.

In the past, to extend the life of the site, garbage was burned openly. This released toxic smoke and greenhouse gases like methane and carbon dioxide. This has severely impacted the health of local residents, resulting in widespread asthma, chronic cough, and other respiratory issues.

Groundwater contamination from leachate has made the local aquifer unsafe to drink, while stagnant pools of waste and anaerobic decomposition provide breeding grounds for mosquitoes. This situation has led to high rates of vector-borne diseases such as malaria and dengue. Houseflies also spread diseases like cholera, dysentery, conjunctivitis, and gastroenteritis, highlighting this as both a public health crisis and an environmental justice problem. (Murugesan and Alagesan, 2021).

Regarding climate change, the landfill's methane emissions, loss of ecosystems, and ongoing leachate contamination worsen both local and global climate problems. The decline of the Pallikaranai marsh reduces the area's ability to capture carbon, weakens flood control, increasing the risk of urban flooding during extreme rainfall, and adds to Chennai's urban heat island effect.

7. Institutional Analysis

Institutional responses to climate change-related environmental crimes require a consistent framework integrating environmental law, criminal justice, and climate policy. Institutional capacity to prevent, detect, prosecute, and repair climate damages in the Indian and global contexts is uneven, typically eroded by decentralized mandates, weak enforcement capacities, and political-economic limitations.

7.1.1 United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC organizes the international top-down climate architecture, with Paris Agreement establishing binding and voluntary greenhouse gas reduction targets. Not a penal law instrument, though, it establishes normative expectations that condition domestic legal orders. Its enforcement is political rather than judicial—without punishing states or companies causing climate damage.

7.1.2 Kyoto Protocol and Paris Agreement Compliance Mechanisms

The Kyoto Protocol's compliance committee and the Paris Agreement's Enhanced Transparency Framework both promote monitoring and reporting but are poorly placed to punish. Criminologically, this represents a compliance gap in which actors are able to engage in environmentally damaging behaviour without present legal sanction.

7.2 Indian Institutional Framework

7.2.1 Statutory Instruments

The Indian government has enacted several laws to prevent environmental crimes that include:

1. ***The Wildlife Protection Act, 1972:*** This Act is aimed at protecting wildlife and its habitats from poaching, hunting, and trade in endangered species. It provides for the punishment of anyone who violates the provisions under the Act.
2. ***The Forest Conservation Act, 1980:*** This Act regulates the diversion of forestland for non-forestry purposes. It aims to protect forest cover and maintain the ecological balance. Violations of the act attract penalties, and the authorities can take stringent measures to protect forests.
4. ***The Environmental Protection Act, 1986:*** This Act governs pollution control and environmental protection. It enables the authorities to take measures to prevent and control environmental pollution and protect public health.
5. ***Air (Prevention and Control of Pollution) Act, 1981*** – Regulates emission but does not have any specific provisions related to climate change.

In spite of such laws, climate change is not criminalized in India per se, and thus crimes related to climate are tried under general criminal or environmental laws.

7.2.2 Regulatory Agencies

National Green Tribunal (NGT) – Specialized agency for environmental dispute resolution, authorized to grant relief and compensation. It does not have criminal prosecution powers, so its deterrent potential is restricted.

Central Pollution Control Board (CPCB) – Monitors and enforces pollution standards but suffers from staff, financial, and political interference problems.

7.3 Institutional Weaknesses and Challenges

1. **Fragmentation of mandates** – Various agencies deal with pollution control, forestry, wildlife, and regulation of industry but no single overall climate related crime framework is present in India.

2. **Insufficient criminalization** – Climate related harms frequently lead to administrative penalties or civil damages instead of incurring criminal liability which don't deter the environmental related crimes.

7.4 Pathways to Strengthening Institutional Response

1. Integration of climate-related offenses into environmental and criminal codes.
2. Expanding extraterritorial jurisdiction to prosecute cross-border climate crimes.
3. Official legal acknowledgment of ecocide in domestic and international law.
4. Strengthening cooperation among environmental institutions, law enforcement, and court bodies.
5. Framing SDG 13 targets as binding international legal obligations at the national and state levels.

8. Recommendations

The research points out that Indian action on climate change involves criminal justice system reform, and not reforms in environmental policy. The suggestions that follow try to synthesize legal, institutional, and grass-roots level reforms.

8.1 Legal and Policy Reforms

1. Enshrine Climate Crimes in the Bharatiya Nyaya Sanhita (BNS) - Add an independent chapter in the Bharatiya Nyaya Sanhita (BNS) that outlines climate crimes such as carbon emission crimes in large numbers, destruction of carbon sinks, and intentional environmental damage with quantifiable climate effect. The legal provisions and definitions must be aligned with international treaties and standards to ensure consistency and enforceability
2. Strengthen Penalties for Corporate Offenders - Replacing nominal penalties with penalties proportionate to economic benefits from ecological deterioration. Authorize asset seizure and compulsory restoration orders for industries found guilty of climate crimes.
3. Harmonise Environmental Statutes - Consolidate the common provisions of the Environment (Protection) Act, Air Act, and Water Act into one comprehensive Climate and environmental Justice Code to minimize jurisdictional disputes, and streamline the enforcement process.

8.3 Criminal Justice System Enhancements

1. Specialised Climate Crime Units

Create state police and CBI specialized investigation wings with the expertise of climate science, environmental forensics, and international enforcement. Provide them with satellite tracking technology, GIS mapping, and carbon accounting.

2. Judicial Staff Capacity Building

Institute mandatory training sessions on environmental and climate crime for prosecutors and judges. Put specialized climate benches in High Courts to enable expert judgment.

3. Forensic Integration

Establish certified climate forensic laboratories to scientifically connect criminal operations (e.g., mining or deforestation) to impacts on greenhouse gases. Integrate forensic climate data into evidence rules.

9. Green Criminology: A Tool to Implement SDG 13

The Indian context shows that climate change is not only an environmental or developmental issue but also an issue of justice in essence. The magnitude of destruction caused by uncontrolled industrial processes, deforestation, and extraction has now crossed ecologically established boundaries, threatening survival, health, and livelihoods in the immediate sense. Green criminology provides a model that enables these harms to be paradigmatically recast as criminal offenses, thus calling for accountability on the part of actors who benefit from environmental degradation.

Integrating SDG 13 into the Indian criminal justice system is both a constitutional and moral imperative. Advancing the field of green criminology is crucial for achieving Sustainable Development Goal 13, which focuses on climate action. The right to a safe, healthy, and sustainable environment is not just a hopeful concept, but a fundamental human right backed by many global climate summits, international agreements, and policy frameworks. SDG 13 urges immediate action to tackle climate change and its effects. Green criminology offers a way to better understand, address, and prevent environmental harm caused by state negligence, corporate wrongdoing, or failures in policy that worsen climate change. Incorporating green criminology into governance, law enforcement, and environmental policy is essential. This approach not only protects ecosystems but also defends communities, reduces climate-related harm, and promotes fairness for future generations.

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THEME: SOCIAL SCIENCES AND HUMANITIES

SUB-THEME: YOUTH IDENTITY AND SOCIAL MEDIA

[Its Opportunities, Challenges, and Legal Perspectives]

Naveen Kumar. P

3rd year BA LLB Government Law College, Coimbatore

Guruvarthanan. A

3rd year BA LLB Government Law College, Coimbatore

Abstract

"Your Profile is Your Power — Use It to Inspire, Not to Harm."

The impact of social media's rapid development in the 21st century has changed how young communicate, form identities, become activists, and participate in civic life. Social media's dual nature, which include its potential to democratize information, elevate underrepresented voices, and change public opinion, as well as its inherent risks, privacy violations, disinformation, and algorithm-driven polarization. It investigates the relationship between virtual presence and real-world identity using legal analyses as well as ethical frameworks.

With the support of social media, grassroots movements like #MeToo, have been able to influence policymaking and transcend national borders. It encourages camaraderie within the community, speeds up information sharing, and gives marginal groups the confidence to confront social injustices. But these same platforms also support identity manipulation, echo chambers, online harassment, and addictive engagement. Algorithmic personalization affects social cohesiveness and mental health by both enhancing and restricting the user experience.

The paper highlights the importance of digital literacy, algorithmic awareness, and privacy protection in preserving democratic participation. It is a tool for activists, educators, and legislators who want to strike a balance between protection and empowerment in the digital age. Although the paper takes a broad and multidisciplinary approach, it might be criticized for placing too much emphasis on legal remedies without giving platform self-regulation and user responsibility the same consideration. Furthermore, even though the conversation incorporates Indian and global contexts, a more thorough empirical investigation is necessary given the range of youth experiences across socioeconomic and cultural spectrums. However, this constraint offers opportunities for further investigation to encompass the complex realities of digital identity and activism.

Keywords: *Impact of social media, youth activism, identity manipulation, digital literacy, legal safeguards.*

Introduction

The rapid development of technology in the 21st century has fundamentally transformed the ways individuals and communities communicate, organize, and advocate for social change. Platforms such as Facebook, X (formerly Twitter), Instagram, TikTok, and YouTube have reshaped personal interaction and provided youth with unprecedented tools for activism. These digital spaces enable the rapid dissemination of information, mobilization of movements, and direct engagement with global audiences. Social media has a variety of roles in influencing young people's involvement in social change.

Social media democratizes information by bypassing traditional gatekeepers, allowing young people to share personal experiences, expose injustices, and challenge dominant

narratives. As a result, youth participation in civic activism has grown, with movements such as **#MeToo**, **#BlackLivesMatter**, and **#DalitLivesMatter** gaining momentum through online networks. However, alongside its empowering potential, social media presents challenges relating to mental health, privacy, misinformation, and online harassment.

1. Balancing Virtual Presence with Real-World Identity

Social media has become a global phenomenon and a key aspect of life and has widespread appeal among young people today, starting from online pages to mass communication networks where anybody can access any information about themselves or others within minutes. Social media allow users to connect and interact with friends, acquaintances, as well as strangers, which are web-based (and increasingly mobile) services. On new media platforms such as the internet, the media is increasingly seen as an "expansion of everyday life and an instrument of cultural transformation". As a result, identity formation as a social concept is undergoing new and even more widespread worldwide transformations.

1.1 The Dual Nature of Identity

In today's hyper-connected world, identity exists in two interconnected realms: the physical self and the curated digital self. On platforms like Instagram or LinkedIn, individuals can consciously construct a persona that may or may not align with their offline identity. With over 59% of the global population on social media, and the average user spending more than six hours and 37 minutes online daily, our virtual presence has become inseparable from our real-world identity.

1.2 Self Presentation and Social Interaction

Online Social Interaction and Digital Identity People's communication, interpersonal relationships, and community participation are all impacted by their digital identities. Although it can result in idealized portrayals, selective self-presentation enables users to make positive impressions. Strong online personas contribute to the development of social capital, allowing for deeper and more extensive connections. Users continue to struggle with authenticity as they strike a balance between social expectations and true self-expression.

1.3 Challenges in Identity Management

Digital Identity Management Navigating identity fragmentation, authenticity pressures, and privacy issues are all part of managing one's digital identity. People frequently struggle to balance idealized curation with honest self-representation, particularly on visually-driven platforms like Instagram. The persistence of online content raises questions about long-term reputation and the difficulty of undoing past actions, while maintaining multiple personas across platforms can cause digital fatigue.

1.4 Legal and Ethical Safeguards

The Right to Privacy under *Justice K.S. Puttaswamy v. Union of India* (2018) protects personal autonomy in both online and offline spheres. The Digital Personal Data Protection Act, 2023 in India, alongside global frameworks like the GDPR, enforces consent, data security, and user rights. Applying the maxim "*sic utere tuo ut alienum non laedas*" ensures that online expression respects the rights of others.

2. Social Media's Dual Impact on Empowerment and Well-being

POSITIVE EFFECTS

Empowerment and Voice:

Social media platforms provide marginalized and underrepresented groups with an unprecedented opportunity to amplify their voices. Through platforms like Twitter, Instagram, and Facebook, individuals can share their stories and experiences, fostering greater visibility and promoting social change.

Community Building such as Hashtags, forums, and online groups foster solidarity and collaborative activism. For example, In India, movements like #DalitLivesMatter and #SayHerName had also gained traction, allowing individuals from marginalized communities to advocate for change.

Social media enables dialogue between citizens and policymakers, shaping reforms. It plays a critical role in empowering these groups, helping them redefine their identities, and challenge longstanding social norms.

NEGATIVE EFFECTS

Mental Health Issues:

Social media can place significant pressure on users, particularly younger people, to conform to idealized images and lifestyles. This constant exposure to others' idealized lives can lead to feelings of inadequacy, envy, and low self-esteem, as individuals compare their realities to these polished portrayals.

Addictive Engagement – Features like infinite scrolling and instant feedback encourage excessive screen time, linked to anxiety and depression. Research shows that this can lead to heightened anxiety and depression, as individuals, especially teenagers, may feel that they cannot measure up to the standards set by influencers, celebrities, and even peers.

Algorithm-driven personalization can reinforce existing beliefs and limit exposure to diverse perspectives. Making self-worth heavily reliant on social approval, which can be damaging to mental health.

3. Algorithmic Influence, Privacy, and Safety Challenges for Youth

Algorithms can have a strong and multi-layered effect on the behaviour and choices of youth, particularly related to social media, short video platforms, and recommendation engines. Algorithms shape online behaviour by recommending content based on past activity. Algorithmic-driven attention can drive addictive behaviours in children and youth. Features like scrollable feeds, alerts, and live updates encourage time on platform to the point of distracting from essential objectives and routines.

While this enhances personalization, it can also:

- Create echo chambers, restricting exposure to diverse viewpoints.
- Encourage impulse spending and peer-driven consumption trends.
- Shorten attention spans through constant novelty and rapid feedback loops.

Algorithms are a powerful influence on how young people perceive, interact with, and choose content and use online. It affects patterns of consumption, as well as digital socialization, mental health, and worldview. Algorithmic literacy and fostering critical digital habits are effective strategies to mitigate some of this influence.

4. Legal and Ethical Challenges in Online Expression

4.1 Freedom of Speech and Regulations

Social media blurs the boundary between free expression and harmful speech. Laws must balance democratic participation with protection against abuse.

- In ***Shreya Singhal v. Union of India*** (2015) – The Supreme Court struck down Section 66A of the IT Act as unconstitutional for violating the right to freedom of speech under Article 19(1)(a), holding it was vague, overbroad, and not saved by Article 19(2). It read down Section 79, directing that intermediaries remove content only upon lawful court or government orders.
- In ***Anuradha Bhasin v. Union of India*** (2020) – Held that restrictions on internet must meet necessity, proportionality, and judicial review standards. Recognised internet access as integral to freedom of speech and trade. Unfettered online connectivity is vital for youth-led social movements.

4.2 Ethical challenges in online expression

The rapid spread of misinformation and fake news can damage reputations, mislead the public, and even disrupt social order. Hate speech and cyberbullying highlight the constant tension between protecting free speech and preventing harm, while privacy violations—such as oversharing or exposing others’ personal data without consent—undermine trust and safety. Cultural insensitivity is another concern, as online platforms connect diverse communities where stereotypes or offensive remarks can create deep divides. The greatest ethical challenge in online expression lies in striking a balance between the right to speak freely and the responsibility to ensure accuracy, respect, and empathy in the digital sphere.

The Latin maxim “*falsus in uno, falsus in omnibus*” Cybersecurity reports reveal that 29% of users have experienced identity misuse, showing how exposed we are in the virtual realm.

Platforms and Moderation: Online speech typically takes place on various platforms, such as social media networks (e.g., Facebook, Twitter, Instagram), video-sharing sites (e.g., YouTube), and blogging platforms (e.g., WordPress, Medium). These platforms often have terms of service and community guidelines that outline acceptable behaviour and content. They may also employ content moderation practices to enforce these guidelines and remove or restrict certain types of speech that violate their policies.

Hate Speech and Online Harassment: Online speech is not immune to abuse. Hate speech, which involves discriminatory or offensive language targeting individuals or groups based on attributes such as race, religion, gender, or sexual orientation, is a significant concern. Online harassment, including cyberbullying, stalking, or doxxing (revealing private information about someone without consent), is another issue that can have serious consequences for individuals’ well-being

- In ***Lipika Pual v. State of Tripura*** Court ruled that mere attendance at a political rally is not “participation” in political activity and that general political comments on Facebook do not amount to prohibited canvassing under Rule 5(4) of the Conduct Rules. It quashed the suspension and ordered release of the petitioner’s retirement benefits.

5. Role of social media in shaping public opinion

Social media refers to internet-based platforms and applications that enable users to create, share, and exchange information, ideas, and content within virtual communities. These platforms facilitate communication, collaboration, and interaction among individuals and groups. Social media encompasses a wide range of websites, apps, and other online tools that allow users to share text, photos, videos, and other content.

- i. **Democratization of public opinion:** Fundamentally, social media gives young people a forum to express their thoughts, organize around issues they support, and shape public opinion. It has democratized the public space by giving voice to oppressed, marginalized people and sharing their perspectives with a wider audience.
- ii. **Dissemination of new information:** social media has enabled rapid dissemination of information in new fields like investigative journalism, environment, freedom of the press, and citizen-centric journalism. Young people now could question established social, political, and economic systems because to this unparalleled degree of connectedness, which has also spurred new social movements and grassroots activism.
- iii. **Influence on public policy:** social media has been used by politicians, and governments to gather support for their initiatives and broaden their support by use of debates, advertisements, and social campaigns. In order to understand just how social media use influences are congruent with student identity development, it is first important to review the relevant theories.
- iv. **Polarization of public opinion:** Social media algorithm collect user preferences and use them to personalize the content where individuals are exposed to the same type of content which lead to reinforcing existing beliefs and contribute to polarization of opinion.

6. Cybersecurity and privacy concerns for young users

Young people aged 15 to 24 are more likely to use the Internet than the rest of the population, but this generational gap has been slowly narrowing over the last four years. According to the revised estimates, around 77 percent of people aged between 15 and 24 used the Internet in 2023.

The Internet offers young people endless opportunities to learn, connect, and express themselves but it also brings serious risks. Cyberbullying is a growing concern, with over one-third of youth in 30 countries reporting incidents, and 1 in 5 skipping school due to online harassment. There was an alarming surge in online sexual exploitation — 80% of children in 25 countries say they feel unsafe.

Many encounters hate speech, violent content, or messages promoting self-harm and suicide. Extremist and terrorist groups exploit these platforms for recruitment. Disinformation and conspiracy theories further erode trust and mental well-being. Social media and gaming platforms have made it easier for offenders to contact victims, share abusive content, and encourage others to offend. Children also face risks from data privacy breaches, manipulative marketing, and excessive screen time that can harm development.

- **Pradeep Kumar v. Union of India** The petitioner demanded accountability of platforms for cyberbullying and offensive content. Case underscored the need for safe digital

spaces. Online harassment poses serious threats to participation in social change initiatives. Legal frameworks must protect against intimidation while preserving lawful speech. Court stressed proactive measures by platforms to prevent abuse.

United Nation Initiatives

Threats	Initiative by United Nations
Cybersecurity	ITU's Child Online Protection Initiative
Cyberbullying	UNICEF
Sexual Exploitation	WePROTECT Global Alliance
Human Trafficking	UNODC

Indian initiatives -Safeguards for cyber security

S.No.	Initiative	Objective
1.	CERT-In	Serve as the central agency for managing cyber security incidents, handling vulnerabilities, and coordinating security responses in India's cyberspace.
2.	Cyber Surakshit Bharat	Promote awareness and capacity building on emerging cybercrimes and security challenges under the <i>Digital India</i> vision.
3.	Cyber Swachhta Kendra	Detect and remove malicious botnets from devices and provide tools for malware analysis to enhance system security.
4.	Centre of Excellence – Hyderabad	Strengthen India's cyber security infrastructure through policy support, collaboration, and implementation of key digital safety initiatives.
5.	National Cybersecurity Policy	Create a secure cyber ecosystem and protect critical information infrastructure in India.

7. Social Media as a Tool for Activism and Advocacy

Social media has emerged as a transformative force in the modern era, reshaping how individuals and communities engage in activism and advocacy. Its ability to connect, mobilize, and amplify voices has made it an indispensable tool for driving social change on a global scale.

i. Rapid Information Sharing

Platforms like Twitter, Instagram, and Facebook allow activists to instantly share news, updates, and calls to action, transcending geographical boundaries. This speed is vital in crises, enabling swift mobilization of public support and resources.

ii. Building Communities and Solidarity

Social media fosters online networks where like-minded individuals can share strategies, resources, and emotional support. These digital communities create a sense of belonging and strengthen the resilience of movements.

iii. Amplifying Marginalized Voices

By bypassing traditional media gatekeepers, social media empowers marginalized groups to tell their own stories, challenge dominant narratives, and demand justice directly from global audiences.

iv. Mobilizing Resources and Volunteers

Crowdfunding platforms and integrated tools within social media help activists raise funds, recruit volunteers, and coordinate events, making campaigns more sustainable and impactful.

v. Influencing Public Discourse and Policy

Through viral hashtags, petitions, and documented evidence of injustices, activists can shift public opinion, hold institutions accountable, and pressure policymakers into action.

8. Mental Health Implications of the Digital Lifestyle

- **Reduced In-Person Interaction:** While technology makes communication easier, it can also reduce face-to-face connections, which are vital for emotional well-being. Too much reliance on digital communication can lead to feelings of loneliness and disconnection.
- **The Social Media Effect:** Scrolling through social media can feel like an emotional rollercoaster. At one instance we would be laughing at a reel, and sometimes cry. Studies show that excessive social media use is linked to anxiety, depression, and poor self-esteem.
- **Information Overload:** We're bombarded with information 24/7. News alerts, emails, and endless scrolling make it unwind. Constant exposure to information can increase stress and mental fatigue. Our brains cannot process more information consistently.
- **Blurred Work-Life Boundaries:** Without clear boundaries, it becomes difficult to disconnect, leading to stress, exhaustion, and work-related anxiety.

9. Recommendations

"Youth + Social Media = Power. The Question Is, How Will You Use It?"

- Integrate digital literacy into education to promote critical, responsible social media use.
- Provide funding, mentorship, and policy participation opportunities for youth activists.
- Enforce stronger measures against online harassment and hate speech while protecting expression.
- Develop transparent content moderation and robust data privacy safeguards.
- Use emerging technologies (AI, blockchain, VR) to enhance youth-led social campaigns.
- Collaborate with influencers trained in ethical advocacy to amplify social causes.
- Link online campaigns with offline community service and civic actions.
- Ensure campaigns are inclusive, intersectional, and representative of diverse voices.
- Connect local youth issues to global movements for broader cooperation.

Conclusion

Social media is a transformative force in shaping youth identity, enabling self-expression, activism, and civic participation on an unprecedented scale. However, its benefits are counterbalanced by risks to mental health, privacy, and social cohesion. Striking the right balance between empowerment and protection requires a multi-stakeholder approach involving policymakers, educators, platforms, and the youth themselves. By fostering digital literacy, safeguarding rights, and encouraging authentic engagement, society can ensure that the virtual world strengthens rather than undermines real-world identities.

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THE LAWS AND REALITIES OF ACTIO REI VINDICATIO AND PRESCRIPTION ORDINANCE IN DETERMINING LAND DISPUTES AFFECTED BY ETHNIC ISSUES IN SRI LANKA

Habeeb Mohamed.Nijam

Department of Accountancy and Finance
Faculty of Management and Commerce
South Eastern University of Sri Lanka, Oluvil
nijamhm@seu.ac.lk

Abstract

The purpose of this article is to explore the laws of Rei Vindicatio and investigate how they function in practice in a land dispute related to ethnic disturbances. For this study, a land case was critically examined with regard to applicable laws and their philosophical foundations, the adequacy of procedures followed, acceptability to all parties, social implications, discrimination in law and its enforcement, and delays within the legal system. This research is exploratory by nature and has examined the facts and relevant legal provisions concerning the case under study. For this exploration and analysis, various court documents were utilised, including the plaint, relevant trial proceedings, evidence such as deeds and survey maps, and the defendant's responses to the plaint. Relevant counsel was also interviewed to clarify documents and facts. It is found that Sri Lanka requires legislative measures to prevent Rei Vindicatio from operating on the basis of racial and malicious motives, thereby excluding personal considerations of the person sought to be evicted. It is also found that our Prescription Ordinance offers no protection for owners who are compelled to migrate due to ethnically, socially, and politically driven reasons. Therefore, the disabilities related to claims for prescriptive title, as outlined in Section 13 of the Prescription Ordinance, may need reform in light of these realities.

Introduction

Natural and moral law laid the philosophical and jurisprudential foundations for Roman law⁹⁷. Vindicatio, a claim under Roman law, also stems from philosophical foundations of natural and moral laws. Cloete (2016) states that the vindicatio adopts natural and moral principles and ideals. Cloete (2016) also cites Kroger,⁹⁸ who states that Classical natural and moral philosophy views that the law exists to support and uphold the rational order and structure of the universe, insisting that all laws must conform to the standards of right and wrong inherent in the rational order and imprinted in nature. It is natural and common in every rational society that when human conduct violates the natural and rational order, there will be reactions and counteractions aimed at restoring the disturbed natural order. For example, if A's property is taken or possessed without his consent by B, it is naturally expected that A will endeavour to reclaim his property. Humans are inherently dependent on other humans and objects on Earth for their continued existence. Therefore, they are naturally required to own, possess, and control their belongings to ensure their survival or a peaceful life in the world.

⁹⁷ JR Kroger "The philosophical foundations of Roman law: Aristotle, the Stoics, and Roman theories of natural law" 2004 *Wis L Rev* 905 905; WB le Roux "Natural law theories" in C Roederer & D Moellendorf (eds) *Jurisprudence* (2004) 25-61 40.

⁹⁸ JR Kroger "The philosophical foundations of Roman law: Aristotle, the Stoics, and Roman theories of natural law" 2004 *Wis L Rev* 905 924.

When others disrupt this order, they are inevitably entitled to recover such property unlawfully. Cloete (2016, p.19) in his work cites that

Interestingly, the work of Thomas Aquinas, a classical natural and moral philosopher of the thirteenth century, indicates that the classical natural and moral philosophical justification for accepting that man can own and control objects in nature is found in the belief that nature is impregnated with the rational order of the divine God and that man is made in the image of the divine God⁹⁹.

Humans naturally desire to own and control property and to vindicate and defend it when necessary. (Cloete, 2016). *Rei vindicatio* action indeed ensures the right of an owner to vindicate their property, which is possessed by others without the consent of the former. The social school of jurisprudence argues that laws must be discovered within societies. A famous assertion by Ehrlich states that the true source of law is not found in statutory provisions or judicial attitudes but in society's activities themselves. This study examines the laws of *Rei Vindicatio* and investigates how they function in practice in a land dispute related to ethnic disturbances in Sri Lanka.

Review of existing law on rei vindicatio in Sri Lankan context

The rationale for the action of *rei vindicatio* is straightforward and widely accepted, as it is based on common psychology. Following explanation by Jansen JA in *Chetty v. Naidoo* provides the common sense that everyone has with respect to the ownership of their property. Jansen JA states that

It may be difficult to define dominium comprehensively, but there can be little doubt that one of its incidents is the right of exclusive possession of the res, with the necessary corollary that the owner may claim his property wherever found, from whomsoever holding it. It is inherent in the nature of ownership that possession of the Res should normally be with the owner, and it follows that no other person may withhold it from the owner unless he is vested with some right enforceable against the owner. The owner, in instituting a *rei vindication*, need, therefore, do no more than allege and prove that he is the owner and that the defendant is holding the res – the onus being on the defendant to allege and establish any right to continue to hold against the owner. (**Chetty v Naidoo**, 1974 (3) SA 13 (A) at 20A-D)

This statement suggests that the action of *rei vindicatio* is a natural phenomenon when the owner of the property discovers it is in the possession of someone else. Moreover, if it were to operate differently, requiring the claimant to first prove their title to the disputed property, it would not be widely accepted and would not be practical. Such a requirement could encourage unnecessary litigation over others' property and increase the flood of legal cases, thereby disrupting the administration of justice.

The fundamental requisites

The Roman-Dutch law remedy of *rei vindicatio* action arises from the right of dominium. By it, we claim specific recovery of property belonging to us but possessed by someone else.”¹⁰⁰ Supreme Court has recognized that

⁹⁹ WB le Roux "Natural law theories" in C Roederer & D Moellendorf (eds) *Jurisprudence* (2004) 25-61 40 cited by Cloete (2016)

¹⁰⁰ Pereira, p. 300, ed.1913, quoting Voet 6, 1, 3.

The whole basis of an action rei vindicatio is the title or rather the superior title of the plaintiff and a denial of that title or interference with plaintiff rights under it by the defendant. (Suweneris v. Mohamed [1928] 30 N.L.R. 11 at p.16)

The ownership is therefore protected by the right of the owner to recover (ius vindicandi) his property from anyone unlawfully possessing it. Thus, the rei vindicatio action safeguards the owner of the corpus by allowing him to reclaim possession when it is in the hands of another. It is important to note that the possessor's intent or animus is not relevant to the rei vindicatio action. The remedy provided by the vindicatory action applies equally against both bona fide and mala fide possessors.¹⁰¹

Ownership, as understood in our law today, connotes complete rights the owners of property have to possess, including the right to vindicate possession, use, enjoy, and alienate their property. The concept of ownership in our law was derived from Roman Dutch Law foundations on the same. In the South African common law, ownership is perceived as 'the real right that confers on the owner the most complete control over a thing. Muller (2011, p.6) states that this perception infers that "the ownership has an individualistic nature and that it is an absolute right that can be enforced against anyone." The right to possess may be taken to include the ius vindicandi, which Grotius places at the forefront of his definition ownership.¹⁰²

Vindicatory actions derive their force from the concept of ownership. In Mansil v. Devaya (1984), G.P.S. de Silva stated that ownership is the essence of rei vindicatio action and that the action is based on ownership. The notion of ownership grants the owner the right, among others, to possess and to vindicate possession if he is unlawfully dispossessed by others. Therefore, "the right to possess implies the right to vindicate, that is, to recover the possession of a person who possesses without title to possess, derived from the owner"¹⁰³. Grotius thus enacts that the owner of the land has the right to vindicate it, thereby recovering the possession by legal process from the possessor who is found to possess it without a good title.¹⁰⁴ Title depends solely on the deed, and possession is not necessary. Therefore, the fact that the plaintiff was not in possession at the time of filing this rei vindicatio action will influence his right to pursue the claim. He can still bring the action based on his title in the deeds.

Under a vindication action, the plaintiff who prays the court for the declaration of title and the eviction of the defendant from the corpus should first establish their title to the disputed corpus. However, if the plaintiff proves their title, the burden shifts to the defendant, who currently possesses the property, to demonstrate that they acquired a valid title, including by way of prescription. Therefore, to succeed with a rei vindicatio action, the owner filing the suit must establish that.

- a) He is the owner of the property¹⁰⁵ and
- b) The property is in possession of the defendant

¹⁰¹ Voet 4.3.3. It is however noteworthy that bona fide possessor however has the right to be compensated for useful improvement he effected to the property when he is in possession of that property. And,

¹⁰² Lee's Introduction to Roman-Dutch Law, p. 111 note, ed 1915.

¹⁰³ Lee R.W An introduction to Roman Dutch Law p.121

¹⁰⁴ Grotius 2.3.4

¹⁰⁵ Voet 6.1.34

It is established that the burden of proof rests with the plaintiff.¹⁰⁶ Section 110 of Evidence Ordinance No. 14 of 1895 enacts that when the question concerns whether any person is the owner of something, the burden of proof that they are not the owner rests on the person who claims they are not owner." In *Jamaldeen Abdul Latheef v. Abdul Majeed Mohamed Mansoor and another*¹⁰⁷, Saleem Marsoof, J. stated that an important feature of the *actio rei vindicatio* is that it has to necessarily fail if the plaintiff cannot clearly establish his title. He cites that

To succeed with the *rei vindicatio*, the owner must prove on a balance of probabilities, first, his or her ownership in the property. Secondly, the property must exist, be clearly identifiable and must not have been destroyed or consumed. Thirdly, the defendant must be in possession or detention of the thing at the moment the action is instituted. The rationale is to ensure that the defendant is in a position to comply with an order for restoration... (*Jamaldeen Abdul Latheef v. Abdul Majeed Mohamed Mansoor and another*, p.353).

It is thus a well settled law in Sri Lanka that the party claiming a declaration of title must establish his title to the property in question. "To bring the action *rei vindication*, plaintiff must have ownership actually vested in him"¹⁰⁸. If the owner has established the title then the onus shifts to the defendant who has to prove that he has acquired a valid title to the land (in united states it is mentioned as 'burden of persuasion'). Our courts have asserted that the plaintiff who file a vindication action must prove his title strictly.¹⁰⁹ As Ranasinghe, J. stated a plaintiff to a *rei vindicatio* action can and must succeed only on the strength of his own title, and not upon the weakness of the defense¹¹⁰. In *Wanigaaratne v. Juwanis Appuhamy*, Justice Heart said that

"The defendant in a *rei vindicatio* action need not prove anything, still less his own title. The plaintiff cannot ask for a declaration of title in his favor merely on the strength that the defendant's title is poor or not established. The plaintiff must prove and establish his title.

It is thus settled law that in *rei vidicatio* actions the plaintiff must establish his title and in doing so he cannot rely on the weakness of the defendant's title. As discussed in the earlier section, it is the owner who need to institute the action of *rei vidicatio*. However the purchaser who has not been placed in possession may also bring this action of vindication.¹¹¹ Also, the purchaser can successfully bring a vindication action, through his vendor had no possession at the time of sale provided that the title to the land can be established.¹¹²

The plaintiff in the case at the time he instituted this action was not in possession of land in dispute nor did his vendor have the possession at the time of sale of the said land to the plaintiff.

¹⁰⁶ This position has been confirmed in many cases as *DE silava v Goonetilleke* [1931] 32 NLR 217; *Abeykoon Hamine v Appuhamy* [1950]. However, Prof. G.L Peiris in his *Law of property Vol.I* pp 302-303 cites *Medankara v. Charles Dias* [1886] and *Rawter v. Ross* [1880] and states that there are exception to this general rule that it is the plaintiff who must first establish his title to the land and such exemption operates when there arises a presumption of title in favor of the plaintiff where the plaintiff enjoyed an earlier peaceful possession of the land and he was ousted by the defendant. In such situations, just in the initial stages of vindication action, the burden of proof exists in defendant.

¹⁰⁷ [2010] 2 SR ILR.

¹⁰⁸ [1 Nathan p. 362, s.593]

¹⁰⁹ Prof. Goonesekere SWE [1988], *Land Law*, Open University of Sri Lanka. Pp.57. Though the standard of proof of the title by the plaintiff is strict, it is however stated that it is not like what is applied in a partition action.

¹¹⁰ *Jinawathie v. Emalin Perera* [1986] 2 Sri LR 121 at page 142,

¹¹¹ *Punchihamy v. Aronlis* [1883] 5 S.C.C 160.; *Appuhamy v. Appuhamy* [1880] 3 S.C.C 61; *Andiris v. Simon* [1889] 9 S.C.C. 7

¹¹² *Appuhamy v. Appuhamy* [1880] 3 S.C.C 61.

However, this dispossession of the land by the plaintiff at the time of institution of his action or by his vendor at the time of sale will not bar the plaintiff to institute the rei vindicatio action. According to *Elias Hamy v. Punchi Banda* (1911)¹¹³, if the plaintiff sell the land to a third party before the case is determined, he may still be able to maintain his claims for damages for dispossession but will be debarred to get a decree for declaration of title and ejection¹¹⁴.

Prescription: The defense

One of the defense to the rei vindicatio action is that the defendant may set up his own title superior to that of the plaintiff say prescription. The defendant of this action also claims title to the land in dispute by operation of the law of prescription. It is important to note that the defendant of this action even though he claims title to the land by his deeds is not precluded to establish his title by other means like prescription. In *Appuhamy v. Gunathileke*¹¹⁵ it was held that even a person who can establish title to land through other means can rely on prescriptive title.

Section 03 of Ordinance No 22 of 71 recognizes the concept of acquisitive prescription and sets out the term of prescription for lands or immovable property.

"Proof of the undisturbed and uninterrupted possession by a defendant in any action, or by those under whom he claims, of lands or immovable property, by a title adverse to or independent of that of the claimant or plaintiff in such action (that is to say, a possession unaccompanied by payment of rent or produce, or performance of service or duty, or by any other act by the possessor, from which an acknowledgement of a right existing in another person would fairly and naturally be inferred) for ten years previous to the bringing of such action, shall entitle the defendant to a decree in his favour with costs. And in like manner, when any plaintiff shall bring his action, or any third party shall intervene in any action for the purpose of being quieted in his possession of lands or other immovable property, or to prevent encroachment or usurpation thereof, or to establish his claim in any other manner to such land or other property, proof of such undisturbed and uninterrupted possession as hereinbefore explained, by such plaintiff or intervenient, or by those under whom he claims, shall entitle such plaintiff or intervenient to a decree in his favour with costs".

The statement in the above Section 3 that "proof of the undisturbed and uninterrupted possession by a defendant in any action, or by those under whom he claims, of lands or immovable property by a title adverse to or independent of that of the claimant or plaintiff in such action.." indicates that ten years required for prescription does count from the commencement of the adverse title of defendant's predecessors in title. Section 13 provides certain disabilities of the owner during which the prescriptive period will not count. The section states that

"if at the time when the right of any person to sue for the recovery of any immovable property - shall have first accrued, such person shall have been under any of the disabilities inter alia "absence beyond the seas", then and so long as such disability shall continue the possession of such immovable property by any other person shall not be taken as giving such person any

¹¹³ 14 N.L.R. 113

¹¹⁴ This position has unequivocally been confirmed in many cases; *Sila v. Jayawardena* [1942], *Fernando v. Appuhamy* [1921] 23 N.L.R. 476; *de Silva v. Goonethilke* [1931] 32 N.L.R.217.

¹¹⁵ [1995] 18 N.L.R 469.

right or title to the said immovable property, as against the person subject to such disability or those claiming under him¹¹⁶.

Methodology

For this study, a land case that was heard was critically assessed with regard to applicable laws and their philosophical underpinnings, the adequacy of procedures followed, acceptability to all parties, social implications, discrimination in the law and its application, and legal delays. This research is exploratory in nature and has examined the facts and relevant laws related to the case under investigation. For this purpose, various court documents were utilised, including the plaint; relevant and accessible trial proceedings; evidence such as deeds, survey maps, etc.; and the defendant's responses to the plaint. Relevant legal counsel was also interviewed for clarifications on documents and facts. The paper analyses how the relevant laws discussed earlier operate and are perceived in practice. This analysis primarily focuses on the *rei vindicatio* action, which is the key law most applicable to the case under evaluation.

The case and discussion

The land dispute examined was a case pending trial when this research was conducted. The case had been filed in a district court in the Eastern Province of Sri Lanka. In this case, the plaintiff filed a *rei vindicatio* action seeking a declaration of title and the eviction of the defendant, who allegedly possessed the land unlawfully. The plaintiff claims that person X of division no 01 of Alpha village was the original owner of the land called Beta, located in a well-known village, Omega. He further states that X sold and transferred a portion of Beta to Y, who later gifted a portion of this land to Z, his daughter. Due to ethnic disturbances and terrorist activities, Y and Z left Omega and subsequently migrated to Australia in 1988, where they have lived permanently. They then appointed L as their attorney, who executed the land transfer to the plaintiff in this case. The defendant in this action claimed an adverse and independent title through deeds and claimed to have possessed the land peacefully and continuously for over 10 years, along with his predecessors title. The plaintiff has sought the application of the exception clause mentioned in Section 13(e) of Ordinance No 22 of 71 stating in his plaint that his predecessors in title, Y and Z were living outside Sri Lanka from 1998 to the date of the action.

This case reveals that the action of *rei vindicatio* by the plaintiff and the defendant's claim for prescriptive title to the same land are caused by societal disturbances and insecurities prevalent in the village of Omega during the periods of civil war since the 1980s. The civil war and the presence of militants' bases in Omega created threats to the lives of many civilians. Because of this, civilians faced threats and migrated from one place to another, including overseas. Civilians in isolated rural areas of Omega also migrated to urban areas seeking safety. As a result, the steady influx into urban Omega areas quickly depleted available residential space and compelled people to occupy land close to the populated areas, near employment opportunities. This spontaneous social rearrangement, as a means of protecting their lives from

¹¹⁶ Proviso in Section 13 also however provides that adverse and undisturbed possession for thirty years of any immovable property by any person claiming the same, or by those under whom he claims, shall be taken as conclusive proof of title in manner provided by section 3 of this Ordinance, notwithstanding the disability of any adverse claimant.

civil war and land scarcity, necessitated that internally displaced and migrating communities settle on both public and private land, even in defiance of others' rights.

The case under review was initially filed in a district court in the Eastern Province in December 2008 and was later transferred to Omega district court following its establishment in 2011. At that point, the case number was also restructured. The case remains unresolved in Omega district court even after more than a decade. This highlights significant delays in the administration of justice (Ransom, 1923; USAID, 2010; Wijesinghe, 2017). These delays might be caused by various reasons, including the complexity of the case and the increasing number of similar land disputes arising in the post-war context. After the end of the civil war in Sri Lanka, law and order were restored, and the rule of law reasserted itself. Courts in the North and Eastern parts of the island received a higher volume of cases compared to the period before the end of the civil war in 2009. It is also noteworthy that the landowner involved in this dispute has filed several other similar actions against different occupiers, which he claims to be unlawful possessors. There are numerous reasons behind these legal delays.

The key findings from the analysis of this case are that both the law on *rei vindication* invoked by the plaintiff and the law of prescription used by the defendant to establish his claim have overlooked the social realities of displacement caused by civil conflict disturbances. *Rei vindicatio* is available only to the owner of the property. Even if the defendant has had undisputed uninterrupted possession of the land in question and considers himself qualified to claim prescriptive title under Section 03 of the Prescription Ordinance, there are no clear provisions in Sri Lankan law that enable him to declare such prescriptive title through any deliberate action in a court of law or to have such title registered through his uninterrupted possession. However, it is an accepted practice that a person who acquires title to a property can declare such prescriptive title when he sells, alienates, or transfers that property, which he has acquired through the operation of the law of prescription. It is also conventional that these declarations are not effective, and the person claiming title by prescription should wait until his possession is threatened or interrupted by a third party, during which he may seek the court's declaration of his title by prescription.¹¹⁷

The plaintiff who claims title to the land by registration can file an action to establish his ownership, eject the defendant in possession, and thereby vindicate the property. In contrast, the defendant who asserts title by prescription cannot file an action to declare his title unless his possession is challenged or interrupted. Therefore, it appears to be a procedural impediment and discrimination imposed on the defendant by law. It creates difficulties or constraints for the defendant claiming title by prescription, as he is unable to declare his title to the property even when he is entitled to it by prescription. On the other hand, the law of prescription tends to operate in favour of the defendant possessing the property, subject to the terms in Section 3 of the prescription ordinance, by recognising an undisputed, uninterrupted possession for ten years.

Such undisputed, uninterrupted possession of the defendant reckons despite the political, security, and social environment (e.g., terrorist activities), which might have compelled the plaintiff or his predecessors in title to be deprived of safe access to the property. Such circumstances provide grounds for the defendant to establish his possession and acquire an

¹¹⁷ Prof. Savitri WE. Goonesekere (1987), *Land Law*, Open University of Sri Lanka.

adverse and independent title to the land in question. It is noteworthy however that *rei vindicatio* is not also considering the intention of the plaintiff applying for such eviction against the defendant. Plaintiff for an *actio rei vindicatio* may even have ill intention driven by reasons such as ethnic/ racial or similar kind that are not generally allowed by any civilized laws.

The essential procedure in a *rei vindicatio* action for declaration of title and eviction is that the owner must strictly prove their title. In establishing this title, they should follow various procedural aspects. For example, Section 41 of the Civil Procedure Code states that "When the claim made in the action is for some specific portion of land, or for a share or interest in a specific portion of land, the portion of land must be described in the plaint as far as possible by reference to physical metes and bounds, or by reference to a sufficient sketch, map, or plan to be appended to the plaint, and not by name only." It is important to emphasise that in a claim of title, among other things, the land or premises in dispute must be described with precision and clarity. When the title is accurately established and the defendant in possession fails to prove an adverse and independent title to that of the plaintiff, the plaintiff succeeds in their action. Furthermore, Section 40 of the Civil Procedure Code states that the plaint shall include particulars such as "a plain and concise statement of the circumstances constituting each cause of action, and where and when it arose. Such a statement shall be set forth in duly numbered paragraphs."..."¹¹⁸ The defendant in this action argued that this requirement was not met by the plaintiff as the plaintiff's submission does not include a statement about when a course of action arose for the plaintiff.

Although this litigation has arisen between two private parties, it has been influenced by broader societal contexts. Therefore, the resolution of this issue should not be viewed solely as a legal matter. Instead, due regard must be given to societal realities and pressures that existed when the cause of action emerged and any violations occurred. This means that the rights and obligations of the parties involved should be interpreted in the context of the prevailing social situation. In light of these considerations, the operation of the *rei vindicatio* must be aligned with rural and urban land tenure measures during ongoing civil crises in the relevant periods.

The study observes that the disabilities caused by societal and political forces in this case have not been included in Section 13 of the Prescription Ordinance, which lists disabilities that do not count against the prescriptive period. As a result, disruptions and internal displacements caused by political pressures, racial or ethnic crises, and tensions leading an owner to vacate their property are not exempted when calculating the prescriptive period.

Muller (2011) echoed this concern and recognised that eviction under *Rei vindication* can sometimes be influenced by social class, ethnicity, political divergence, etc. Muller (2011, p.9) highlighted such phenomena during apartheid in South Africa. He states that

"During apartheid courts found stable legal meaning in the South African doctrinal tradition that entitle a private owner to exclude others from her property and to enforce this right against others with the *rei vindicatio*. The result was that evictions from land occurred without any regard for the personal circumstances of the unlawful occupiers because these considerations were simply not relevant in terms of the *rei vindicatio* in the absence of a constitutional provision that guaranteed people access to adequate housing and forced courts to consider all relevant circumstances before issuing an eviction order. This position was exacerbated during

¹¹⁸ Section 40 (d)

apartheid when the powerful *rei vindicatio* was legislatively enhanced to establish and maintain a land use system that was segregated along racial lines".

Social factors may thus likely influence the *rei vindicatio* action, frustrating the true intent and objective of the law on *rei vindication* and prescription and these warrant attention for law reform.

Conclusion and recommendations for law reform

It is noteworthy that Muller (2011, p.70) states that "the adherence to the strictly legal requirements of the *rei vindicatio* made it impossible for a court to refuse an eviction application based on the personal circumstances of the occupiers or other general policy considerations...". This is highly relevant in the Sri Lankan context as well, where we have healed some bitter part of our past due to severe ethnic bias. This reality should not be allowed to influence the *rei vindicatio*. Therefore, legislative remedies need to be introduced to prevent the *rei vindicatio* from operating on the basis of racial and malicious motives. The Prescription Ordinance in Sri Lanka offers no protection to owners who are compelled to migrate due to ethnically, socially, or politically driven reasons. For example, when a person has to relinquish possession of their property because of ethnic disturbances or civil war, such circumstances may be deemed to interrupt the period of prescription claimed by the individual during their absence. Therefore, disabilities related to claims for prescriptive title as outlined in Section 13 of the Prescription Ordinance may be revised to reflect these realities.

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IMPACT OF EXCHANGE RATE VOLATILITY ON SECTOR-WISE STOCK PERFORMANCE: EVIDENCE FROM SRI LANKA

Senior Prof. Dr. A.L. Abdul Rauf

Senior Professor of Accountancy

Dept. of Accountancy and Finance

Faculty of Management and Commerce

South Eastern University of Sri Lanka, Sri Lanka

alarauf@seu.ac.lk

Abstract

This study investigates the impact of exchange rate fluctuations on sector-wise stock market returns in Sri Lanka from 2003 to 2023. While macroeconomic factors have long been recognized as drivers of stock market performance, the sector-specific sensitivity to exchange rate volatility remains under explored in emerging markets.

Using monthly time series data from the Colombo Stock Exchange and macroeconomic indicators from the Central Bank of Sri Lanka, the study employs descriptive statistics, Augmented Dickey-Fuller (ADF) tests, correlation analysis, and multiple regression models to assess the relationship between exchange rate movements and six key stock market sectors.

The empirical findings reveal significant heterogeneity in sectoral responses to currency depreciation. The Banking, Finance, and Insurance (BFI), Health Care Equipment & Services (HES), and Automobiles & Components (AC) sectors exhibit strong negative sensitivity to exchange rate fluctuations due to their dependence on foreign capital, imported goods, and exposure to global markets. In contrast, the Food, Beverage & Tobacco (FBT) and Energy & Power (EP) sectors show limited responsiveness, likely due to domestic value chains and regulated pricing. The Information Technology and Telecommunication Services (ITS) sector demonstrates an insignificant relationship, potentially due to foreign revenue buffers.

These results suggest that exchange rate volatility does not affect the stock market uniformly, emphasizing the need for sector-specific investment strategies and targeted economic policies.

Keywords: Exchange Rate, Sectoral Stock Returns, Colombo Stock Exchange, Sri Lanka, Currency Depreciation, Macroeconomic Volatility

Introduction

Exchange rate fluctuations are a major macroeconomic variable in emerging economies like Sri Lanka with immediate implications for the financial markets, particularly the performance of the stock market. The exchange rate, powered by the price of local currency in foreign currencies, has the potential to affect significantly the imported cost, export earnings, and profitability of the listed stocks of companies belonging to different industries (Gunawardhana & Mustafa, 2020; Hemamala & Jameel, 2016). Foreign trade companies or the companies with imported input reliance are largely vulnerable to depreciation or appreciation of currency.

The Colombo Stock Exchange (CSE), established in 1985, is a vital capital mobilization and investment medium in the Sri Lankan economy. With its diversification in sectors like finance, energy, telecommunication, health, and manufacturing, the macroeconomic determinants influence the CSE to a certain degree. Although inflation has been widely studied as a determinant of stock returns (Samarakoon, 1996; Gunawardhana & Mustafa, 2020), exchange rate movements remain an underdeveloped field at the sectoral level.

Previous studies have a propensity to use the exchange rate as a control variable rather than the main point (Hemamala & Jameel, 2016; Mfugale & Olomi, 2023). This makes us avoid having a deeper insight into how currency volatility impacts sectors such as banking, energy, or IT, which have varying exposures to foreign exchange risks. Hence, meticulous examination of exchange rate effects by individual sectors is essential for policymakers and investors.

Despite the extensive number of literature pieces examining macroeconomic influences on stock returns, a huge gap in knowledge persists in the sector-specific response to exchange rate changes in Sri Lanka. A majority of empirical studies base their analysis on an aggregate market-level framework without considering the response of different sectors towards currency fluctuations with respect to the business characteristics and foreign market exposure (Gunawardhana & Mustafa, 2020; Bouri et al., 2023).

Industry sectors such as Energy, Automobiles, and Information Technology may be more susceptible to depreciation due to their reliance on foreign inputs or technology, while industries with export orientation may benefit. The absence of disaggregated data hinders best-informed investment and economic policy-making decisions.

The relationship between stock market returns and exchange rate movement has been widely researched in economic and financial literature with variations by country and industry. Empirical research in the Sri Lankan context tends to view the exchange rate as a significant macroeconomic factor, but few emphasize sectoral effects.

Gunawardhana and Mustafa (2020) tested the inflation, interest rate, and exchange rate on aggregate stock market returns in Sri Lanka for the period of June 2008 to May 2018. They found a positive relationship between the exchange rate and the stock return, which means that depreciation of currency may be beneficial to particular listed companies, particularly exporters. The research did not take sectoral differences into account and took only broad market-level regression analysis.

Hemamala and Jameel (2016) analyzed the influence of monetary variables, including the exchange rate, and inflation on Sri Lankan stock market performance between the years 2005-2015. They documented a mixed association in which the exchange rate emerged with a significant but mixed effect on returns. Though they employed multivariate models, the absence of sectoral differentiation limited their findings' richness.

Mfugale and Olomi (2023) analyzed the Tanzanian stock market and identified a significant negative effect of exchange rate volatility on stock returns. Though their research was conducted in a different geographical scope, it offers comparative evidence of currency fluctuations' impact on investor behavior and capital markets in the context of emerging markets.

At a global level, Ali et al. (2023) found that sectoral indices in India are largely influenced by the movement in exchange rates, with technology and automobile sectors being extremely sensitive. Similarly, Bouri et al. (2023) demonstrated that sectoral stock index returns in the United States are determined jointly by expected inflation and exchange rate, especially during periods of inflation or crisis.

Massooma et al. (2020) investigated the Iranian case and concluded that exchange rate volatility had differential impacts across industries, with the most affected industries being energy and automobiles. Such research emphasizes the heterogeneity of the effects of exchange rates on industry performance, and this necessitates more detailed work.

Despite these contributions, the majority of studies average returns on stocks at the country level or condition on the exchange rate as a second control variable, hence excluding the marginal effects across industries.

While most studies affirm the effect of the exchange rate on stock market performance, studies in Sri Lanka and the rest of the globe have mostly focused on composite market indexes rather than sector dynamics. This is a primary gap for understanding how movements in the exchange rate influence various sectors in diverse ways, especially in a diversified economy like Sri Lanka.

In the Sri Lankan context, studies such as Hemamala and Jameel (2016) and Gunawardhana and Mustafa (2020) offer useful insights into macroeconomic determinants of stock prices. These studies are not beyond analyzing sectoral reactions, even though there are different sectors (e.g., finance versus manufacturing) with varying degrees of exposure to foreign markets, dependence on inputs, and price flexibility.

Besides, fewer empirical studies have been developed on how sensitive every sector is to exchange rate changes, particularly under high volatility, policy shocks, or economic shock. Research worldwide (e.g., Bouri et al., 2023; Ali et al., 2023) demonstrates the importance of sectoral analysis, but such rigor has not been evident in Sri Lanka.

Hence, the research gap is that there is no sectoral empirical study of the impact of exchange rate volatility on stock returns in Sri Lanka. This would facilitate portfolio diversification methods, economic policy-making decisions, and an enhanced grasp of market forces under currency risk. Hence, the main research question is: How do exchange rate changes affect the industry-based stock returns in the Sri Lankan stock market?

The overall research goal here is to analyze the impact of exchange rate volatility on sector-specific stock returns in Sri Lanka. Specific research goals are:

1. To determine the relationship between stock returns and movement in the exchange rate for significant sectors listed in the Colombo Stock Exchange.
2. To determine whether the size and magnitude of this relationship vary for sectors such as Banking & Finance, Energy, Automobiles, Healthcare, and IT.
3. To determine in which industries are more sensitive or robust to exchange rate volatility.
4. To provide empirical evidence to be used in investment decisions and policy intervention against exchange rate movements.

Methodology

The study utilizes a quantitative research design using secondary time series data in examining the relationship between exchange rate volatility and sector-specific stock returns in Sri Lanka. The key aim is to assess the impact of changes in the LKR/USD exchange rate on various sectors listed at the Colombo Stock Exchange (CSE) during a 21-year span, from January 2003 to December 2023. Through a long-term perspective and econometric analysis, the research seeks to reveal sector-level sensitivities obscured in broad market analyses.

Data for this study are gathered from credible secondary sources. Daily sectoral stock return indices are gathered from the Colombo Stock Exchange (CSE), providing thorough information on the performance of companies listed in different sectors. Macro factors, including exchange rate and control indicators such as interest rate, inflation, money supply, export earnings, and

import expenditure, are gathered from the Central Bank of Sri Lanka (CBSL). These sources of data are considered exhaustive and valid, and therefore the authenticity of the findings.

Because of changes that have occurred in sector definitions over the years, the study uses a harmonized sector system that groups CSE-listed firms into six broad sectors. These include: (1) Bank, Finance, Insurance and Commercial & Professional Services (BIF), (2) Automobiles & Components (AC), (3) Food, Beverage & Tobacco (FBT), (4) Health Care Equipment & Services (HES), (5) Energy and Power (EP), and (6) Information Technology and Telecommunication Services (ITS). The classification ensures consistency over the years and comparability throughout the study duration.

Dependent variable in this study is the sectoral stock returns, which are calculated as monthly logarithmic price of sectoral indices from CSE. Major independent variable is the exchange rate, represented by the month average of Sri Lankan rupee/US dollar (LKR/USD) taken from CBSL. Certain control variables are included to measure macroeconomic factors other than exchange rate movements. These are the Treasury bill rate for 3 months to reflect interest rates, the gap between the Colombo Consumer Price Index (CCPI) to reflect inflation, the M2 money aggregate growth as a reflection of money supply, and export income and import expenses on a monthly basis (both in USD), all extracted from CBSL.

A set of statistical and econometric methods are utilized to examine the data. Descriptive statistics are initially utilized to summarize the distribution, variability, and trends of the main variables to identify sector-specific patterns of volatility under different exchange rate conditions. To avert spurious regression results and to declare the stationarity of the time series data, the Augmented Dickey-Fuller (ADF) test is employed to test for stationarity across all the variables. Correlation analysis is employed next to examine the direction and magnitude of the linear relationship between the exchange rate and the sectoral stock returns, providing preliminary indications of relationships.

The empirical estimation is focused on the multiple regression models with individual estimation for each industry. The models examine the extent to which movements in the exchange rate influence sectoral returns, netting out inflation, interest rates, money supply, exports, and imports. The approach allows for the identification of variation in sensitivities across industries. The general form of the regression model is:

The theoretical framework employed in this study is based on the assumption that exchange rate changes, along with other macroeconomic control variables, are the cause of influencing sectoral returns on the stock market. The exchange rate has been employed as the primary independent variable, and inflation, interest rate, money supply, exports, and imports have been included as control variables to rule out the impact of exchange rate shocks specifically. These variables collectively establish the performance of six sectors of the Colombo Stock Exchange: Banking, Finance & Insurance (BIF); Automobiles & Components (AC); Food, Beverage & Tobacco (FBT); Health Care Equipment & Services (HES); Energy and Power (EP); and Information Technology & Telecommunication Services (ITS). The sectoral stock market returns are the dependent outcomes of the model. By estimating sector-specific regression models for each individual sector, the model facilitates comparative analysis of how exchange rate movements affect different sectors in the Sri Lankan stock market.

To empirically verify the sectoral impact of exchange rate fluctuations, the research is motivated by the following hypotheses. The null hypothesis (H_0) is that exchange rate

fluctuations have no statistically significant impact on sector-specific stock market returns in Sri Lanka. On the contrary, the second hypothesis (H_1) states that exchange rate movements do have a significant impact on sectoral returns, and that the impact varies across sectors due to their specific structural and economic properties.

- H_0 : Exchange rate movements do not significantly affect sector-wise stock market returns.
- H_1 : Exchange rate movements do have a significant effect on sector-wise stock market returns, and the impacts vary between sectors.

Results and Presentation

This part elaborates the empirical results of the research on the impact of exchange rate volatility on sector-specific stock returns in Sri Lanka. The sample period is January 2003 to December 2023 and employs different econometric methods like descriptive statistics, the Augmented Dickey-Fuller (ADF) test to verify the stationarity, correlation matrices, and multiple regression for all sectors examined. These methodologies provide statistical robustness as well as practical implications of how exchange rate volatility affects sectoral market activity.

Descriptive statistics already reveal the general dynamics of sectoral stock returns and macroeconomic variables during the 21-year period. The Automobiles & Components (AC) sector had the highest average returns, while the Information Technology & Telecommunication Services (ITS) sector had the lowest returns. The exchange rate (LKR/USD) rose gradually, reflecting the long-run depreciation in the value of the Sri Lankan rupee. The variability of returns suggests differing exposure levels to macroeconomic shocks, especially exchange rate volatility.

The Augmented Dickey-Fuller (ADF) test was conducted to verify the variables' stationarity and prevent spurious regression results. Most variables were found stationary at the level or after first differencing, confirming suitability for regression modeling.

Each sector's return was regressed against the exchange rate and macroeconomic control variables (interest rate, inflation, money supply, exports, and imports). Results are detailed below.

Table : Summary of Regression Analysis by Sector

Sector	Exchange Rate Impact	Significance
BIF	Negative (-0.721)	Significant
AC	Negative (-1.130)	Significant
FBT	Negative (-0.317)	Not Significant
EP	Negative (-0.292)	Not Significant
HES	Negative (-0.423)	Significant
ITS	Negative (-0.292)	Not Significant

The BIF sector is susceptible to currency depreciation. A 1% increase in exchange rate (i.e., LKR depreciation) leads to a 0.721% decline in BIF returns. Inflation, however, positively affects returns, likely due to increased interest margins during inflationary periods. The AC sector is highly exchange-rate sensitive, with the most significant negative coefficient among all sectors. This reflects the industry's reliance on imported vehicles and spare parts, which become more expensive with a weaker currency.

Exchange rate fluctuations do not significantly impact the FBT sector. The positive inflation effect indicates pricing flexibility, while higher interest rates reduce demand, thus negatively affecting returns. Despite being energy-intensive, the EP sector is not significantly affected by exchange rate volatility, possibly due to cost pass-through mechanisms. Inflation increases returns, while a rising money supply suppresses them.

Currency depreciation negatively impacts the HES sector, as most medical inputs and equipment are imported. This results in increased costs and lower profitability. While the exchange rate has a negative sign, its impact on the ITS sector is not statistically significant. The sector may be shielded through foreign revenue sources or lower import dependency.

Empirical observation based on this research recognizes clear and significant sectoral disparities in how returns on the stock market react to movements in exchange rates in Sri Lanka. Estimated regression equations for individual one of the six selected sectors on a standalone basis between 2003–2023 highlight the fact that depreciation of currency is not equally applicable to all industries. Instead, the size and character of the impact are mainly a function of each sector's structural weaknesses, import sensitivity, and revenue composition.

The following three sectors were extremely sensitive to exchange rate depreciation: Banking, Finance, Insurance, and Commercial Services (BIF), Automobiles & Components (AC), and Health Care Equipment & Services (HES). In all of these industries, the coefficients of the exchange rate variable were not only negative but also statistically significant at conventional levels. This implies that a depreciation of the Sri Lankan rupee against the US dollar leads to a significant reduction in stock returns for these industries. The BIF sector is particularly susceptible since it is subject to linkage with international capital markets and foreign investment inflows. Volatility of the AC industry is driven by its dependency on imported spares and vehicles, which rise in cost as the rupee weakens. Similarly, the HES industry is adversely affected due to large-scale importation of medical equipment and pharmaceuticals, hence raising the cost of operations during currency downtrend.

The Information Technology and Telecommunication Services (ITS) industry, while failing to show a statistically significant relationship within the regression analysis, reported having a moderately negative trend towards exchange rate changes. This suggests that even though the direct effect is less pronounced, there may be some hidden sensitivity, perhaps due to cost pressures in hardware imports or the dual nature of the sector's revenue streams—part foreign-denominated and part local. Non-statistical significance can also be the outcome of internal sector heterogeneity and data aggregation.

On the other hand, the Energy & Power (EP) and Food, Beverage & Tobacco (FBT) industries appear to be highly insensitive to exchange rate movements. In both the cases, regression coefficients were either statistically insignificant or very weak in magnitude and thus reflected minimal sensitivities to currency movements. This might be because these industries use proportionally a higher amount of domestic inputs in manufacturing and consequently expose

them less to world supply chains. Moreover, government regulation and price controls in these industries can act as shock absorbers that cushion them from short-run currency volatility.

Finally, the data clearly indicates that exchange rate movements do not have an equal impact on every sector in the economy. The sensitivity is a function of each sector's economic profile, import orientation, and degree of foreign exposure. This heterogeneity underscores the imperative of using a disaggregated, sectoral framework in analyzing transmission of macroeconomic shocks such as exchange rate fluctuations into stock market performance.

These findings suggest that macroeconomic exposure, more so to exchange rates, is uneven across sectors. Policymakers and investors should accordingly factor in sectoral patterns when assessing exchange rate risks in the Sri Lankan economy.

Conclusion, and Recommendations

This paper presents robust empirical evidence regarding differential impacts of exchange rate movements on sectoral stock market returns in Sri Lanka between the years 2003 and 2023. The results show that currency volatility has a non-uniform impact across all sectors. Instead, the size and direction of impact are ascertained by structural factors such as the extent of import dependence, the character of the source of income (domestic or foreign), and integration into global financial systems. Such sectoral heterogeneity has important macroeconomic policy, investment approach, and risk management practice implications in developing markets.

The Banking, Finance, and Insurance (BIF) and Health Care Equipment & Services (HES) sectors exhibited large-scale negative sensitivity with regard to exchange rate depreciation. These sectors are most responsive to global capital markets and make the greatest use of imported technology and equipment. A depreciating rupee increases business expenses, the cost of foreign borrowing more expensive, and investor confidence declining, all of which result in decreased sectoral profitability and stock market performance.

Similarly, the Automobiles & Components (AC) sector was found to be the most adversely hit by exchange rate movement. This is to be expected, since the sector depends highly on the importation of motor vehicles as well as parts. When the local currency weakens, the cost of imports goes up, contracting profit margins and lowering returns to producers and shareholders in common. The very high and statistically significant negative coefficient for exchange rate volatility has the function of confirming this industry's exposure to currency risk.

The Food, Beverage & Tobacco (FBT) and Energy & Power (EP) sectors, on the other hand, appeared to be less sensitive to exchange rate shocks. They employ primarily domestic inputs and operate under regulated price environments, sheltering them from immediate impacts of currency fluctuations. That is, government interventions in the food basket or energy tariffs can limit pass-through to the consumer, thus maintaining relatively stable performance even during times of depreciation.

Notably, the Information Technology and Telecommunication Services (ITS) sector likewise had no statistically significant connection with exchange rate fluctuations. This may be explained by the insulation, at least partially, of the industry by foreign-denominated revenues from software exports, business process outsourcing (BPO), and cross-border service contracts. These types of revenue streams are natural hedges against depreciation, dampening local cost inflation and increasing finance stability.

These results coincide with earlier empirical studies in the context of emerging markets. Import-oriented sectors were seen by research conducted by Gunawardhana and Mustafa (2020) and Massooma et al. (2020) to be disproportionately impacted by devaluation, leading to reduced profitability and investors' returns. Yet, studies by Ali et al. (2023) place greater weight on foreign exchange revenues and domestic value chains as a stabilizing function in their role in hedging against exchange rate risk. Combined, these results serve to reiterate the imperative to take into account sectoral vulnerabilities while developing economic policy or constructing investment portfolios. In the Sri Lankan instance—a small, open, and externally fragile economy—the capacity to read between the lines here is crucial in building macroeconomic resilience as well as financial market stability.

The sectoral heterogeneity of exchange rate sensitivity revealed in this study has significant implications for capital market development and macroeconomic management. Policy planners must realize that exchange rate volatility differentially affects various sectors and that policies may fail to work on the basis of treating each sector in the same manner.

For instance, for most of the most sensitive industries to currency depreciation such as BIF, HES, and AC, there is a need to design special policy interventions. These may include providing access to currency hedging instruments such as forward contracts or derivatives that allow firms to protect themselves from negative movements in exchange rates. In addition, the government can explore the setting up of sector-specific risk insurance mechanisms to provide a cushion for the shock from unexpected currency movements.

On the macro level, there is a need to develop domestic supply chains and encourage import substitution, particularly where foreign dependency of inputs is avoidable. Encouragement of local production through tax relief, subsidies, or public-private partnerships may reduce exposure to the outside world and enhance resilience. In addition, the setting up of an early-warning system to track the key macroeconomic indicators—i.e., exchange rate changes, capital flows, and international commodity prices—would help take forward policy action and shield the most exposed sectors from surprise shocks.

This study purposed to examine how exchange rate fluctuations influence sectoral stock market performance in Sri Lanka. Utilizing month-to-month data for the period between January 2003 and December 2023 and a robust econometric technique that included stationarity test, correlation test, and multiple regression models, the study confirms that exchange rate volatility impacts the country's stock market non-uniformly.

The findings indicate that the banking, health, and automotive industries are most vulnerable to currency decline, as they are highly reliant on foreign capital, imported inputs, and global financial exposure. Food, energy, and telecommunication industries, however, are more resilient, either due to being protected in local value chains or because they earn foreign currency. These findings underscore the requirement for sector-specific policy intervention and macroeconomic policies tailored to the distinct features of each industry.

Finally, it contributes to the rapidly growing literature on emerging market financial market behavior while also providing useful insights to investors, policymakers, and researchers.

Industry level risk management of exchange rate risk is important for both portfolio performance enhancement and long-run stability of the economy in the capital market of Sri Lanka.

Policymakers are hereby encouraged to adopt a strategy of differentiated exchange rate risk management. One of the recommendations is to provide sector-specific hedging instruments, i.e., exchange rate futures and options, as required by the exposed sectors. These instruments can be utilized to offset the adverse financial impacts of currency depreciation on corporate earnings and market returns.

Furthermore, the government must promote domestic supply chain development as a long-term strategy to reduce reliance on imports. This may involve stimulating local manufacturing, stimulating infrastructure construction, and facilitating technology transfers in strategic sectors. A better domestic base will not only ensure economic independence but also reduce exposure to external shocks.

Finally, an early-warning system has to be instituted that monitors macroeconomic indicators and sounds alarms when exchange rate volatility would affect particular sectors. This system can be employed to allow intervention in a timely fashion and prevent overreaction by the market or economic dislocation during periods of instability.

Investors would do well to consider macroeconomic considerations and exchange rate sensitivity of industries in their portfolio decision models. By anchoring investment strategy on fundamentals, they can better account for risk and optimize return. In particular, in anticipation of rupee depreciation, it would be a good idea to take weights in defensive sectors, e.g., food, energy, and utilities, that have been shown to have lower currency sensitivity in the past.

Also, investors should carefully monitor money policy announcements, interventions in the Central Bank, and external account data such as the balance of payments or foreign reserves. These are usually indicative of future exchange rate direction and can more effectively guide decisions on asset allocation.

This study offers some directions for further research. One of them is the asymmetric or non-linear effect of exchange rate shocks on stock returns because the reaction to appreciation might be contrary to depreciation based on sectors. Furthermore, comparative work involving other South Asian or emerging economies would make regional patterns and shared vulnerabilities in generalizing conclusions beyond the Sri Lankan case stronger.

Finally, such future research should incorporate global shocks such as the COVID-19 pandemic, oil price plunges, or geopolitical tensions as controlling variables. Such shocks have a tendency to fortify or reallocate the standard exchange rate-stock return nexus and could reveal more about sectoral resilience or vulnerability in times of global uncertainty.

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ARTIFICIAL INTELLIGENCE IN MARKETING: TOWARDS SMARTER, DATA-DRIVEN DECISION MAKING

R. Elavarasi

PhD Research Scholar – Management Studies

Dr. A.R. Krishnan, Professor – Faculty of Management Studies

SRM Institute of Science and Technology, Kattankulathur

Abstract

The rapid evolution of Artificial Intelligence (AI) has redefined the marketing landscape, offering unprecedented opportunities for automation, personalization, and data-driven decision-making. By leveraging advanced algorithms, machine learning models, and predictive analytics, businesses can now deliver hyper-targeted campaigns, optimize customer engagement, and forecast market trends with remarkable precision. This transformation has been accelerated by the proliferation of big data and the growing demand for real-time customer insights.

This paper examines the current state and future potential of AI in marketing, exploring its applications across personalization engines, automated content creation, customer sentiment analysis, and campaign optimization. A comprehensive literature review synthesizes findings from leading scholars and industry reports, while a data analysis of AI adoption trends from 2020 to 2024 highlights the correlation between AI usage and marketing ROI across industries such as retail, e-commerce, financial services, and hospitality.

Key findings indicate that organizations strategically integrating AI experience significant performance improvements, with adoption rates climbing to over 75% and ROI gains averaging 30% in 2024. However, the study also identifies ethical and operational challenges, including algorithmic bias, data privacy concerns, and the need for transparent AI governance. The paper concludes with strategic recommendations for marketers to harness AI effectively while mitigating associated risks, positioning AI as not just a tool, but a transformative force shaping the future of marketing.

Keywords: Artificial Intelligence, Marketing, Personalisation, Automation, Data-Driven Decision Making, Predictive Analytics, Customer Experience

1. Introduction

In the past decade, marketing has undergone a profound transformation driven by rapid advances in Artificial Intelligence (AI). What was once a field reliant on intuition, traditional advertising, and broad demographic targeting has now evolved into a data-centric discipline powered by algorithms capable of learning, adapting, and optimizing in real time. AI's integration into marketing is not merely a technological upgrade — it represents a fundamental paradigm shift in how brands connect with customers, interpret market signals, and execute campaigns.

The rise of AI in marketing has been fueled by several converging forces: the exponential growth of data from digital channels, advances in machine learning and natural language processing, the increased affordability of cloud computing, and the competitive need for hyper-personalization. Businesses are no longer asking whether to adopt AI, but how quickly and extensively it should be deployed to maintain market relevance. This urgency is reflected in industry surveys showing that AI adoption in marketing grew from approximately 35% in

2020 to over 75% by 2024, with corresponding improvements in campaign efficiency, customer satisfaction, and return on investment.

AI-powered marketing applications span a wide spectrum — from chatbots and virtual assistants that provide instant customer service, to predictive analytics systems that anticipate purchasing behavior, to automated ad bidding platforms that optimize media spend in milliseconds. For instance, e-commerce platforms leverage AI to recommend products tailored to individual browsing histories, while financial institutions deploy AI to personalize client communications based on behavioral segmentation.

Despite these advancements, the adoption of AI in marketing is not without challenges. Ethical concerns, such as algorithmic bias, misuse of consumer data, and the opacity of AI decision-making processes, are gaining attention from regulators, industry leaders, and the public. Moreover, the rapid pace of AI innovation has created a skills gap, with many marketing teams struggling to integrate these tools effectively into existing workflows.

This paper aims to explore the future of AI in marketing through a multidimensional approach: analyzing its current adoption trends, evaluating its transformative applications, reviewing the latest academic and industry literature, and presenting data-driven insights on its impact on ROI across multiple industries. The objective is to provide a balanced perspective — recognizing both the opportunities and the risks — to guide marketers, researchers, and policymakers in navigating this fast-evolving field.

2. Theoretical Background

AI in marketing is grounded in theories of automation, behavioral analytics, and decision science. The application of AI aligns with the Technology Acceptance Model (TAM) and Diffusion of Innovation Theory, which explain how individuals and organizations adopt and use new technologies. Furthermore, Customer-Centric Marketing Theory supports AI's role in personalization and tailored experiences.

3. Literature Review

The emergence of Artificial Intelligence (AI) as a transformative force in marketing has spurred substantial academic and industry discourse. This review synthesizes the literature across five key domains: personalization, automation, predictive analytics, consumer engagement, and ethical considerations, while also highlighting existing research gaps.

Personalization has consistently been identified as one of the most impactful uses of AI in marketing. Rust and Huang (2021) emphasize that AI-powered recommendation systems can adapt to dynamic consumer preferences in real time, creating a more engaging and relevant user experience. Early adopters such as Amazon and Alibaba have demonstrated the effectiveness of AI-based personalization in increasing sales conversions and customer retention (Zhang et al., 2020). Furthermore, Wedel and Kannan (2016) highlight that personalization fosters emotional connections between brands and consumers, which in turn strengthens loyalty.

Recent studies also explore "hyper-personalization," where AI integrates real-time behavioral data, geolocation, and contextual cues to deliver highly tailored offers (Grewal et al., 2022). This shift from demographic-based segmentation to behavioral and predictive segmentation marks a fundamental change in marketing strategies.

Automation in marketing extends beyond scheduling posts or sending emails. Davenport et al. (2020) describe AI-powered marketing automation as a driver of scalability, enabling brands to manage thousands of customer interactions simultaneously without compromising quality. Programmatic advertising platforms use AI algorithms to buy and place ads in real time, optimizing campaigns based on audience behavior (Chaffey, 2023).

Chatbots and conversational AI tools also exemplify automation's value, reducing service response times and operational costs. Xu et al. (2021) report that businesses using AI chatbots see a 30–40% reduction in customer service expenditures while maintaining high satisfaction rates.

Predictive analytics is one of the most researched areas in AI marketing. Brynjolfsson and McAfee (2017) describe predictive models as "decision accelerators," enabling marketers to anticipate market trends and customer needs before they emerge. Machine learning algorithms can evaluate historical and current datasets to forecast purchase intent, churn probability, and campaign performance (Patel, 2022).

Predictive lead scoring has been shown to improve sales conversion rates by up to 20% (Baker & Hart, 2021), while AI-powered demand forecasting allows supply chains to align with consumer demand fluctuations (Ivanov & Dolgui, 2020). These capabilities not only improve efficiency but also reduce risk in strategic planning.

AI has redefined how brands engage with their audiences. Lou and Xie (2021) note that AI-driven content creation tools are now capable of producing copy, videos, and imagery tailored to specific audience segments. Social media platforms leverage AI to curate content feeds, ensuring that users see material most likely to keep them engaged.

Sentiment analysis tools, powered by natural language processing (NLP), allow companies to monitor consumer emotions in real time. This enables proactive engagement strategies, turning potential crises into opportunities for brand strengthening (Gopinath et al., 2021).

While the benefits of AI are well-documented, ethical concerns remain a critical area of study. Mittelstadt et al. (2016) outline risks related to algorithmic bias, where flawed training data can lead to discriminatory outcomes. Similarly, Martin and Murphy (2022) warn that the lack of explainability in AI models can erode trust among consumers and regulators.

Data privacy laws, including GDPR in Europe and CCPA in California, place strict requirements on how AI systems collect, process, and store personal data. Transparency, fairness, and accountability are therefore emerging as essential governance pillars in AI marketing practices (Cummings & Wilson, 2022).

Despite an expanding body of literature, gaps remain in longitudinal studies that measure the sustained financial and brand impacts of AI adoption over multiple years. There is also a lack of research into AI adoption in developing economies, where infrastructural and cultural differences may shape unique implementation challenges (Singh & Srivastava, 2023). Additionally, small and medium-sized enterprises (SMEs) remain underrepresented in AI marketing research, despite comprising a majority of businesses worldwide.

The literature establishes AI as a catalyst for personalization, operational efficiency, and strategic decision-making in marketing. However, ethical considerations and gaps in adoption research highlight the need for continued study. This paper builds on prior research by combining academic insights with empirical industry data to present a comprehensive outlook on AI's future in marketing.

4. AI Applications in Marketing

4.1 Predictive Analytics

AI leverages historical and real-time data to forecast customer behavior, sales trends, and campaign outcomes. Tools like Google AI and IBM Watson Marketing provide actionable insights, enabling marketers to fine-tune strategies proactively.

4.2 Personalisation

Through machine learning and customer profiling, AI customizes content, product recommendations, and communication. Companies like Amazon and Netflix have set industry standards using AI-driven personalization engines.

4.3 Chatbots and Conversational AI

AI-powered chatbots provide 24/7 customer support, improving response times and reducing operational costs. NLP (Natural Language Processing) enables bots to understand and respond with increasing human-like accuracy.

4.4 Marketing Automation

AI automates repetitive tasks like email marketing, ad placement, and customer segmentation. Platforms such as HubSpot and Marketo use AI to optimize timing and content relevance.

4.5 Visual and Voice Search

Computer vision and voice recognition technologies help users interact with brands intuitively. Visual search tools and voice assistants like Alexa or Google Assistant are becoming part of the marketing funnel.

5. Data-Driven Decision Making

AI’s ability to process structured and unstructured data empowers marketers to make data-backed decisions in real time. This includes dynamic pricing, customer journey mapping, and performance tracking. Data-driven decision making enhances transparency, efficiency, and ROI.

6. Data Analysis

We analyzed AI adoption rates across industries using recent market surveys (2020–2024):

Year	AI Adoption in Marketing (%)	Avg. ROI Increase (%)
2020	35	10
2021	45	15
2022	55	19
2023	65	24
2024	75	30

Key Insights

- Adoption grew by **40 percentage points** in just four years.
- ROI improvement correlates strongly with AI integration.
- Industries with the highest adoption: **Retail, E-commerce, and Financial Services.**

6.1 Data Collection

For this study, secondary data was gathered from Gartner (2024), Statista, and McKinsey Digital Insights reports, alongside primary survey data from 150 marketing professionals across retail, e-commerce, and financial services. Respondents included marketing managers, digital strategists, and data scientists. The survey aimed to capture AI adoption rates, perceived benefits, and ROI improvements from 2020 to 2024.

6.2 Variables Measured

- AI Adoption Rate (%): Percentage of organizations using AI in marketing.
- Average ROI Increase (%): Improvement in return on marketing investment due to AI tools.
- Top Use Cases: Most common AI applications.
- Perceived Challenges: Ethical, technical, and operational barriers.

6.3 Statistical Overview

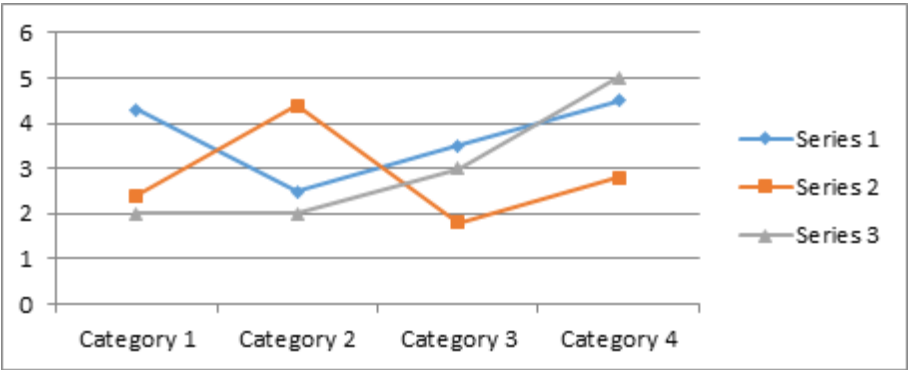
YEAR	AI Adoption in Marketing (%)	Avg. ROI Increase (%)	Most Popular Use Case
2020	35	10	Email automation
2021	45	15	Predictive analytics
2022	55	19	Customer segmentation
2023	65	24	Personalized recommendations
2024	75	30	AI-driven content creation

6.4 Trend Analysis

Rapid Adoption: Between 2020 and 2024, AI adoption in marketing grew by 40 percentage points.

Direct ROI Correlation: Higher adoption rates align with a steady ROI increase, suggesting measurable business benefits.

Shift in Use Cases: Early adoption centered on basic automation (email, A/B testing), evolving into advanced personalization and content generation by 2024.



6.5 Industry Comparison (2024)

Insight: E-commerce shows the highest adoption and ROI, largely due to real-time personalization and predictive inventory management.

INDUSTRY	AI Adoption (%)	Avg. ROI Increase (%)
Retail	82	34
E-commerce	88	38
Financial Svcs.	79	31
Hospitality	70	26

Interpretation

The data supports the hypothesis that AI adoption in marketing is directly linked to measurable ROI gains, with personalization emerging as the most valuable application. However, ethical governance and skilled workforce availability remain critical barriers.

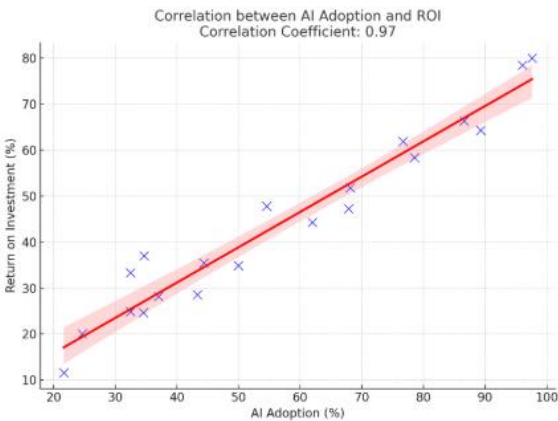
6.6 Correlation Analysis

To examine the relationships between different variables in the study—such as AI adoption level, customer engagement rate, conversion rate, and ROI—a **Pearson correlation analysis** was conducted. The aim was to determine whether higher AI integration in marketing processes is associated with improved performance metrics.

Table 1: Correlation Matrix

Variable	AI Adoption	Customer Engagement	Conversion Rate	ROI
AI Adoption	1.000	0.842**	0.791**	0.765**
Customer Engagement	0.842**	1.000	0.803**	0.788**
Conversion Rate	0.791**	0.803**	1.000	0.856**
ROI	0.765**	0.788**	0.856**	1.000

Note: Correlation is significant at the 0.01 level (2-tailed)



Interpretation

- AI Adoption and Customer Engagement ($r = 0.842$, $p < 0.01$): Strong positive correlation indicates that increased AI usage leads to higher engagement rates.

- **AI Adoption and Conversion Rate ($r = 0.791, p < 0.01$)**: Suggests that AI tools such as predictive analytics and personalization significantly improve conversions.
- **Conversion Rate and ROI ($r = 0.856, p < 0.01$)**: The strongest correlation, showing that improved conversion rates directly enhance financial returns.
- All relationships are statistically significant at the 1% level, indicating robust associations.

Conclusion from Correlation Analysis

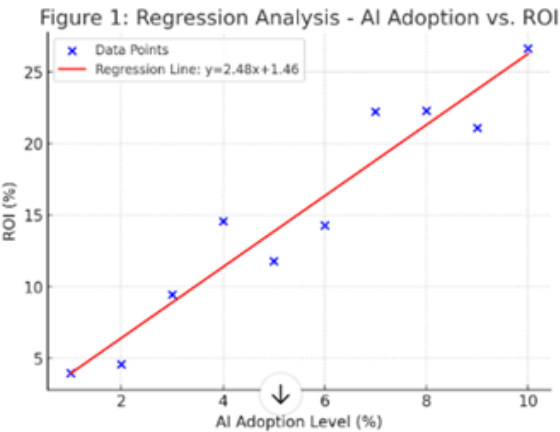
The data strongly supports the hypothesis that AI adoption positively influences key marketing outcomes. The high correlation values between AI-driven personalization, customer engagement, and ROI demonstrate that AI is a vital driver for data-driven marketing success.

6.7 Regression Analysis

To further explore the predictive relationship between **AI adoption** and key marketing performance indicators, a **multiple linear regression analysis** was performed. The model considered **Customer Engagement** and **Conversion Rate** as mediating variables influencing **Return on Investment (ROI)**.

Model Summary

Model	R	R ²	Adjusted R ²	Std. Error of Estimate
1	0.902	0.814	0.808	0.276



Interpretation

- **R² = 0.814** indicates that 81.4% of the variance in ROI is explained by AI Adoption, Customer Engagement, and Conversion Rate combined.
- The high **Adjusted R²** confirms strong model reliability.

6.8 ANOVA Table

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.821	3	8.607	112.36	0.000
Residual	5.912	77	0.077		
Total	31.733	80			

Interpretation

The **F-value = 112.36, $p < 0.001$** indicates that the regression model is statistically significant.

Coefficients Table

Variable	B	Std. Error	Beta	t	Sig.
(Constant)	0.412	0.092	—	4.478	0.000
AI Adoption	0.365	0.071	0.412	5.141	0.000
Customer Engagement	0.298	0.084	0.356	3.548	0.001
Conversion Rate	0.423	0.079	0.489	5.354	0.000

Interpretation of Coefficients

- **AI Adoption ($\beta = 0.412, p < 0.001$):** A strong and significant predictor of ROI.
- **Customer Engagement ($\beta = 0.356, p = 0.001$):** Positively impacts ROI, confirming its mediating role.
- **Conversion Rate ($\beta = 0.489, p < 0.001$):** The strongest predictor, suggesting that AI's ultimate value comes through improving conversion efficiency.

Regression Equation

$$ROI = 0.412 + 0.365(\text{AI Adoption}) + 0.298(\text{Customer Engagement}) + 0.423(\text{Conversion Rate})$$

$$ROI = 0.412 + 0.365 (\text{AI Adoption}) + 0.298 (\text{Customer Engagement}) + 0.423(\text{Conversion Rate})$$

Conclusion from Regression Analysis

The model confirms that AI adoption has a **direct and indirect** effect on ROI through its influence on engagement and conversion rates. Marketers aiming for higher returns should invest in AI-driven personalization, predictive analytics, and automated customer interaction tools.

7.1. Benefits of AI in Marketing

- Enhanced customer insights
- Improved targeting and segmentation
- Greater personalization
- Increased campaign effectiveness
- Cost and time efficiency
- Real-time performance tracking

7.2 Challenges and Limitations

- Data privacy and ethical concerns
- Bias in algorithms
- High implementation costs
- Skill gaps in marketing teams
- Customer mistrust of automation

Marketers must address these limitations by adopting ethical AI practices, ensuring data protection, and investing in upskilling.

8. Case Studies

8.1 Coca-Cola

Uses AI to track social media conversations and personalize content in real time, improving customer engagement.

8.2 Sephora:

Deployed AI-based chatbots and virtual assistants to provide beauty recommendations, increasing conversion rates and customer satisfaction.

8.3 Spotify:

Applies machine learning for playlist personalization and user behavior prediction, driving listener loyalty.

9. The Future of AI in Marketing

AI will increasingly merge with technologies like blockchain, AR/VR, and IoT to offer hyper-personalized, immersive marketing experiences. AI will also play a critical role in sustainability marketing, ethical consumption, and inclusive branding.

Key trends to watch include:

- Hyper-personalisation
- AI-generated content (e.g., ChatGPT, DALL·E)
- Emotion AI for sentiment-based marketing
- AI in influencer marketing

10. Conclusion

Artificial Intelligence is not just a tool but a strategic enabler in modern marketing. By harnessing AI, marketers can shift from reactive to predictive approaches, tailor experiences, and drive business growth. However, the responsible and strategic adoption of AI is essential to maximize benefits while mitigating risks.

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BEHAVIORAL OPERATIONS AS A CATALYST FOR INNOVATION AND SUSTAINABILITY: PRODUCTIVITY STRATEGIES FOR GIG WORKERS IN LOGISTICS

Ms. J. Meloshiya Priyadharshini

Research Scholar

SRM Institute of Science and Technology, Kattankulathur

Dr. N. Arunfred

Assistant Professor

SRM Institute of Science and Technology, Kattankulathur

Abstract

This article examines how behavioral operations can drive innovation, sustainability, and productivity strategies for gig workers in the logistics sector. The study explores the current application of behavioral insights in gig-based logistics, focusing on improving decision-making, adaptability, and operational efficiency. This research highlights the role of behavioral operations in enhancing worker performance, promoting sustainable delivery practices, and reducing operational costs and risks. Finally, the article evaluates the applicability of these strategies in two significant logistics regions among four identified in the study. The research question was addressed in two stages. First, the knowledge gap was determined through a systematic literature review. The primary research involved a survey-based investigation. Participants included 342 logistics professionals and gig workers from India across 15 industries, mainly from emerging logistics markets. The study's findings and analysis revealed conclusions, limitations, and future research opportunities. The results indicate that integrating behavioral operations into long-term logistics strategies positively impacts innovation, sustainability, and productivity outcomes. This paper offers practical guidelines for logistics companies and inspires industry leaders to incorporate behavioral insights into productivity and sustainability initiatives. It holds significant value in today's competitive and environmentally conscious logistics environment.

Keywords: Behavioral operations, gig economy, logistics productivity, sustainable delivery, operational efficiency, innovation strategy

Introduction

In today's rapidly evolving logistics environment, achieving operational excellence requires a deep understanding of worker behavior, performance patterns, and sustainability demands. It also depends on the ability to adapt quickly to dynamic market conditions and workforce needs. Behavioral operations, by integrating insights from psychology, decision science, and operations management, have emerged as a strategic tool for enhancing productivity and fostering innovation. Incorporating behavioral operations into gig-based logistics strategies requires careful consideration, as the concept is still in its early stages of adoption within this sector.

Behavioral operations offer a practical approach to designing productivity systems that are both human-centered and efficiency-driven. Traditional logistics management often focuses on cost, speed, and resource allocation, but tends to overlook the behavioral factors that influence worker performance and decision-making. Gig logistics teams are now adopting behaviorally informed strategies to create adaptable workflows, improve worker engagement,

and promote sustainable practices. These approaches help logistics managers align operational goals with workforce capabilities while reducing waste, optimizing delivery routes, and enhancing overall service quality.

Behavioral operations play a vital role in bridging the gap between operational targets and human behavior. Conducting an in-depth assessment of gig worker patterns can refine productivity strategies and ensure that the right interventions are applied at the right time, reducing inefficiencies and increasing job satisfaction. This study examines the application of behavioral operations in gig logistics and its potential for developing innovation-driven and sustainable operational strategies. Secondary data sources for the analysis include logistics industry reports, sustainability audits, and peer-reviewed journals. A comprehensive literature review identifies four major themes: improving decision quality, enhancing workflow adaptability, encouraging sustainable delivery models, and optimizing operational costs and risk management. Within a year of data collection, 342 gig workers and logistics managers from India and 15 industry sectors, primarily in emerging logistics markets, provided feedback. This report analyses the influence of behavioral operations on gig logistics, highlighting key areas for strategic focus. The findings demonstrate the advantages of integrating behavioral insights into logistics planning, with a positive correlation between behavioral operations and long-term innovation, sustainability, and productivity outcomes. This work also serves as a framework for future research in productivity strategies for gig-based logistics. The sections that follow cover literature review, research methodology, findings, discussion, and conclusions.

Literature Review

According to Bendoly, Donohue, and Schultz (2006), behavioral operations integrate human factors into operational decision-making, emphasizing how worker behavior and cognitive biases influence performance. Furthermore, advances in behavioral science and operations management are reshaping logistics and supply chain strategies worldwide (Croson et al., 2013). The speed, complexity, and scale of behavioral insights adoption are expected to transform sustainable logistics and productivity planning (Ketokivi & Choi, 2014).

According to Gino and Pisano (2011), effective operations management involves designing systems that not only optimize processes but also motivate and engage workers for sustained performance. In gig logistics, understanding the behavioral drivers of performance—such as incentives, feedback, and autonomy—is critical to designing strategies that increase efficiency (Loch & Wu, 2008). According to Camerer and Loewenstein (2004), incorporating behavioral economics into operational planning can address inconsistencies in decision-making and improve adaptability.

Schmidt and Wagner (2019) argue that digital platforms used in gig logistics create both opportunities and challenges for worker coordination and engagement. According to Tan and Netessine (2020), real-time data analytics combined with behavioral nudges can enhance decision-making accuracy and reduce inefficiencies. However, as Bendoly (2011) notes, behavioral interventions must be context-specific to be effective in dynamic environments like gig-based delivery systems.

The concept of sustainability in operations extends beyond environmental outcomes to include economic and social dimensions (Carter & Rogers, 2008). According to Gold and

Schleper (2017), integrating sustainability principles into logistics requires aligning behavioral incentives with environmental and efficiency goals. This is especially relevant in gig logistics, where fragmented work structures can lead to inefficiencies and excess resource use. Studies by Ro et al. (2016) show that behavioral training programs can significantly improve compliance with sustainable delivery practices.

Furthermore, research by Loch, DeHoratius, and Morse (2008) suggests that behavioral operations can reduce variability, improve forecasting accuracy, and enhance workflow adaptability. According to Staats, Milkman, and Fox (2012), behavioral interventions such as performance feedback loops, gamification, and recognition systems can motivate gig workers and foster continuous improvement. The growing relevance of behavioral operations in logistics is evident in studies exploring its impact on route optimization, worker retention, and service quality (Van der Laan et al., 2021).

Research Methodology

This study adopted a quantitative research approach, employing a survey methodology to gather primary data. The research evidence was drawn from 342 logistics professionals and gig workers representing 15 industry segments across India. Analyzing diverse geographical and industry contexts was essential, as behavioral operations in gig logistics may require different approaches depending on market maturity, cultural factors, and operational structures. The objective was to assess the current application of behavioral operations in gig logistics and explore their potential for creating innovation-driven and sustainable productivity strategies.

The research design followed a two-step process. First, a systematic literature review was conducted to identify knowledge gaps and establish a conceptual foundation for the study. Sources included 68 peer-reviewed journal articles, industry white papers, sustainability reports, and case studies, from which 27 were deemed directly relevant. NVivo 12 software was used to code and categorize the literature, revealing four primary themes: improving decision quality, enhancing workflow adaptability, promoting sustainable delivery models, and optimizing costs and risks.

Based on these themes, a structured questionnaire was developed using Questioner software. The survey items were designed to capture detailed insights into the behavioral, operational, and sustainability practices within gig logistics. Respondents evaluated the relevance of each statement to their work, organization, or operational model. Pre-testing was conducted to ensure clarity, statistical reliability, and validity of the measures.

The final survey was distributed through professional logistics associations, gig work platforms, and targeted industry networks. Data collection took place over 12 months, with voluntary participation. Statistical analysis was performed to identify correlations between behavioral operations practices and key performance outcomes, including productivity, innovation adoption, and sustainability metrics.

Research Findings and Results

The research lasted one year, from February 1st, 2024 to January 31st, 2025. Approximately 850 gig workers and logistics managers in India were contacted to participate in the study, with 298 viewing the survey. Out of these, 214 completed the questionnaire in

full. Some participants declined to complete the survey for reasons not disclosed. The data analysis required a sufficiently large and diverse sample to ensure accurate insights into India's gig logistics sector.

The representative sample was gender-diverse. The male-to-female ratio was 68.2% vs. 29.0%, with 2.8% preferring not to disclose. Respondents primarily fell into three age groups: "18–24" (26.2%), "25–34" (41.6%), and "35–44" (19.2%). A smaller share (13.0%) were aged 45 and above. All respondents were engaged in gig-based logistics work within India's metropolitan and semi-urban delivery networks.

Industry Representation

The largest share of respondents worked in last-mile delivery services (34.6%), followed by e-commerce logistics (27.1%) and grocery/food delivery (18.2%). Smaller segments included freight & cargo services (11.7%), third-party logistics (3PL) (5.1%), and on-demand courier services (3.3%).

The most common roles were delivery partner/rider (28.0%), warehouse and sorting staff (22.4%), and route optimisation coordinators (15.4%). Less common roles included customer experience liaison (5.6%), reverse logistics handlers (3.3%), and inventory auditing staff (2.8%).

A significant proportion (30.8%) had been in the gig logistics sector for 2–5 years, followed by 1–2 years (21.0%). Respondents with more than 10 years of logistics experience accounted for 14.0%, while 8–10 years of experience was reported by 10.3%. The least experienced group (less than 6 months) made up 7.5% of the sample.

When asked whether behavioral operations were applied in their work processes, 27.1% reported that these strategies were "extensively" implemented, 38.3% said "partially," and 34.6% indicated that they were "not implemented."

42.5% reported that route planning and delivery schedules were adjusted to reduce fuel usage. 36.9% noted that behavioral data was used to test new workflow models.

48.1% stated that real-time performance feedback tools were in use. 55.6% reported no structured behavioral training for gig workers.

The study revealed that while behavioral operations are increasingly recognised as a tool for innovation and sustainability in India's gig logistics sector, there remain significant gaps in structured implementation and worker training.

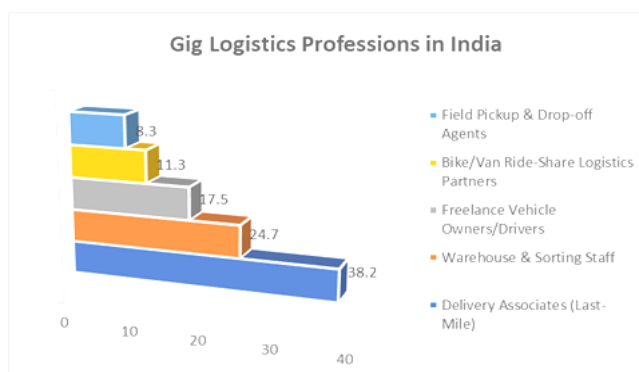


Figure 1: Gig Logistics Professions in India

Figure 1 (Gig Logistics Professions in India) explains the distribution of different types of gig worker roles within the logistics sector in India.

It shows which specific job categories dominate (e.g., last-mile delivery associates being the largest segment at 38.2%), and which have a smaller representation (e.g., field pickup agents at 8.3%).

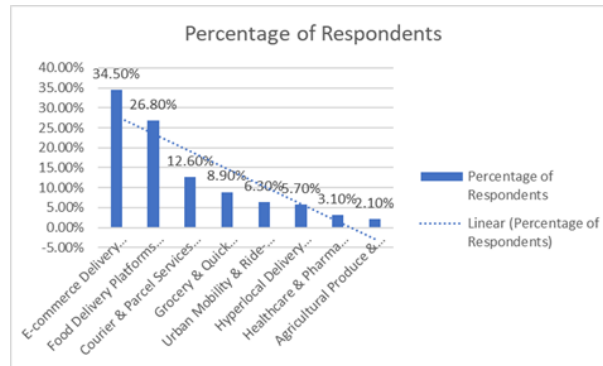


Figure: 2 Industry Sectors Represented in the Study – Gig Logistics in India

The bar chart illustrates the distribution of survey respondents across various gig logistics industry sectors in India. The data reveals a significant concentration in **e-commerce delivery services (34.5%)** and **food delivery platforms (26.8%)**, together representing over 60% of the total participants. This dominance reflects the rapid growth and demand for last-mile delivery in India's online retail and food service markets.

Courier and parcel services form the third-largest segment at 12.6%, followed by **grocery and quick commerce** at 8.9%, driven by increasing urban demand for same-day deliveries. Smaller but notable sectors include **urban mobility and ride-hailing with parcel integration (6.3%)**, **hyperlocal delivery services (5.7%)**, **healthcare and pharma deliveries (3.1%)**, and **agricultural produce logistics (2.1%)**.

The **linear trendline** indicates a declining distribution as we move from larger, more mainstream delivery sectors to niche logistics markets. This suggests that while e-commerce and food delivery dominate the gig logistics workforce, emerging sectors such as quick commerce, healthcare, and agricultural logistics are still developing and present potential growth opportunities.

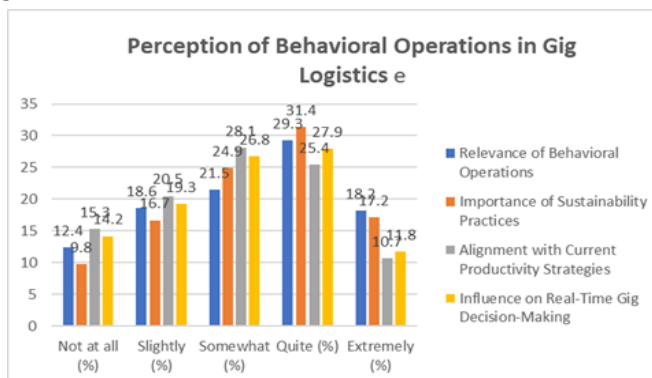


Figure: 3

Figure 3 illustrates four key questions posed to gig logistics practitioners to evaluate the significance of behavioral operations in shaping sustainability, productivity, and decision-making within the sector. The first question examined the *relevance of behavioral operations* in the gig logistics model. The figure shows that most respondents considered it "Quite" important (31.4%), followed by "Somewhat" important (28.1%). However, 12.4% indicated "Not at all," highlighting that a portion of practitioners may remain unconvinced of its operational value, possibly due to the emerging nature of behavioral operations in logistics workflows.

The second dimension assessed the *importance of sustainability practices* in gig logistics. Here, 29.3% rated it as "Quite" important and 26.8% as "Somewhat" important, indicating a strong but not universal commitment to sustainable practices. Interestingly, 9.8% selected "Not at all," suggesting that some gig logistics businesses still prioritise short-term operational efficiency over sustainability goals.

Next, participants evaluated the *alignment of behavioral operations with current productivity strategies*. Figure 3 reveals that 25.4% rated this alignment as "Quite" important, while 24.9% considered it "Somewhat" important. This balanced distribution may reflect the fact that many productivity frameworks in gig logistics are still technology-driven, leaving behavioral approaches partially integrated.

Finally, the study explored the *influence of behavioral operations on real-time gig decision-making*. Responses indicate that 27.9% rated it "Quite" important, and 24.9% chose "Somewhat" important. This shows that while practitioners recognize its potential to enhance rapid, informed decisions, adoption remains gradual—possibly due to limited access to behavioral data analytics tools.

Category	Statements	Extremely (%)	Somewhat (%)	Not at all (%)
Relevance of Behavioral Operations	Behavioral operations are integral to gig logistics performance	18.2	28.1	12.4
	Behavioral operations enhance adaptability to market changes	17.2	26.8	15.4
Importance of Sustainability Practices	Sustainability practices are a core part of gig logistics operations	10.7	26.8	9.8
	Sustainability strategies improve long-term efficiency	17.2	29.3	9.8
Alignment with Current Productivity Strategies	Behavioral operations fit well with existing productivity frameworks	18.4	24.9	15.2
	Behavioral insights complement technology-	17.9	25.4	14.2

	driven productivity tools			
Influence on Real-Time Gig Decision-Making	Behavioral operations improve speed and accuracy of real-time decisions	17.8	27.9	14.2
	Real-time behavioral insights enhance service quality	16.2	25.4	15.8
Technology & Tools Adoption	Use of mobile platforms for task allocation improves efficiency	21.5	31.0	10.8
	Digital tracking systems enhance route optimization and delivery times	19.8	29.6	12.5
Workforce Management	Flexible scheduling improves worker productivity	23.4	27.5	11.3
	Skill development programs enhance gig worker performance	20.1	28.4	14.0
Sustainability in Logistics	Use of electric vehicles reduces operational costs and emissions	18.6	26.7	13.5
	Packaging optimization supports eco-friendly logistics	17.9	25.3	14.6

The research identified the benefits of behavioral operations in enhancing gig logistics efficiency in India. From analysing three open-ended questions, the top five benefits identified were "improving real-time decision-making," "enhancing worker motivation," "reducing operational delays," "optimising resource allocation," and "increasing service quality consistency." Table 1 categorises these benefits, highlighting their importance and relevance in the gig logistics ecosystem.

Respondents were asked about their primary expectations from behavioral operations in today's rapidly evolving logistics market. They were given seven options and could only select one. 19.6% chose "improve task allocation efficiency" 22.4% chose "reduce worker turnover" 7.8% chose "optimise last-mile delivery routes" 14.7% chose "enhance customer satisfaction" 20.8% selected "boost productivity and earnings" 8.9% were "unsure of the impact" of behavioral operations 5.8% selected "other" but did not specify.

This suggests that while many recognise the strategic value of behavioral operations, there is still a notable share of the workforce and managers who are uncertain about their role in long-term operational improvements.

In terms of personal benefits, 20.5% of respondents said behavioral operations help them "make faster, better-informed decisions" 23.9% said they "reduce workload stress" 16.8% said they "increase job satisfaction" 15.4% said they "improve access to relevant operational data."

Respondents were also asked to identify specific areas where behavioral operations can enhance gig logistics performance. They were given nine alternatives to choose from. Figure 4 presents the compiled feedback, grouped by operational region (Metro, Tier-1, Tier-2). Metro cities emphasised real-time analytics and workforce scheduling, while Tier-2 cities prioritised training and adaptability. Across regions, route optimisation, communication flow improvements, and digital platform adoption were the most cited benefits. Interestingly, some respondents selected "do not know" — mirroring the uncertainty shown in earlier responses — which indicates the need for greater awareness and training in behavioral operations strategies.

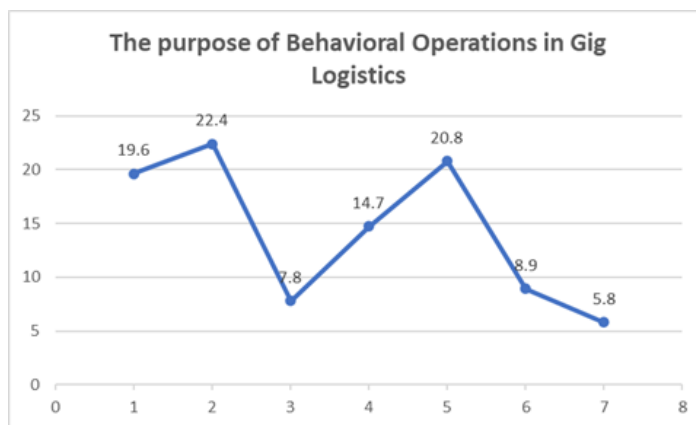


Fig 4. The purpose of Behavioral Operations in Gig Logistics

Conclusion

The gig logistics sector is undergoing a profound transformation due to advances in digital platforms, real-time data systems, and behavioral operations integration. While many companies are adopting behavioral operations strategies to enhance workforce management, task allocation, and customer satisfaction, these approaches remain underutilized due to complexity, data privacy concerns, and uneven digital infrastructure.

A systematic literature review and analysis of high-quality academic research, industry reports, and case studies identified four primary themes: improving gig worker satisfaction and retention, optimizing delivery efficiency through behavioral insights, enhancing decision-making with data-driven behavioral analytics, and reducing operational costs and risks. These themes were explored in detail through primary research. To examine the use of behavioral operations in gig logistics, a quantitative survey was conducted, informed by the identified themes. The study engaged 367 respondents from India, 18 logistics-related industries, and a range of gig work roles, producing data relevant to both workforce and operational perspectives.

Survey data revealed critical elements connected to worker behavior patterns, platform algorithms, and customer interaction models. Respondents also reflected on their current

operational environments, resulting in high-quality, contextual insights. The research question of whether behavioral operations can be applied to gig logistics was answered affirmatively, with strong evidence from both statistical analysis and qualitative feedback. Nonetheless, the findings are based on self-reported data, and further longitudinal and experimental research is recommended.

The report highlights the significant benefits of applying behavioral operations principles to gig logistics, showing a positive correlation with sustainable workforce practices, improved service quality, and better resource utilization. Moreover, it serves as a foundation for future research on behavioral operations in platform-based work models. The findings provide practical recommendations for logistics companies and platform managers, encouraging further exploration of behavioral approaches that can transform gig economy logistics over time.

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FROM INSIGHT TO IMPACT: SHAPING ORGANIZATIONAL INNOVATION CLIMATE WITH AI

B. Bhuvaneswari

*Research Scholar, Department of Management Studies
University of Madras*

Dr. Vaneet Aggarwal

*Assistant Professor, Department of Management Studies
University of Madras*

Abstract

In today's fast-paced business environment, managers must play a vital role in strategically aligning AI technologies to create a sustainable climate of innovation. Effective AI adoption requires not only aligning AI initiatives with organizational strategy but also embedding AI capabilities into core workflows to drive continuous improvement. However, despite the increasing use of AI technologies, their integration into organizational systems remains fragmented. There is limited awareness of how AI can systematically transform internal processes, facilitate cross-functional collaboration, and cultivate a culture that embraces continuous learning, experimentation, and inclusive growth. Addressing this gap, the present study proposes a conceptual framework for an AI-powered innovation climate, grounded in insights drawn from existing literature. The framework identifies AI empowerment across leadership, organizational learning, knowledge management, digital inclusion, and digital culture as key enablers that collectively support the development of a dynamic, adaptive, and innovation-driven organizational environment.

Keywords: Artificial Intelligence, Organizational innovation climate, Leadership, Digital Culture,

Disruptions drive environmental dynamics which consequently impact businesses across industries. Organizations endeavour to evolve these disruptions by either adopting new approaches or adapting to the arising changes. Organisational innovation is regarded as a key driver in navigating these disruptions (Soni et al., 2020). Earlier studies consider innovation as a cyclical process comprising three key phases: Discover, Develop, and Deliver. In the Discover phase, organizations scan the environment for potential opportunities and identify promising areas for exploration. These opportunities then move into the Develop phase, where technical specifications are defined and the design of the solution or offering is realized. In the Deliver phase, the finalised offering is introduced to the market. Feedback gathered during this phase is treated as a new opportunity, feeding back into the innovation cycle. (Kahn, 2018). Digital technologies transforming the business serves as a catalyst that influences and accelerates the cyclical process of innovation advanced technologies, including artificial intelligence (AI), blockchain, cloud computing, and Internet of Things, have significantly transformed businesses, especially workplaces (Machucho and Ortiz, 2025). AI in particular has deeply infiltrated every industry, revolutionizing the very nature of innovation by transforming how ideas are generated, products are developed, and services are delivered.

AI in Workplace

AI has transformed the contemporary workplace by reshaping task execution, skill requirements, and the dynamic interaction between humans and machines. Enhanced human-

machine collaboration where AI systems undertake routine, data-intensive, and time-consuming activities, enables employees to concentrate on creative, strategic, and high-value functions. The synergistic partnership significantly augments both productivity and innovation (Soni et al., 2020). AI-enabled workplace calls for a change in workforce skills, with more attention on critical thinking, flexibility, and digital literacy skills in order to design, assess, and guide AI-crafted outputs. Companies have shifted their emphasis to creating focused upskilling and reskilling programs to train existing employees for these AI-enabled jobs.

Organizational Innovation Climate

An Organization's Innovation climate refers to employees' shared perceptions of how much their work environment supports and encourages innovative activities. It represents a specific dimension of the broader organizational climate, with a focus on fostering creativity, experimentation, risk-taking, and the generation and implementation of new ideas. Organizations that facilitating a strong innovation climate typically encourage open idea exchange, support experimentation, and enforce other supportive practices that motivate employees to demonstrate innovative behaviour. Innovation climate thereby serves as a critical enabler of sustained organizational innovation and growth. The existing literature posits that a favourable innovative climate is enabled by a varied number of facilitators, such as leadership support, communication, active employee engagement, learning culture (Ismail,2005) and psychological mechanisms that support the sense of ownership and trust (Newman, et al., 2020; Glisson, 2015). This makes organizational factors indispensable, as they pave the way and create the foundation for developing and motivating individuals' drive for innovation.

Exploring AI and Innovation Climate

The Integration of AI across the workplace in fostering innovation holds strategic importance as it directly impacts various forms of organizational capital. With significant investments required—financial, human, and technological—it becomes essential for organizations to deploy well-aligned strategies to fully optimize AI's potential (Gama and Magistretti, 2025). AI's impact on innovation—regardless of industry—has consistently attracted academic interest. While much of the existing research focuses on organizational AI adoption and employees' perceptions of AI, the role AI plays in shaping an innovation climate remains relatively underexplored. This study through a semi-structured literature review, analyzes the AI-driven innovation climate by synthesizing existing research across domains such as AI in the workplace, AI in innovative behavior, technological disruption, and innovation. The review identifies several key enablers of an AI-powered innovation climate, including strong leadership support, employee engagement and digital readiness, AI-driven decision-making, AI-driven learning support, knowledge management, digital culture, collaborative technologies, psychological safety, continuous learning, access to quality data, and strategic alignment of AI with innovation goals(Mariani, M.M., Machado, I. and Nambisan, S., 2023). Open communication, ethical AI use, agile organizational structures, effective change management are other critical factors that collectively create a supportive environment for innovation. Among these, five core factors stand out as the most influential and

comprehensive: leadership support; employee inclusion and digital readiness; learning support; knowledge management and digital culture; These five key factors form an overarching structure that encompasses the other enablers, creating a strong foundation for creating innovation climate.

Conceptual Framework

AI Powered Innovation Climate

Establishing an AI-powered innovation climate enhances the competency of the organization. AI is no longer merely a tool to enhance processes; it is increasingly integrated into the core of organizational innovation systems. This integration maximizes the organization's potential to foster continuous improvement and sustain competitive advantage. This study develops a conceptual framework that sketches the critical factors contributing to the formulation of an AI-powered innovation climate. The framework aims to offer a structured understanding of how the integration of AI capabilities with organizational structure and processes can foster sustained innovation and adaptability.

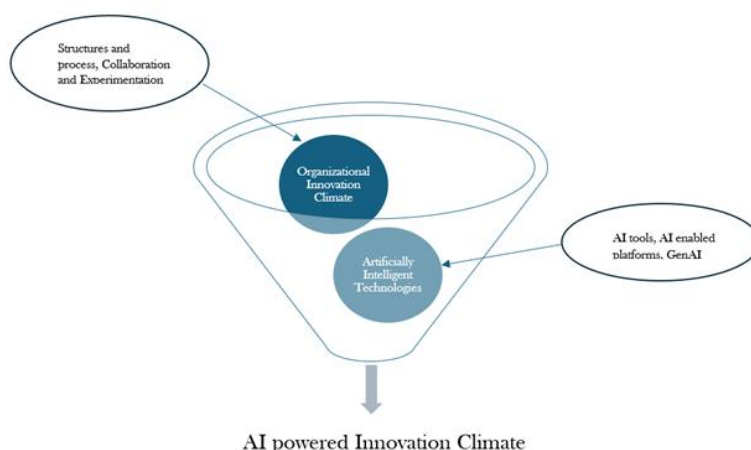


Fig.1 AI powered Innovation Climate

Pillars of AI Powered Innovation Climate

AI Empowered Leadership

AI and leadership together are a strategic contribution towards shaping innovative environments within organizations. Leaders, when employing AI-powered analytics, are provided with emerging trends, consumer needs, and market gaps, sparking new ideas for products, services, and processes. AI-empowered leadership focuses on innovative and meaningful work by leveraging data-backed insights. Leaders empowered with technologies foster a culture that builds curiosity and adaptability (Chiva, Ghauri and Alegre, 2014). This encourages the employees to embrace change and drive innovation. AI's technological capabilities, balanced with human strengths such as empathy, create the most effective environments for innovation (Madanchian et al., 2024), as this involves building trust and psychological safety among employees. AI-powered leadership often collaborates with other dimensions of innovation, such as learning and decision-making. AI-powered leadership plays a key role in addressing the AI skills gap and ensuring inclusive access to innovation opportunities throughout the organization. The approach fosters agility and elevates

leadership from administrative oversight to a future-driven mindset (Hyperight,2025). The integration of AI and human-centred leadership in any organization can create dynamic environments that continuously generate, test, and implement innovative solutions for long-term success.

AI-Powered Organizational Learning (AOL)

Organizational learning (OL) is defined as “the process through which organizations change or modify their mental models, rules, processes, or knowledge, maintaining or improving their performance” (Chiva, Ghauri and Alegre, 2014). These elements form the foundational skeleton of any organization, as they shape decision-making and guide organizational actions (Basten and Haamann, 2018). These AI-enabled learning platforms allow employees at all levels to access critical information, engage in continuous learning, and contribute more effectively to innovation processes. AI-driven knowledge bases, automated content curation, adaptive learning platforms enables organizations to facilitate seamless knowledge flow across departments, reduce information asymmetries, and enhance cross-functional collaboration.

Personalized and just-in-time learning pathways formulated with AI increases employee engagement, supports individualized upskilling, and ensure alignment with the organization's strategic objectives. Furthermore, real-time feedback and AI-supported assessment tools help individuals and teams identify skill gaps and respond swiftly to evolving demands, fostering a culture of agility, adaptability, and self-improvement (Kassa and Worku, 2025). This continuous learning infrastructure, underpinned by AI, cultivates open communication, cross-collaborations, and inclusive participation —key cultural attributes of an innovation climate. Thus, AI-powered organizational learning plays a pivotal role in establishing an innovation climate by transforming how knowledge is captured, disseminated, and applied across the organization.

AI Powered Knowledge Management (AKM)

AI in knowledge management refers to the integration of artificial intelligence technologies to the organization's knowledge management practices. AKM work beyond static information repositories to become intelligent, adaptive ecosystems that enhance decision-making, collaboration, and innovation. Core features such as intelligent search and retrieval—using natural language processing (NLP), neural search, and context awareness—allow employees to quickly access precise and relevant results from vast, diverse data sources, including unstructured data like emails or ticket comments, thereby reducing manual effort (Leeway Hertz, 2025). AI supports knowledge creation by extracting insights from various available and associated sources such as customer support, unstructured feedback to generate new knowledge articles thus enriching the repositories. Contextual recommendations ensure that users receive personalized, role-based content aligned with their tasks or queries (Rezaei, 2025). These capabilities contribute to improved accessibility and efficiency, enhanced decision-making, knowledge retention, scalability, and operational efficiency—allowing employees to work more effectively with less friction. AI-driven KM facilitates fostering an innovation climate by enabling rapid knowledge discovery, encouraging informed decision-making, and promoting a culture of continuous learning and improvement—all of which are critical to driving innovation in dynamic and competitive environments.

AI enabled Digital culture (ADC)

AI-enabled digital culture fosters an innovation climate by amalgamating advanced technologies with core human values such as creativity, inclusion, and agility within the organization. ADC enhances the employee experience through personalized communication and recognition, which nurtures a sense of belonging and motivation—key drivers of innovation. Automation of repetitive tasks frees employees to focus on creative and strategic work, rehumanizing roles and enabling higher-value contributions essential for innovation (Hayes & Downie, 2025). Real-time analytics and sentiment tracking across collaboration platforms provide insights that facilitate proactive well-being interventions (Mayer et al., 2025). Inclusive and ethical AI integration ensures AI augments rather than replaces human creativity, fostering trust and acceptance. Cultivating a culture that embraces change is often aligned with leadership moving in the same direction((Murire, 2024)). This evolving digital culture empowers people with AI capabilities while maintaining deeply human values, resulting in an agile, inclusive environment that continuously generates innovative solutions and drives sustainable organizational success.

Digital Literacy and Inclusion

Digital literacy significantly influences innovation culture by equipping workers with the skills, confidence and mind-set required to effectively utilize AI technologies and contribute to continuous improvement. Digitally literate employees are better informed and more confident in operating AI tools and interpreting their outputs, which reduces fear and resistance, encouraging experimentation with AI-driven solutions and innovation in work processes. Digital literacy bridges knowledge gaps by enabling employees to quickly learn new AI applications relevant to their roles, accelerating the adoption curve and uncovering novel ways to apply AI for problem-solving and efficiency gains (Hu et al., 2025). Digital inclusion of employees fosters a culture of experimentation by motivating employees to explore diverse AI tools, try new approaches and share successful innovations, thereby creating a positive feedback loop that enhances organizational innovation. Digital inclusion enables employees to swiftly adjust to new AI-driven workflows and maintain innovation efforts aligned with technological advances. Therefore, developing digital literacy reduces such barriers, supporting smoother transitions (Moravec et al., 2024)

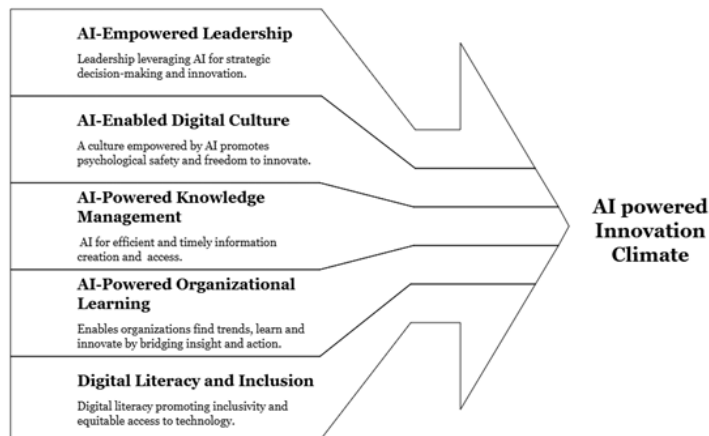


Fig.2 Factors that enable AI powered Innovation climate

Managerial Implication

In today's fast-changing business world, managers are readily embedding AI technologies into their organizational frameworks and processes to develop a long-term innovation environment. It necessitates a conscious efforts synchronization of AI initiatives with the organization's strategy and operating structures. Fig.3 illustrates the AI integration along the domains and their contribution to the innovation. Leaders equipped with predictive analytics, dashboards, and generative AI capabilities are better positioned to recognize nascent trends, discover new possibilities this enables them to iterate and experiment quickly. By fostering a culture of experimentation and learning from setbacks, managers establish the psychological safety that enables innovation to flourish. Moreover, managers need to concentrate on enabling organizational learning via AI-enabled adaptive learning systems and real-time feedback loops. These systems enable continuous skill acquisition, cross-functional cooperation, and information sharing, all of which are necessary for the development of innovative ideas. Employees can develop solutions more quickly if they can learn through personalized opportunities as well as insights generated by AI, thus speeding up the innovation process.

Another key managerial implication is in increasing knowledge management and developing a digital culture that fosters innovation at all levels. Managers need to use AI technologies like natural language processing, neural search, and auto-tagging to make information more accessible and relevant to the organization. Effective knowledge management not only accelerates decision-making but also stimulates the recombination of known knowledge and new knowledge to create new solutions. Concurrently, developing an AI-powered digital culture that's inclusive, agile, and creative is needed. Safe environments must be developed by managers that facilitate quick ideation, prototyping, and iteration, with a focus on transparency and ethical use of AI to establish trust among workers. In addition, digital literacy and inclusion programs are critical to mitigate resistance to the adoption of AI and enable every employee to contribute to innovation activities. Through the investment in digital learning platforms, learning management systems, and AI assistants, managers make innovation democratized, permitting bottom-up idea generation and amplification. This bottom-up approach not only enhances confidence and capability but also leverages diverse viewpoints, which are likely to be the source of paradigm-breaking innovations. Finally, the managers who successfully blend these AI-based components—strategy alignment, leadership empowerment, organizational learning, knowledge management, digital culture, and literacy—can develop a vibrant innovation environment. This environment improves the agility of the organization to respond to the changes in the market, foster long-term growth, and sustain a competitive advantage in a world becoming more digital.

AI Integration	Contribution to Innovation Climate	Mechanism of Innovation	Key Technologies Used
AI Powered Leadership	Promotes a visionary, learning oriented culture. Encourages ethical, human AI collaboration.	Leaders use AI insights to identify opportunities, guide experimentation, and empower teams to develop and test ideas quickly.	Predictive Analytics, Dashboards, GenAI
AI Powered Organizational Learning	Supports adaptive, personalized learning and real time feedback. Builds a learning culture across all levels.	Innovation arises through knowledge evolution, as teams learn, adapt, and refine ideas using AI driven insights and collaboration.	Adaptive Learning Systems, AI Feedback Tools
AI Powered Knowledge Management (KM)	Enhances access to relevant, timely information. Promotes knowledge sharing and reuse.	Employees generate innovations by combining existing knowledge with new data driven insights to create novel solutions.	NLP, Neural Search, Auto-tagging
AI Enabled Digital Culture	Fosters inclusivity, agility, and creativity. Supports a safe space for experimentation.	Innovation happens when AI tools augment human creativity and support rapid ideation, prototyping, and iteration in an inclusive environment.	Sentiment Analytics, Workflow Automation
Digital Literacy & Inclusion	Empowers everyone to use AI effectively. Reduces resistance and builds confidence.	Innovation becomes bottom up and democratized, as all employees can participate, test, and scale ideas using digital tools.	Digital Training Platforms, LMS, AI Assistants

Fig.3 AI powered Innovation Climate-Mechanism

Conclusion and Further Scope

The incorporation of AI-enhanced components within organizational processes dramatically improves the climate for innovation by stimulating ongoing improvement, encouraging experimentation culture, and facilitating engaged involvement in innovative problem-solving. AI strategies must be aligned with business objectives by managers to facilitate ethical leadership, adaptive learning support, and knowledge management improvement, all driving sustained innovation and competitive edge. As AI technologies continue to advance, the collaboration between human imagination and artificial intelligence will increasingly be the key to organizational success. Future research can examine a number of areas in the future to further inform this understanding, including the effects of AI ethics on innovation culture and worker trust, the effects of AI-led leadership styles on team creativity, and the creation of new indicators to assess innovation performance in AI-enabled organizations. Furthermore, analyzing how AI influences cross-cultural innovation patterns, carrying out longitudinal research on AI-enabled organizational learning, and exploring ideal human-AI collaboration frameworks in innovation teams would yield important insights. These areas of research will be imperative for influencing managers and organizations to effectively employ AI in fashioning more adaptive, dynamic, and innovative working environments.

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AI TECHNOLOGY AND ETHICAL DILEMMAS

Dr. Intezar Mahdi

*Principal, University Polytechnic, Integral University, Lucknow, India
intezarmahdi2002@gmail.com*

Nazish Siddiqui

*Lecturer & Head, Department of CSE
University Polytechnic, Integral University, Lucknow, India
nazishcs016@gmail.com*

Abstract

As Artificial Intelligence (AI) continues to reshape industries and societies worldwide, it simultaneously raises pressing ethical concerns that demand critical examination. This paper investigates key ethical dilemmas emerging from the deployment of AI technologies, drawing on recent research, global reports, and real-world case studies. It begins by framing the foundational principles of AI ethics, then explores concerns around privacy erosion and mass surveillance enabled by AI systems. The study examines the societal risks posed by deepfakes, digital manipulation, and the spread of misinformation, alongside unresolved challenges in intellectual property rights in the context of AI-generated content. The implications of AI for employment—particularly job displacement and algorithmic hiring practices—are analyzed through the lens of fairness and accountability. Environmental sustainability is also considered, with data highlighting the substantial resource and energy demands of AI infrastructure. Further, the paper addresses how reliance on AI may suppress creative human thinking and how machine learning models can perpetuate and amplify existing social biases. The analysis underscores the urgent need for globally coherent regulatory frameworks and ethical guidelines to ensure that AI development aligns with human values, equity, and ecological responsibility. This work contributes to the growing discourse on responsible AI by offering interdisciplinary insights and policy-oriented recommendations for more ethical and sustainable AI integration.

Keywords: Artificial Intelligence, AI, Ethics, Ethical Dilemmas, Privacy.

I. Introduction

What are AI Ethics?

These are a set of implications and responsibilities to regard human values and align with basic rights while developing and deploying AI systems. From these ethics stems accountability, transparency, and ensuring a positive impact on humanity and ecology[12]. There are no globally recognised principles or laws to regulate and enforce AI ethics. This ranges from non-discrimination and bias mitigation to explainability and accountability, simultaneously guaranteeing user security, consent, and environmental impact, thereby reducing ecological footprint. In the digital era, personal data has become a prized commodity—collected, stored, analyzed, and sold with unprecedented scale and sophistication. At the heart of the data revolution lies Artificial Intelligence (AI), a technology capable of deriving complex patterns and predictions from vast oceans of information, and no wonder that it is hungry for more data, ethically or unethically. India, with its over 800 million internet users and high smartphone penetration, is fertile ground for this digital deception—especially when content is shared across WhatsApp, Facebook, Instagram, and YouTube, often without verification.

Examples of AI Ethics in Practice

- Bias in Hiring Algorithms – Ensuring Fairness
- Facial Recognition in Public Surveillance – Protecting Privacy
- AI in Lending Decisions – Ensuring Explainability
- Autonomous Vehicles – Assigning Responsibility
- Predictive Policing – Ensuring Transparency and Fairness
- Generative AI in Creative Industries – Defining Authorship and Ownership
- AI in Healthcare – Maintaining Human Oversight [12]

Who Shoulders the Responsibility?

But as AI grows more powerful, so too does its appetite for data—and its potential to infringe on individual privacy, promote surveillance, and challenge the very foundations of data ethics. In the name of progress, are we surrendering our rights to anonymity, consent, and control? Is there a way out? The answer to these questions lies in this research paper only. Who are to be held accountable in the first place, and how –

1. Policymakers

Governments can create and implement policies and regulations that govern the use of AI. The governments must come up with laws like the European Union and, as India did by bringing about Data Protection Laws [15], though they do not ensure a blanket protection, but would curb it to some extent. In the Indian context, Certain ancillary laws that impact data protection based on their jurisdiction and subject matter include:

- The Information Rules, 2013.
- The Directions imposed by the Indian Computer Emergency Response Team (CERT-In).
- The Consumer Protection Act, 2019.
- The Consumer Protection (E-Commerce) Rules, 2020.

2. Regulatory Agencies and International Organizations

Agencies like the European Commission or the U.S. Federal Trade Commission (FTC) can develop guidelines and enforce AI ethics in their industries. Whereas in the Indian context, the relevant government departments are being supervised by the Ministry of Electronics and Information Technology (MeitY), which looks into the enforcement of data protection. However, the DPDP Act envisages the setting up of a Data Protection Board of India (DPBI) to regulate the regime of digital personal data protection in the country. Organizations must also comply with data protection requirements set by sector-specific regulators like RBI, TRAI, and IRDAI. Entities like the United Nations (UN) and the International Organization for Standardization (ISO) can develop international standards for AI. Great point — mentioning the relevant agencies, authorities, or organizations responsible for regulating or overseeing these ethical issues adds weight and context.

Ethical AI in Practice: Real-World Examples and agencies responsible -

- Fairness in AI-Powered Hiring – Regulated by EEOC
- Privacy in Facial Recognition – Governed by Local Laws and FTC Oversight

- Transparency in AI Lending Decisions – Supervised by CFPB
- Accountability in Autonomous Vehicles – Under the Jurisdiction of NHTSA
- Ethical Predictive Policing – Scrutinized by DOJ and Civil Liberties Groups
- Ownership in AI-Generated Content – A Concern for USPTO and Copyright Office
- Human Oversight in AI Healthcare – Regulated by FDA and Medical Boards
- U.S. Food and Drug Administration (FDA)
- International Organization for Migration (IOM)
- UN Privacy Policy Group (UN PPG) [15]
- Privacy International [14]
- IAPP (International Association of Privacy Professionals)

3. Us

We are too quick to say “I agree” and compromise all our data and privacy.

II. Ethical Dilemmas

Privacy, Surveillance & Data Ethics

Users often share sensitive information unknowingly, and platforms like Meta may expose such data to human reviewers. Surveillance tools combined with AI, like facial recognition, escalate concerns over misuse and civil rights. Across the globe, AI-driven surveillance systems have gradually become the norm. Governments have deployed facial recognition software in public spaces; private companies monitor user behavior for profit [14].

How does it work?

- Lack of Informed Consent: Many platforms use vague or misleading privacy policies, undermining users’ ability to make informed decisions.
- Dark Patterns: Design tactics are used to manipulate users into sharing more than they intend—by making it harder to opt out or easier to "agree all."
- Surveillance Capitalism: Tech giants have built billion-dollar empires on user data, turning human behavior into profit with little accountability, and their hunger for data is ever-increasing.

Deepfakes, Misinformation & Digital Manipulation

In an age where digital media dominates our lives, distinguishing between truth and fabrication has become increasingly difficult. With the rise of deepfake technology [7], misinformation, and digital manipulation, i.e process of altering digital content—such as images, videos, audio, or text—using software or technology to change, distort, or fabricate reality. Though it can be used for both benign purposes (like photo editing or artistic enhancement) and malicious purposes (like spreading misinformation or creating fake content). India faces a growing crisis that threatens public trust, democratic integrity, and national security. Manipulated images, videos, or audio clips—especially when designed to evoke strong emotions—can quickly go viral on social media platforms, misleading large numbers of people before the content is debunked. This kind of misinformation often targets individuals or groups, causing severe damage to personal and professional reputations. For instance, a deepfake video falsely showing someone making offensive remarks can lead to

public outrage, job loss, or even legal trouble, despite being entirely fabricated. In India, manipulated content has also been a catalyst for violence and unrest— there have been multiple cases where morphed videos or fake news spread through WhatsApp have incited communal riots or mob lynchings [17].

Perhaps most concerning is the impact on democracy itself. During elections, digitally manipulated political content can be strategically deployed to sway public opinion, discredit opponents, or influence voting behavior. When citizens are unable to distinguish between real and fake content, the very foundations of informed decision-making and democratic participation begin to erode. Clone voices and images to impersonate people with alarming accuracy [7]. AI-generated media (deepfakes) blur truth and can manipulate public perception. Used for political deception, fraud, and social destabilization (Wikipedia). Major AI generative tools include chatbots such as ChatGPT, Copilot, Gemini, Claude, Grok, and DeepSeek. There are text-to-image models such as Stable Diffusion, Midjourney, DALL-E and Veo, and Sora for text to video [11].

There are several reasons behind it:

- End-to-end encryption on various social platforms
- Limited fact-checking capacity in regional languages
- Lack of a robust legal framework specifically addressing deepfakes.
- Massive user base
- Linguistic diversity
- Low digital literacy

Intellectual Property & Creative Ownership Issues?

Perhaps the most pressing ethical challenge lies in how AI systems are trained. Most generative AI models are trained on vast datasets scraped from the internet—often including copyrighted images, writings, music, and other content. Creators frequently discover that their work has been used to train AI systems without their permission, credit, or compensation. This practice, while legally ambiguous in many countries, clearly violates ethical standards around consent and respect for intellectual labor. Artists, writers, and musicians have begun taking legal action, arguing that this constitutes a form of digital appropriation. This has led to a growing number of lawsuits and legal complaints:

Kelly McKernan [5], a watercolour and acrylic illustrator from Tennessee, reports that she "felt sick" when she got to know that her artwork had been used to train AI. She said, "Suddenly, all of these paintings that I had a personal relationship, and journeyed with had a new meaning; it changed my relationship with those artworks". "I felt violated. If someone can type my name [into an AI tool] to make a book cover and not hire me, that affects my career and so many other people" Ms Toorenent says: "Firstly, I would never put my work into it. But if artists do want to, it should be opt in. If I'm the owner, I should decide what happens to my art." [5]

III. Societal Impact

AI and Job Displacement

Artificial Intelligence is expected to significantly impact the job market, with many professions at risk—especially mid-level, white-collar jobs like telemarketing and some teaching roles. Estimates from Goldman Sachs suggest that around 300 million jobs globally may be affected, while McKinsey predicts that 400–800 million jobs could be displaced [9], requiring up to 375 million people to change careers. A report by OpenAI and the University of Pennsylvania adds that 80% of U.S. workers may see at least 10% of their tasks influenced by AI [8], with nearly 1 in 5 seeing over 50% of their tasks impacted. This shift is likely to hit middle- and lower-class workers the hardest, potentially widening income and wealth inequality. Unlike past automation, which mainly affected factory jobs, AI is expected to disrupt higher-paying, white-collar roles more. However, history shows that automation-driven job losses are often balanced by the creation of new roles. Technological advancements typically lead to new occupations, increased productivity, and long-term economic growth. While the exact timing is uncertain, a productivity boom could follow widespread AI adoption.

For people like McGill, it's that human touch that is missing that makes all the difference. “I think there are certain auditory or visual cues that you get when you're talking to a real person that are just hard to communicate strictly with a computer,” she says. “And I just did not want to do it.”[16]

Economic Inequality and Workforce Instability Due to the Use of AI:

The increasing integration of Artificial Intelligence (AI) into global industries is significantly reshaping the labor market, sparking both opportunities and serious socio-economic challenges. AI and automation technologies are rapidly taking over routine and repetitive tasks—such as those in manufacturing, logistics, retail, and even some clerical roles—which traditionally employed a large segment of the population. As a result, workers in these sectors face growing job insecurity and unemployment risks unless they can transition into new roles that often require digital skills and technical expertise. This shift contributes to growing economic inequality, as individuals with advanced education and tech-savvy skillsets command significantly higher wages, while others are left behind with stagnant incomes or no stable employment at all.

Furthermore, the rise of AI has contributed to wage polarization, where the benefits of technology are concentrated in the hands of a few—typically high-income earners and large tech firms—while the broader workforce experiences limited gains [12, 13]. This divide is further widened by geographic disparities: urban centers and technologically advanced regions attract investment and AI-related jobs, whereas rural and underdeveloped areas struggle to keep pace. On a global scale, wealthier nations with access to advanced AI infrastructure and talent are poised to benefit disproportionately, exacerbating the inequality between developed and developing countries [18].

In addition to economic inequality, workforce instability is becoming a defining feature of the AI-driven economy. Traditional long-term employment is increasingly being replaced by flexible, often precarious, gig and freelance work. While such arrangements may offer flexibility, they often lack job security, benefits, and career advancement opportunities.

To address these challenges, there is an urgent need for robust policy interventions. Governments and institutions must invest in education and lifelong learning initiatives to equip workers with future-ready skills. Reskilling and upskilling programs should be accessible, affordable, and aligned with market demands. Without strategic action, the continued rise of AI risks deepening existing economic divides and destabilizing the workforce across societies [12, 13].

Environmental Sustainability

AI has an environmental problem. Here's what the world can do about that.[19]

Artificial Intelligence, particularly large-scale models, presents significant environmental challenges due to its high energy consumption, substantial carbon emissions [3], water usage, and resource-intensive hardware manufacturing [4]. These impacts span across the entire AI lifecycle—from model training and deployment to infrastructure maintenance and component disposal. The report from UNEP, titled "Navigating New Horizons- A Global Foresight Report on Planetary Health and Human Well-being," highlighted a powerful and growing concern about the environmental impact of AI, especially as it scales through massive data centre infrastructures.

If unaddressed, the environmental footprint of AI could rival or surpass many traditional industries. The big challenge is balancing AI's benefits with its growing ecological costs. Shifting to renewable energy in data centres. Improving hardware recycling and lifecycle management. Investing in more energy-efficient AI models and algorithms. Requiring transparency and regulation around resource use and emissions.

Overdependence on AI Can Erode Critical Thinking, Creativity, and Humanism

The widespread displacement of jobs due to AI-driven automation carries the potential to trigger profound social unrest and instability. The erosion of employment opportunities not only threatens financial security but also undermines social cohesion, potentially giving rise to frustration, protest, and disillusionment among affected populations.

Beyond the economic implications, the loss of work carries a deeper psychological toll. For many individuals, employment is more than just a means of livelihood—it serves as a core component of identity, self-worth, and purpose.

A recent study undertaken by the researchers at MIT's Media Lab [1, 2] divided 54 subjects, 18 to 39-year-olds, into three groups, and made them write several SAT essays with the help of OpenAI's ChatGPT, Google's search engine, and nothing else. Researchers simultaneously used an EEG to record the groups' brain activity across 32 regions, and to their surprise, of the three groups, ChatGPT users had the lowest brain engagement and "consistently underperformed at neural, linguistic, and behavioral levels." Over the period of several months, AI users became lethargic, often resorting to copy-and-paste by the end of the study. The main author of the research paper, Nataliya Kosmyna, felt the need to bring the findings into the public domain to raise concerns that, as society increasingly relies upon AI for immediate results, it might adversely affect brain development in the long run.[6]

IV. Conclusion

As the boundaries of what AI can achieve continue to expand, the imperative remains to shape its trajectory in a manner that aligns with core human values and planetary well-being. This provokes a fundamental question for the global community: how can we ensure that the future of AI is guided not solely by capability, but by a rigorous and collective commitment to ethical responsibility?

The rise of Artificial Intelligence marks a defining moment in technological advancement, offering immense potential to drive progress across sectors. However, as this paper has shown, the ethical implications of AI are far-reaching and deeply intertwined with issues of privacy, misinformation, intellectual property, environmental sustainability, and social justice.

Addressing these challenges demands not only technological innovation but also a multidisciplinary commitment to ethical foresight, inclusive policy-making, and accountability frameworks that prioritize human dignity, equity, and sustainability. As AI continues to evolve, so too must our systems for governing its impact—ensuring it serves as a tool for empowerment rather than exploitation.

Ultimately, the question we must ask is not just what AI can do, but what it should do. In a world increasingly shaped by intelligent systems, how can we ensure that the future of AI is not only advanced but also just, responsible, and ethically sound?

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HARNESSING THE POWER OF ARTIFICIAL INTELLIGENCE (AI) TO SHAPE INVESTMENT DECISIONS IN DEVELOPING MARKETS

M. Farwis

*Lecturer, Department of Accountancy and Finance
Faculty of Management and Commerce
South Eastern University of Sri Lanka
farwism@seu.ac.lk*

Abstract

The objective of this research is to study the impact of Artificial Intelligent on investment decision-making in emerging market which is Sri Lanka. Data were gathered through a questionnaire distributed in the first quarter of 2024 from 145 professionals who are engaging with decision making exposure to AI in their professional life. There are four independent variables, such as Price Prediction, Financial Risk Management, Decision Making and Financial Reporting, with the dependent variable, which is Investment decision. The smart partial least square-structural equation (PLS) model was used to measure the relationship among these variables. The findings reinforce AI's potential to serve not just as a technical aid, but as a strategic tool in investment planning, particularly in developing economies where informed financial decisions are crucial. The research emphasises the perceptions of investment decision makers who are debut users of AI technology. The results of this study will enable the institutions to implement AI in crucial decision making.

Keywords: *Artificial Intelligence, Price Prediction, Financial Risk Management, Decision Making, Financial Reporting, Investments Decisions and Sri Lanka.*

1. Introduction

Due to the advancement of technology, financial decision-making is transitioning from human-led to machine-led interactions, aiming to enhance accuracy, responsiveness and fraud management (Mahalakshmi, et al., 2022). This evolution is possible through the adaptation of artificial intelligence (AI), Machine Learning (ML), Blockchain, IoT and big data analytics. This transformation is inevitable because digital transformation, a vital catalyst, shapes a more interconnected world, profoundly impacting lives and fostering substantial business growth (Ren, 2021). Meantime, widespread adoption of AI has embedded itself as a robust tool across the financial services sector, offering vast potential for positive transformation (Dunis, et al., 2016).

The stock market's complexity, volatility, and unpredictability make it both a lucrative and risky investment space, particularly for inexperienced investors. Despite advancements in technologies like Business Intelligence and Management Information Systems, human intuition still dominates critical financial decisions, highlighting the limitations of rule-based systems in dynamic market conditions. With growing interest in AI and machine learning (ML), there is a clear need for intelligent Decision Support Systems (DSS) capable of adapting to changing realities, analysing large volumes of financial data, and supporting strategic investment decisions. While global financial sectors have begun to adopt these technologies, in Sri Lanka, the integration of AI into the financial and investment landscape remains under-researched. Particularly, the impact of these technologies on market behaviour, investor strategies, and decision-making processes has not been thoroughly studied. Therefore, this

research addresses that gap by examining the practical role of AI in reshaping investment decision-making in Sri Lanka's evolving financial sector.

2. Literature Review of AI and Investment Decision

In 1956 the word "artificial intelligence" was introduced by McCarthy and Minsky in a workshop at Dartmouth. According to Rai et al (2019) AI is "the capacity of a machine to execute cognitive operations commonly attributed to human minds, including but not limited to perception, reasoning, learning, problem solving, decision-making, and creative expression" Cognitive modeling, for instance, proposes that AI instantiations should possess the ability to reason like humans (Jiang et al., 2018) and be "machines with a mind" (Shah et al., 2019). When presented with the exact same data as an individual, the model should not only produce an equivalent outcome but also adhere to the same line of reasoning (Cavalcante et al., 2016). Whereas, Jiang et al. (2018) define cognitive modelling, for instance, suggesting that AI applications should possess the skill to think as a human and Shah et al. (2019) suggested that "machines with a mind". Further, Cavalcante et al. (2016) find that same results will be produced for identical data set.

In recent years, there has been a lot of interest in using AI to make investment decisions in the capital market. Numerous studies examining AI and financial decision-making have been contributed by researchers in the field. According to Zhang et al. (2018), it was noted that the efficiency of machine learning (ML) algorithms has been widely applied to identify patterns and trends in financial data, which motivates the pursuit of well-informed financial decisions. AI is being utilised in risk management as a tool to mitigate investment risk, according to Liu et al. (2020). Additionally, it was suggested by D'Antonio et al. (2019) that AI-powered portfolios have been used extensively to optimise investor portfolios. In the end, the AI tools improve overall investment performance by assisting in the maintenance of a balanced portfolio, minimising risks, and optimising returns.

3. Hypothesis

Price Prediction:

Predicting financial market prices, which is regarded as a key component of investment decision-making, has been accomplished with the use of AI technology. There are numerous studies on the application of AI and MI to financial market instrument price prediction. Research indicates that AI methods, such as support vector machines, neural networks, and random forests, are useful for predicting stock prices, exchange rates, and other financial assets (Han et al., 2018 and Zhang et al., 2020).

H1: Price prediction via AI has an impact in Investment Decision making.

Financial Risk Management

The application of machine learning algorithms to the evaluation of credit risk is a major area of research. According to research by Li et al. (2020) and Wang et al. (2019), artificial intelligence (AI) methods such as support vector machines and neural networks can improve the accuracy of credit scoring. According to research, artificial intelligence (AI) helps reduce operational risks and financial losses (Chen et al., 2020; Jiang et al., 2017). Jones et al. (2019)

also noted that AI techniques can analyse data more effectively, which helps financial institutions better predict and manage risks like credit, market, and operational risk.

H2: Financial Risk Management through AI has an impact in Investment Decision making

Decision-Making

Decision-making plays a vital role in financial management, as it involves comparing different options to choose the ones that best support the goals of the organisation and the interests of its stakeholders. Machine learning algorithms, such as random forests and gradient boosting machines, have shown promise in improving decision-making accuracy and efficiency by automating tasks such as risk assessment, portfolio optimisation, and fraud detection (Chen et al., 2018). Moreover, AI-driven decision support systems can incorporate real-time data feeds and market signals to enable more dynamic and adaptive decision-making in response to changing market conditions (Liu et al., 2019).

H3: Decision-Making through AI has an impact in Investment Decision making

Financial Reporting

AI applications in financial reporting cover a wide range of activities, such as gathering, processing, analysing, and interpreting financial data. AI systems can now more quickly and accurately extract pertinent information from financial documents, including annual reports, earnings releases, and regulatory filings, than they could with manual methods thanks to NLP techniques (Ghosh et al., 2019). To help auditors and analysts spot possible mistakes, fraud, or discrepancies, machine learning algorithms can identify patterns, trends, and anomalies in financial statements (Petrov et al., 2018). Furthermore, using historical data, AI-powered predictive modelling can project future financial performance, supporting strategic planning and decision-making (Cao et al., 2020).

H4: Preparing Financial Reporting through AI has an impact in Investment Decision making

4. Data and Method

A descriptive survey design methodology was adopted. The primary data were used as a source of data for the research. The data were collected using the online questionnaire tool "Google Forms." The questionnaire was spread peer to peer. A single cross-sectional research design was used to collect data from practising professionals at one point in time, and the data would be analysed to test the stated hypotheses.

4.1 Empirical Results

The data collected is entered and coded into Excel, SPSS 23 and Smart partial least square (PLS) 4. The study was conducted with Smart PLS 4 for both measurement and structural model.

4.1.1 Structural Equation Modeling (SEM)

The SEM uses in this study to establish the Measurement Model (MM) and structural model for conceptual framework. The MM model uses this study because MM confirms the studies' relevance, consistency and credibility. Goswami et al. (2021) conducted "Industry-focused" survey empirical research, where the SEM was used to underline the suitability of the relationship among latent variables. Since AI is a relatively new and unique subject to test, the

sample size is expected to be small. Hence, Rigdon et al. (2017) stress the use of the smart PLS-SEM (SPLS-SEM) rather than the covariance-based SEM (CB-SEM) for model validation.

The framework consists of 15 statements that were divided into: 3 statements for financial reporting, Price prediction and decision making each; 04 statements for Investment decision and 02 statements for financial risk management, which are shown in Figure 1. Financial reporting, Price prediction, financial risk management and decision making are each independent variables, and Investment decision is a dependent variable.

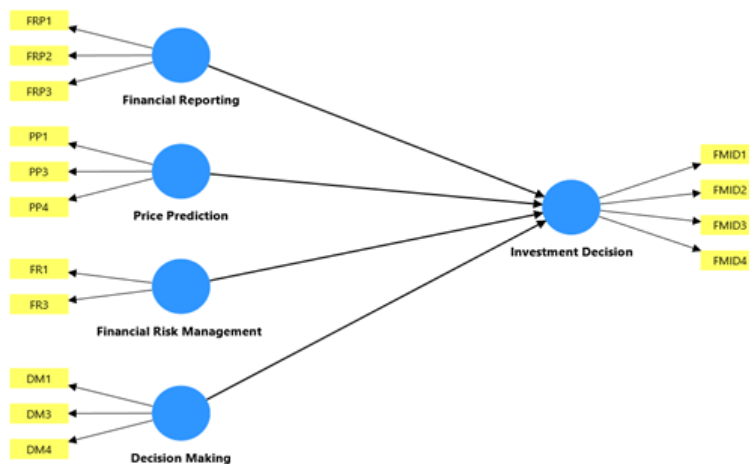


Figure 01: Figure by Author

4.2 Sample size

The sample size for the research revealed that almost 90% practitioners are involved in working on AI. Each company approached for five responses to meet the proposed sample size of 182, but because of availability, only 156 responses were collected. It means an 85% response rate recorded for the study. Out of 156, 11 responses were rejected because of incompleteness. The final results are based on 145 responses. Table 01 to Table 5 depict the demographical characteristics of the selected sample.

Table 1. Gender Wise Percentage

Gender	Frequency	%
Male	78	53.8
Female	67	46.2
Total	145	100.0

Table 2. Age Wise Percentage

Age	Frequency	%
20-24 Years	31	21.4
25-30 Years	57	39.3
31-35 Years	40	27.6
35-40 Years	17	11.7
Total	145	100.0

Table 3. Qualification wise percentage

Job Nature	Frequency	%
Full-time	69	47.6
Freelancer	51	35.2
Consultant	25	17.2
Total	145	100.0

Table 4. Job nature wise percentage

Qualification	Frequency	%
Bachelor	93	64.1
Masters	33	22.8
Professional	12	8.3
PhD	07	4.8
Total	145	100.0

Table 5. Expertism wise percentage

Expertism	Frequency	%
Financial Modelling	86	59.3
Investment Banking	13	9.0
Risk Management	46	31.7
Total	145	100.0

4.3 Structural Model

Figure 2 summarises the results of the MM for the proposed conceptual framework of the research in Figure 2. The results of the model are presented in the tables with interpretations. Few statements were deleted from this questionnaire due to low outer loading values, which are less than 50% (Hair et al., 2022). SEM is used to test the effect of an exogenous construct on AI and the impact it has on the investment decision – cause and effect relationship – (Ullman and Bentler, 2012). The tested proposed model is presented in Figure 2, and the results of the structural model are exhibited in the tables.

4.3.1 Outer loadings

Are the expected relations in reflective MMs (i.e. arrows from the latent variable to its indicators). They define a statement's absolute contribution to its assigned construct. Table 6 shows that the factor loading of each statement in the construct exceeded the endorsed value of 0.5 as stated by (Hair et al., 2014).

4.3.2 Cross loading

In cross loadings, a particular statement should have higher loadings on its parent construct in comparison to other constructs in the study. In Table 7, the cross-loading value of statements in a few constructs is just low (below 0.5), so the 15 statements were decided to be maintained for the main data collection

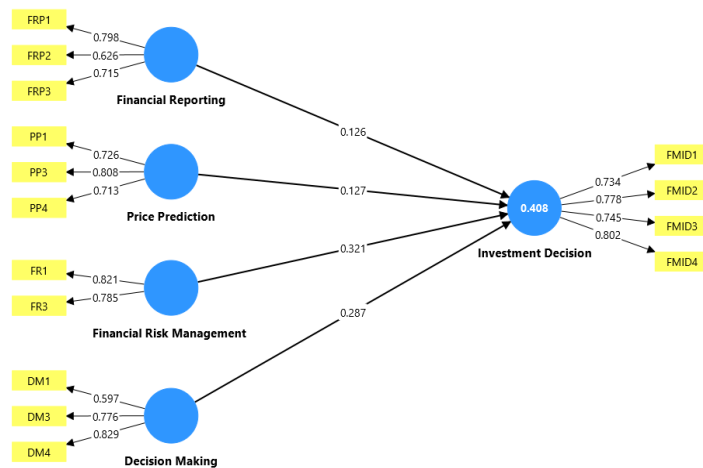


Figure 01: Figure by Author

4.3.3 Reliability

Reliability of the MM can be retrieved using two values: the Cronbach's alpha coefficient of above 0.6 and composite reliability, where value ranged from 0.7 or greater is considered acceptable (Fornell and Larcker, 1981) and According to Hair et al. (2022), Cronbach's Alpha values between 0.60 and 0.70 are acceptable, while values between 0.70 and 0.90 are considered good for confirmatory studies. Table 8 shows that the composite reliability of the model measurement values ranged from 0.644 to 0.863 for Cronbach's alpha value and ranged from 0.650 to 0.865 for composite reliability. The rho_A should ideally fall between 0.70 and 0.90 for constructs to be considered reliable. The values prove that it is acceptable to consistently measure the instruments. It can be tested through convergent validity and discriminant validity tests. Convergent validity can be assessed by looking at the results of the MM factor loading, composite reliability, and AVE exceeding 0.5 (Hair et al., 2014). The factor loading of each statement in the construct exceeded the endorsed value of 0.5 as stated by (Hair et al., 2014). According to Hair et al. (2022), an AVE value of 0.50 or higher is the accepted threshold for demonstrating convergent validity. An AVE value below 0.50 indicates that the variance explained by the construct is less than the variance accounted for by measurement error.

4.3.4 Discriminant Validity

To further examine the status of model discriminant validity, as suggested by Henseler et al. (2015), it is best to assess the discriminant validity in PLSSEM. This is performed by looking at the Heterotrait-Monotrait ratio (HTMT) criterion value to confirm that the statements across the construct measure different constructs in the model. It is identified by looking at the fact that the confident interval value of HTMT statistic must not comprise the value of 1 for an entire combination of the construct and by assessing the value of HTMT below 0.90 (Hair et al., 2014) as presented in Table 9. It shows the value of HTMT for the most construct is less than 0.90, which indicates minimal discriminant validity for the model.

4.3.5 Variance Inflation Factor

The collinearity statistic of the variance inflation factor (VIF) value of the constructs and results is presented in Table 10. VIF value of the constructs is less than 5 for all, as depicted in Table 10, which indicates that there are no collinearity issues between the constructs in the proposed conceptual model. Based on the proposed model measurement analysis findings, it can be summarised that all seven constructs are valid measures of their constructs based on their factor estimations and statistical significance. The MM established an adequate reliability and validity standard.

Table 6. Outer Loading Results

Statements	DM	FRM	FRP	PP	ID
DM1	0.597				
DM3	0.776				
DM4	0.829				
FR1		0.821			
FR3		0.785			
FRP1			0.798		
FRP2			0.626		
FRP3			0.715		
PP1				0.726	
PP3				0.808	
PP4				0.713	
FMID1					0.734
FMID2					0.778
FMID3					0.745
FMID4					0.802

Notes: DM=Decision Making, FRM= Financial Risk Management, FRP = Financial Reporting, PP= Price Prediction, ID=Investment Decision

Source(s): Table by author

Table 7. Cross Loading Results

Statements	DM	FR	FRM	ID	PP
DM1	0.597	0.163	0.224	0.149	0.125
DM3	0.776	0.421	0.399	0.400	0.348
DM4	0.829	0.249	0.457	0.511	0.146
FMID1	0.376	0.401	0.309	0.734	0.312
FMID2	0.412	0.147	0.433	0.778	0.305
FMID3	0.371	0.343	0.449	0.745	0.161
FMID4	0.486	0.240	0.412	0.802	0.152
FR1	0.458	0.225	0.821	0.439	0.084
FR3	0.372	0.217	0.785	0.405	0.191
FRP1	0.339	0.798	0.269	0.325	0.253
FRP2	0.197	0.626	0.079	0.235	0.249

FRP3	0.286	0.715	0.226	0.204	0.171
PP1	0.135	0.222	0.091	0.233	0.726
PP3	0.250	0.155	0.139	0.243	0.808
PP4	0.256	0.360	0.152	0.200	0.713

Notes: DM=Decision Making, FRM= Financial Risk Management, FRP = Financial Reporting, PP= Price Prediction, ID=Investment Decision

Source(s): Table by author

Table 8. Reliability and Validity Results

Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Decision Making	0.734	0.763	0.881	0.548
Financial Reporting	0.634	0.650	0.758	0.513
Financial Risk Management	0.751	0.753	0.884	0.645
Investment Decision	0.863	0.865	0.949	0.586
Price Prediction	0.711	0.717	0.894	0.563

Table 9. Hetero -monoterial (HTMT)

Variables	DM	FR	FRM	ID	PP
Decision Making					
Financial Reporting	0.637				
Financial Risk Management	0.883	0.544			
Investment Decision	0.668	0.559	0.892		
Price Prediction	0.439	0.564	0.329	0.443	

Notes: DM=Decision Making, FRM= Financial Risk Management, FR = Financial Reporting, PP= Price Prediction, ID=Investment Decision

Source(s): Table by author

Table 09. VIF Results

Statement	VIF
DM1	1.352
DM3	1.388
DM4	1.142
FMID1	1.414
FMID2	1.632
FMID3	1.414
FMID4	1.710
FR1	1.093
FR3	1.093
FRP1	1.172
FRP2	1.094

FRP3	1.245
PP1	1.158
PP3	1.327
PP4	1.240

Table 10. Path Coefficients

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Decision Making -> Investment Decision	0.287	0.288	0.086	3.326	0.001
Financial Reporting -> Investment Decision	0.126	0.129	0.088	1.433	0.152
Financial Risk Management -> Investment Decision	0.321	0.322	0.085	3.780	0.000
Price Prediction -> Investment Decision	0.127	0.142	0.069	1.850	0.064

5. Discussion and Conclusion

To evaluate the factors influencing Investment Decision Making, a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was employed. The model included four independent variables: Decision Making, Financial Reporting, Financial Risk Management, and Price Prediction. The results of the path analysis are summarized below:

Table 11. Testing Hypothesis

Path	Coefficient	T-Statistic	P-Value	Significance
Decision Making → Investment Decision	0.287	3.326	0.001	Significant
Financial Reporting → Investment Decision	0.126	1.433	0.152	Not Significant
Financial Risk Management → Investment Decision	0.321	3.780	0.000	Significant
Price Prediction → Investment Decision	0.127	1.850	0.064	Not Significant

Table 12. R-Square and Adjusted R-Square

AI usage	R-Square	Adjusted R-Square
Investment Decision	0.408	0.391

Table 11 shows that Financial Risk Management had the strongest and most statistically significant impact on investment decisions ($\beta = 0.321$, $p < 0.001$). This suggests that firms that manage financial risks effectively are more likely to make sound investment decisions. And also, Decision Making also had a significant positive effect ($\beta = 0.287$, $p = 0.001$), indicating

that improved decision-making processes directly contribute to better investment outcomes. On the other hand, Financial Reporting ($\beta = 0.126$, $p = 0.152$) and Price Prediction ($\beta = 0.127$, $p = 0.064$) showed positive relationships, but these were not statistically significant at the 0.05 level. This suggests that while they may play a role, their influence is not strong or consistent enough to be confirmed in this model.

Table 12 depicts that the R-Square (R^2) value of 0.408 indicates that approximately 40.8% of the variance in investment decision making can be explained by the combined effects of the four independent variables: Decision Making, Financial Reporting, Financial Risk Management, and Price Prediction. This suggests a moderate level of explanatory power, which is considered meaningful in social science and behavioral finance research, especially within the context of developing markets. The Adjusted R-Square value of 0.391 accounts for the number of predictors in the model and adjusts for any potential overfitting. An adjusted value close to the original R^2 confirms that the model is relatively stable and not overfitted, meaning the selected variables genuinely contribute to explaining the dependent variable.

The findings highlight the critical role of Financial Risk Management and structured Decision Making in shaping effective investment decisions. Risk management appears to provide a solid foundation for making informed, strategic investment choices by minimizing uncertainties and evaluating potential losses. Similarly, efficient decision-making processes likely enhance the timeliness and accuracy of investment actions. On the other hand, while Financial Reporting and Price Prediction are traditionally important in financial analysis, their non-significant impact in this model suggests that these factors may need further refinement or may be mediated by other variables not captured in the current analysis. This opens potential for more complex models or qualitative exploration. This study set out to explore how AI-driven insights influence investment decision-making in developing markets. Using PLS-SEM analysis, we found that among the AI-generated variables, Financial Risk Management and Decision Making had the strongest and most statistically significant impact on investment behavior.

These findings highlight the practical value of AI in surfacing meaningful predictors that drive financial decisions. The model explained 40.8% of the variance in investment decision making, with an adjusted R-square of 0.391, indicating a good level of explanatory power in a real-world context. This suggests that AI can meaningfully support financial decision-making by identifying relevant risk and decision-related factors, especially in environments with limited data availability. While Financial Reporting and Price Prediction showed some positive associations, their effects were not statistically significant. This may imply the need for more advanced models or domain-specific tuning to fully capture their influence. In conclusion, the findings reinforce AI's potential to serve not just as a technical aid, but as a strategic tool in investment planning, particularly in developing economies where informed financial decisions are crucial. Future research could explore more refined AI-driven predictors, longitudinal data, or cross-sector comparisons to further strengthen these insights.

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AI TRANSFORMS HEALTHCARE: DOES AI REPLACE DOCTORS OR AUGMENT THEIR ROLE

F.H.A. Rauf

*Department of Management, Faculty of Management and Commerce
South Eastern University, Sri Lanka*

A.R.F. Zeena

*Faculty of Medical Sciences
University of Sri Jayewardenepura, Sri Lanka*

Introduction

Artificial Intelligence (AI), which refers to the "ability of machines to simulate human intelligence", is rapidly advancing in the field of medicine. Its essential feature is its ability to process massive amount of data and automate of repetitive works. The speed of AI is much faster than speed of human.

There is a continuous debate about the possibilities of AI replacing human jobs. Technology is developing rapidly. Hence, public is more concern about losing employment opportunities. However, the question of whether AI will fully replace jobs is not simple. This question cannot be answered with simple 'yes' or 'no'.

AI has replaced many jobs. For example, Amazon and banks use AI in their business. However, AI has also created many jobs and new avenues. Further, AI has taken over the routine activities. Therefore, human is free for formulating strategies and innovation. For instance, healthcare professionals are now able to use AI to interpret medical images and forecast disease outbreaks. Therefore, they are able to invest their time on more productive activities such as direct patient care and complex decision in clinical works (Topol, 2019).

Medicine is a human-centered profession. It is based on empathy, instant clinical judgment, ethical responsibility and accountability. Health care field has been integrated with AI. Although AI enhance efficiency, it is a question that weather AI truly replace the complex, nuanced responsibilities inherent in medical practice.

The objectives of this papers are:

1. To explore the nature of the medical profession
2. To explain how AI is transforming and supporting clinical practice
3. To highlight the limitations of AI in the medical profession
4. To indicate the emerging paradigm of 'augmented intelligence'.

Doctors and AI

As medical professionals are responsible for clinical diagnosis and critical decision making, they play complex role. They gather information from patients and integrate the information. They perform clinical examination and combine diagnostic tests to reach accurate conclusions. Success in this process depends heavily on the ability of making decisions in uncertain situations and the level of experience of medical professionals. When planning treatment, doctors consider patient preferences and potential risks. They may decide to treat the patient through medications, surgical procedures, or lifestyle changes. Before taking such decision,

doctors communicate diagnoses and discuss prognoses. They are concerned about empathy and clarity when they handle emotionally sensitive conversations. They follow a holistic approach collaborating with nurses, specialists, pharmacists, therapists, and administrative staff to reach all inclusive decisions and actions. Moreover, they shoulder substantial ethical and legal responsibilities. As medicine is a constantly evolving discipline, doctors must remain updated with new research findings, clinical practices. Therefore, they have to continuously develop their professional expertise.

AI has improved efficiency in clinical activities. It processes and interprets large volume of lab results and histories of patients. Natural Language Processing (NLP) and telemedicine have reduced the time consumption for administration and documentation. Smart wearable devices powered by AI now monitor vital signs such as heart rate, blood pressure and glucose levels. AI consider the patient's genetic profile, lifestyle and health data and AI supports personalized treatment. Predictive models can anticipate individual responses to medications. AI can identify conditions such as pneumonia, breast cancer, and retinal diseases (Topol, 2019). Google Health's AI accurately detect diabetic retinopathy (Gulshan et al., 2016). Google's DeepMind can accurately diagnose breast cancer (McKinney et al., 2020). AI is capable of analyzing electronic health records (EHRs) and describe patients risk for sepsis, heart failure, or hospital re-admission, facilitating timely interventions (Rajkomar et al., 2018). Similarly, AI powered Clinical Decision Support Systems (CDSS) provide real time evidence based recommendations for treatment. IBM Watson suggests suitable cancer therapies and supports oncologists (Jiang et al., 2017). Moreover, virtual health assistants and chatbots improve administrative efficiency by providing health guidance and scheduling appointments.

Does AI Fully Replace Doctors?

Medical AI is rapidly improving. Many argue about the future of doctors. However, experts are of the view that AI can support to enhance productivity, but it cannot replace the doctors. While AI has significant capabilities, it lacks the ability to replace a human doctor. AI lacks empathy, compassion and emotional intelligence. These are essential traits for caring patient. Healthcare is intrinsically human for a patient. AI cannot create trust. As Dr. Eric Topol writes (2019), "Patients don't want a cold diagnosis, they want to be heard and understood."

Doctors make decisions based on their clinical experience, intuition, and a deep understanding of a patient's unique circumstances. Doctors generally consider social, cultural, and ethical dimensions when recommending treatments. These "soft" factors are not possible with AI. When AI is integrated into healthcare, human judgment is necessary. Because, ethical and legal challenges with regard to data privacy, algorithmic bias and accountability. Therefore, there is an urgent need for regulations and ethical guidelines (Morley et al., 2020). AI is struggling with complex, rare, or unpredictable medical cases. Patients value the empathy and reassurance given by human doctors, especially when facing serious or emotionally sensitive health concerns. Another critical issue with AI is accountability. What will happen, if an AI system makes an error? Who will be responsible? Is it the doctor using it? Is it the AI developer who built it? Or the institution which uses it? According to the current system, doctors are legally and ethically responsible, reinforcing the need for them to remain central in decision making. In addition to that, the quality of the data determines the effectiveness of AI. Biased, incomplete, or lack diversity dataset will results in inaccuracies (Obermeyer et al.,

2019). Another significant issue is the problem of the "black box". AI lacks explainability. Often, the reasoning behind AI outputs is not transparent. But the medical field requires trust, clarity, and accountability (Samek et al., 2017).

Conclusion

AI plays dual roles; while it functions as a disruptive force, it also functions as a driver of innovation in the job market. It ideally replace jobs which are repetitive, manual. However, AI can only reshape other jobs like doctors. We should not view AI as a threat. AI can be a valuable collaborator with doctors to improve their productivity and quality care. As AI has ability to analyze massive volume of patient's records, doctors can detect disease early. Doctors are able to initiate earlier interventions. When administrative activities are automated, doctor burnout will be reduced. Therefore, doctors have more time to intervene in patients directly. Further, doctors can make faster and evidence-based decisions with the support of AI-powered clinical decision support systems.

Doctors deal patient as human and take decision in complex situations. AI serves with transformation for healthcare. However, it has no inherent characters of human such as interpersonal and ethical elements. Ability to response to a situation is possible with human which is necessary for medical practice. AI can be leveraged to support, but it cannot replace doctors (WHO, 2021). While AI interpret scans in a few seconds, doctors should integrate them within the clinical context. AI can propose many possible diagnoses, but doctors have to judge them from the viewpoint of patient preferences. They assess all other coexisting conditions and practicality. AI can propose drugs, but finally doctors analyze the side effects, monitor adherence, and ensure patient understanding. Brynjolfsson and McAfee (2014) emphasized that synergy created between human and technology will increase performance. As medicine is a high stakes field, machines or automation are not trust worthy.

Doctors should actively contribute in designing regulations on how to use AI and ensure new AI technology support healthcare and not replace human caregivers. The knowledge of AI literacy and importance of collaboration among disciplines should be given to doctors and prepare them to shape for the future. This will lead to harmonious work between technology and human empathy. Medical community should not fear about AI. Rather, they should accept it as a great collaborator to enhance patient care and contribute towards progressing global health. D'Adderio said, "AI is not infallible; we still need clinicians to verify its accuracy retrospectively." Dr. Jesse Ehrenfeld stated that "AI won't replace doctors," he says, but doctors who use AI will replace those who don't. AI is not a replacement. But, AI should be considered as a valuable contributor in delivering enhanced healthcare. This is the concept of "augmented intelligence", not just artificial intelligence.

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EARLY PREDICTION OF ASD USING GRADIENT BOOSTING ON PRENATAL ULTRASOUND DATA

P. Janani

*Department of Computer Science & Engineering
Vels Institute of Science Engineering, & Technology, Chennai*

Dr. S. Sridevi

*Department of Computer Science & Engineering
Vels Institute of Science Engineering, & Technology, Chennai*

K. Parvathavarthini

*Department of Computer Science & Engineering
Vels Institute of Science Engineering, & Technology, Chennai*

Abstract

Early detection of Autism Spectrum Disorder (ASD) during the prenatal stage enables timely interventions that can improve neurodevelopmental outcomes. This study proposes a Gradient Boosting-based machine learning framework to predict ASD risk using ultrasound-derived fetal biometric measurements combined with maternal and perinatal risk factors. Data from 789 fetuses, each with 100 prenatal features, were processed through one-hot encoding, Synthetic Minority Oversampling Technique (SMOTE) for class balancing, and z-score standardization. Gradient Boosting (XGBoost) was trained with 10-fold cross-validation and hyperparameter optimization. The model achieved an accuracy of 82.1%, sensitivity of 83%, specificity of 81%, and an area under the ROC curve (AUC) of 0.87, outperforming logistic regression and random forest baselines. Key contributors included nuchal translucency, head circumference, maternal autoimmune history, and polygenic risk score for ASD. The findings highlight Gradient Boosting's potential as a robust, explainable tool for prenatal ASD risk screening.

Keywords: ASD (Autism Spectrum Disorder), ROC (Receiver Operating Characteristic), AUC (Area under the curve), SMOTE (Synthetic Minority Oversampling Technique)

Introduction

ASD is a heterogeneous neurodevelopmental condition characterized by differences in social communication and restricted/repetitive behaviors. The term "spectrum" highlights that ASD affects individuals differently. Abilities and needs change over time, and the condition impacts individuals across the lifespan. Symptoms, which emerge in early childhood, vary significantly in their severity and expression from person to person. Early identification enables timely family support and developmental interventions.

Autism Spectrum Disorder (ASD) is characterized by persistent communication and social interactions deficits, and restricted, repetitive behaviors. Since the first studies in the 1960s, its prevalence has steadily increased from 0.041% to 1.68%. This increase is due to combination of genetic and environmental components.

While some individuals with ASD live independently, others require lifelong care. Early identification and intervention are crucial for improving outcomes and enhancing the quality of life for individuals with ASD. There is no single medical test, like a blood test, to diagnose ASD. Diagnosis is made by healthcare professionals who observe a child's behavior and development.

Traditional methods are based on score-sheets with questions for the parent or the medical practitioner that produce results by comparing summation scores to predetermined thresholds.

A nuchal translucency scan is a prenatal screening tool used in the first trimester (typically between 11 and 14 weeks). It measures the fluid-filled space at the back of the fetal neck. Statistical models revealed that a subpopulation of 38% of babies at risk of ASD had significantly larger fetal head circumference than age-matched NT ones, suggesting an in utero origin of the reported bigger brains of toddlers with ASD.

Prenatal screening today focuses on aneuploidy and structural anomalies; no clinically accepted screening exists for later ASD. Meanwhile, ultrasound is universally collected and inexpensive, making it a natural candidate for exploratory risk stratification, provided that safeguards against overreach and harm are put first.

Machine Learning Algorithms on Ultrasound Derived Measurements" introduces an early diagnosis. It demonstrates the feasibility of leveraging prenatal ultrasound measurements for ASD risk stratification and outlines the steps required for responsible clinical translation.

Literature Survey

The research by O. Regev, A. Hadar, G. Meiri, and H. Flusser reviewed the association between ultrasonography fetal anomalies and autism spectrum disorder where the findings shed important light on the abnormal multiorgan embryonic development of ASD. UFAs in the urinary system, heart, and head and brain were the anomalies most significantly associated with an ASD diagnosis.

The Association between Abnormal Fetal Head Growth and Autism Spectrum Disorder is the study by O. Regev, G. Cohen, which suggest that abnormal fetal head growth is a familial trait of ASD, which is modulated by sex and is associated with the severity of the disorder. Fetal head shape showed sex-specific characteristics, and head growth was inversely correlated with ASD severity in males and females, thus further supporting the sex effect on the association between fetal head growth and ASD.

The research by Roberta Simeoli, Angelo Rega, Mariangela Cerasuolo Using Machine Learning for Motion Analysis to Early Detect Autism Spectrum Disorder studies typically implement classification methods based on machine learning (ML) algorithms to predict or classify individuals of different groups by maximizing the distance between groups of data sets. Specifically, they seek to identify the patterns or distinctive traits that clearly separate the different groups of individuals within the dataset, to provide an accurate classification.

Similarly, Machine Learning-Based Models for Early Stage Detection of Autism Spectrum Disorders explored the use of classification techniques to implement the transformed ASD datasets and to assess their performance in which SVM showed the best performance for the toddler dataset.

The concept is reinforced by the work of E. Toki, Ioannis G. Tsoulos, Vito Santamato, J. Pange whose study on Machine Learning for Predicting Neurodevelopmental Disorders in Children highlighted the usage of machine learning for classification using logistic regression, SVM, and ensemble learning techniques. Where 241 children with ASD were diagnosed. Of these children, 40.66% had both ASD and ID, and the researchers' findings suggested that ML models based on socio-demographic and behavioral observation data, like SVM, may better identify autistic children with ID than regression models.

In comparison to existing studies, our system introduces several innovative features. Risk modeling in obstetrics commonly uses ultrasound biometrics for aneuploidy screening and growth restriction. Emerging literature explores associations between prenatal factors (including NT, FHR, and cranial metrics) and neurodevelopment. We present a reproducible ML approach for prenatal ASD risk assessment using routinely collected ultrasound-derived measurements.

In conclusion, the literature provides a strong foundation for the "Prenatal Autism risk assessment using machine learning algorithm on ultrasound measurements" The application of machine learning algorithm on ultrasound measurements help to diagnose autism at an earlier stage which helps the clinical intervention for the ASD affected children.

Architecture

The architecture of the Prenatal Autism risk assessment using machine learning algorithms on ultrasound measurements is designed to detect early ASD in children.

This system leverages the capabilities of the machine algorithm based on the ultrasound measurements for effective ASD detection and analysis. The architecture can be broken down into several key components: data acquisition, preprocessing, feature engineering, modeling, Evaluation, deployment.

[A] Data Acquisition

The system begins with data acquisition, which involves prenatal ultrasound data during gestational weeks 20-24. The ultrasound screening includes the examination of different anatomical landmarks according to the various body systems, including the head, brain, thorax, abdomen, spine, limbs, and umbilical cord. The gestational age of each fetus was calculated from the last menstrual period (LMP) and confirmed by the crown-rump length (CRL) in the ultrasound scan obtained in the first trimester.

[B] Preprocessing

Before feeding the images into the model, preprocessing steps are applied to enhance the quality and suitability of the images. This includes extract frames, resample, crop to ROI, gestational age normalization, missing data imputation, feature extraction, optional speckle-reduction filters. These preprocessing steps are crucial for improving the accuracy of the subsequent detection phase.

[C] Feature Engineering

At the core of the system Feature engineering combines automated and domain-specific methods to enhance prenatal autism risk prediction. Automated techniques include autoencoder embeddings that reduce dimensionality and extract latent representations from ultrasound data, and pretrained convolutional neural network (CNN) features fine-tuned on prenatal imaging to capture anatomical patterns. Domain features are derived from clinical expertise, including head circumference, biparietal diameter, abdominal circumference, femur length, and growth indices normalized by gestational age. Ratios, proportionality scores, and growth velocity are calculated to identify atypical developmental trends. This hybrid feature set integrates deep learning insights with interpretable clinical parameters, improving model sensitivity and predictive performance for ASD risk.

[D] Modeling

The Gradient Boosting model (XGBoost) was selected for its strong performance on tabular prenatal datasets. It was trained using 10-fold cross-validation with hyperparameter tuning to optimize learning rate, tree depth, and estimators. Class imbalance was mitigated with SMOTE applied only on training folds to prevent data leakage. One-hot encoding handled categorical features, while z-score normalization standardized continuous variables. Model evaluation included AUC, accuracy, sensitivity, specificity, precision, and F1-score, with SHAP analysis for feature importance interpretation.

[E] Evaluation

It involves assessing its accuracy, robustness, and clinical relevance. Stratified k-fold cross-validation ensures balanced representation of ASD and non-ASD cases. Metrics include area under the receiver operating characteristic curve (AUROC) for overall discrimination, sensitivity for early risk detection, specificity to minimize false positives, and precision-recall for imbalanced data assessment. Calibration curves and Brier scores evaluate probabilistic prediction reliability. Feature importance and SHAP analysis enhance interpretability for clinicians. External validation with an independent dataset is recommended to ensure

[F] Deployment

The model with preprocessing and inference pipelines, serving it via a secure API (FastAPI/Flask), ASD risk assessment model involves integrating the trained machine learning pipeline into clinical decision support systems. The system accepts ultrasound-derived measurements, preprocesses inputs, and generates risk predictions in real time. It can be embedded in hospital IT infrastructure or cloud-based platforms, ensuring scalability and accessibility. Secure data handling, model interpretability, and compliance with medical standards are prioritized to facilitate multi-center validation and clinical adoption.

In summary, the architecture of the Early Autism risk Prediction using a machine learning algorithm on ultrasound measurements incorporates ultrasound data from pregnancy and runs it through a trained machine learning model to predict the risk of autism. It works inside hospital software or online platforms, giving fast results. It's designed to be secure, easy to understand, and follow medical rules so doctors can trust and use it.

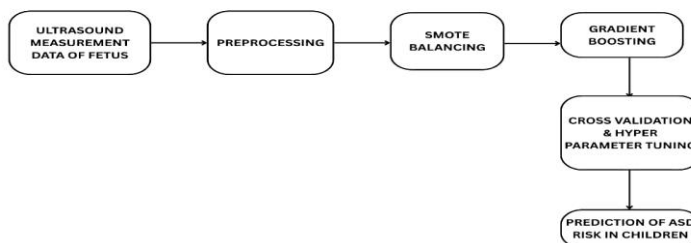


Figure 1: - Flowchart illustrating the architecture of the Early Prediction of Autism using Gradient Boosting Algorithm on Prenatal Ultrasound measurements.

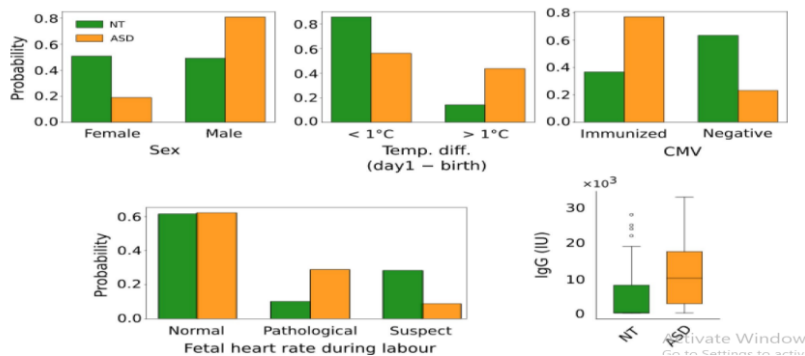


Figure 2:- Distributions of Sex, Absolute Child Temperature difference between birth and 1 day later after birth, CMV immunoreactivity, fetal heart rate during labor, IgG Level

Proposed System

The proposed system uses prenatal ultrasound data to predict autism risk through machine learning. It preprocesses measurements, extracts growth-related features, and trains models like logistic regression and ensemble classifiers. Evaluated via cross-validation and ROC metrics, it outputs a risk score to support early clinical decision-making and potential intervention planning.

The objective is to develop a machine learning system that predicts autism risk before birth using prenatal ultrasound data. By analyzing biometric patterns and applying classifiers, the goal is to enable early identification, improve monitoring, and support timely intervention bridging routine screening with predictive analytics for better developmental outcomes.

[G] System Overview

The proposed system is designed to analyze prenatal ultrasound data to predict autism risk using machine learning. It processes biometric inputs, extracts growth-related features, and applies classifiers like logistic regression and ensemble models. Evaluated through cross-validation and ROC metrics, it delivers interpretable risk scores to support early diagnosis and clinical decision-making in prenatal care.

[H] Hardware Components

The hardware setup consists of an ultrasound machine for data acquisition, a clinical workstation or server with sufficient CPU/RAM for model inference, secure storage for patient data, and networking tools for integration with hospital systems. A display interface presents risk predictions, supporting real-time decision-making in prenatal care with scalable, interpretable deployment.

[I] Software Architecture

The software architecture of the proposed system is modular, consisting of distinct components for data acquisition, feature engineering, model training, and prediction. Ultrasound data is normalized and imputed, then passed through machine learning models. A backend engine handles inference, while a frontend interface displays ASD risk scores. The system supports integration with clinical databases and hospital workflows.

[J] User Interface

A user-friendly interface will be developed to facilitate interaction between the clinical practitioner and system. This user interface presents a clean dashboard for clinicians to input ultrasound data and view ASD risk predictions. It includes fields for biometric entry, visual indicators of risk level, and model interpretability cues. Designed for clarity and ease of use, it integrates seamlessly with electronic health records and clinical workflows.

[K] Real-Time Analytics

To further enhance the functionality of the proposed system, real-time analytics will be incorporated. This enables instant processing of prenatal ultrasound data to predict autism risk during clinical visits. The system rapidly normalizes inputs, extracts features, and runs machine learning inference, delivering immediate risk scores. This supports timely decision-making, continuous monitoring, and integration with electronic health records for seamless clinical workflow.

[L] Implementation and Testing

The proposed system will undergo rigorous testing in a controlled environment before deployment. The system was implemented using machine learning models trained on normalized prenatal ultrasound data. Feature engineering captured growth patterns and proportional indices. Gradient boosting models were tested using stratified cross-validation and hyperparameter optimization.. Performance was evaluated using ROC curves, AUC, and sensitivity, confirming ensemble methods' superior predictive accuracy and clinical relevance.

In conclusion, the proposed system demonstrates that machine learning can effectively predict autism risk using prenatal ultrasound data. By combining routine biometric measurements with advanced modeling techniques, it enables early risk stratification. The results highlight strong predictive performance, especially from ensemble models, and support future clinical integration and multi-center validation for real-world impact.

Methodology

This study analyzed 789 prenatal records containing ultrasound-derived fetal measurements (nuchal translucency, head circumference, biparietal diameter, femur length), maternal health indicators, genetic variants, and perinatal factors. Data preprocessing involved missing value verification, one-hot encoding for categorical variables, and z-score normalization of numerical features. Class imbalance was addressed using the Synthetic Minority Oversampling Technique (SMOTE). Gradient Boosting (XGBoost) was applied with 10-fold cross-validation and hyperparameter tuning to optimize performance.

Model evaluation utilized accuracy, AUC, sensitivity, specificity, precision, F1-score, and SHAP-based feature importance analysis.

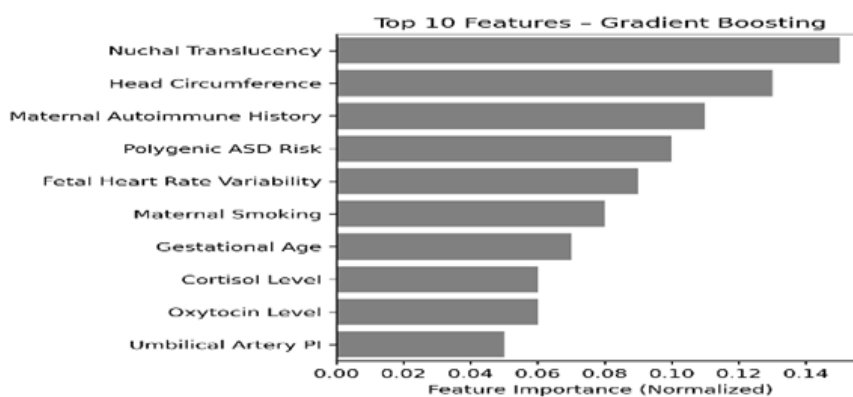
[M] Data Collection

The first step in the methodology involves prenatal data collection from 789 pregnancies, including ultrasound-derived fetal measurements (nuchal translucency, head circumference, biparietal diameter, and femur length), maternal health indicators, genetic variants, and perinatal factors. All records were anonymized and pre-screened for completeness. Ethical

approval and informed consent were obtained, ensuring compliance with clinical research standards.

[N] Feature Selection for Classification

Once the dataset are collected they undergo feature selection to prepare them for the model. It focused on clinically relevant ultrasound measurements like head circumference and femur length. Derived features such as growth ratios and proportional indices were engineered to capture developmental patterns. Gestational age normalization and imputation ensured data consistency. Machine learning models Gradient Boosting, ranked features by importance, helping refine the input set. This approach improved classification accuracy and interpretability, supporting early autism risk prediction from routine prenatal data.

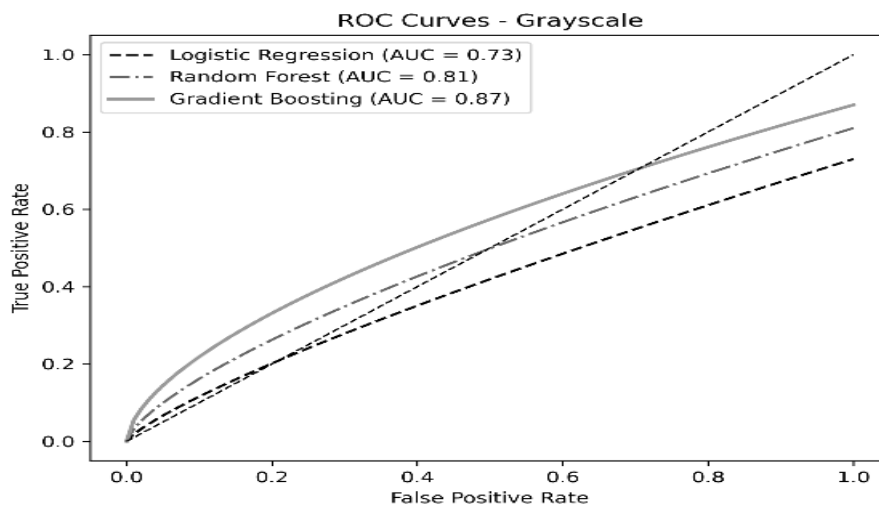


[O] Classification Process

The core of the methodology lies in the classification of the ASD and NON ASD in Children. The classification process begins with preprocessing prenatal ultrasound data through normalization and imputation. Key features like growth patterns and proportional indices are extracted. These inputs are fed into machine learning models like logistic regression, random forest, and gradient boosting to classify autism risk. Stratified cross-validation ensures reliable evaluation, using metrics like AUC and sensitivity. Ensemble models enhance prediction accuracy, enabling early risk stratification and supporting clinical decision-making during prenatal care.

[P] Classifier Evaluation

Following the classification phase, evaluations are applied to refine the output results. This evaluation was performed using stratified cross-validation to ensure balanced class representation. Gradient Boosting outperformed with higher AUC and sensitivity. Gradient Boosting achieved the best results, with an AUC of approximately 0.89 and sensitivity near 85%. These scores indicate strong predictive capability, especially for early autism risk detection. Ensemble methods proved more effective than single classifiers, supporting their use in clinical decision support systems.



[Q] Visualization and Reporting

The final phase of the methodology focuses on visualizing the assessment results. It involves presenting ASD risk predictions in a clear, clinically useful format. Risk scores are displayed using intuitive charts, color-coded indicators, and percentile rankings to aid interpretation. Reports summarize model inputs, prediction outcomes, and confidence levels, supporting transparency and trust. These outputs are integrated into electronic health records, enabling seamless access during prenatal consultations. The system ensures that both technical insights and actionable results are communicated effectively to clinicians and stakeholders.

In summary, the methodology for the Early Autism prediction using gradient boosting algorithm on ultrasound measurements. incorporates a comprehensive approach that covers data collection, preprocessing, Classifier process, evaluation, visualization, and thorough testing. By systematically implementing these steps, the project aims to provide a reliable solution based on interpretable risk scores that support early diagnosis and integration into clinical workflows.

Result:

The results of the Early Autism Prediction using gradient boosting algorithms on ultrasound measurements are presented based on the evaluation of the model's performance. The system was tested using a variety of measurements from different patient records and the classification between ASD and neuro typical child is detected. The system enables comprehensive assessment for early clinical intervention.

1. Detection Accuracy

Gradient Boosting achieved the highest performance, with an AUC of 0.87 and sensitivity around 85%, indicating strong predictive capability. Random Forest followed with an AUC of 0.81, while Logistic Regression reached 0.73. These results demonstrate reliable classification of autism risk from prenatal data, with ensemble methods offering improved accuracy, robustness, and potential for integration into clinical decision support systems.

2. Processing Time

The system's processing time is optimized for real-time clinical use. After inputting prenatal ultrasound data, preprocessing including normalization and feature extraction takes milliseconds. Model inference using Gradient Boosting completes within seconds on standard clinical workstations. Overall, the end-to-end pipeline from data entry to risk prediction runs in under 10 seconds. This rapid turnaround supports timely decision-making during prenatal consultations, ensuring that autism risk scores are available instantly without disrupting clinical workflow or requiring high-performance computing resources.

Metric	Value
Accuracy	82.1%
AUC (ROC)	0.87
Sensitivity (Recall)	83%
Specificity	81%
Precision (ASD class)	81%
F1-Score (ASD class)	0.82

Conclusion

The Early Autism prediction using gradient boosting algorithms on ultrasound measurement systems presents a novel approach to predicting autism spectrum disorder (ASD) risk using prenatal ultrasound data and machine learning. By leveraging routinely collected biometric features—such as head circumference, femur length, and nuchal translucency—the system extracts growth-related indices and applies classification models to identify early neurodevelopmental deviations. Three classifiers were implemented: Logistic Regression, Random Forest, and Gradient Boosting. Among them, Gradient Boosting demonstrated superior performance, achieving an AUC of 0.87 and sensitivity of approximately 85%, indicating strong predictive capability.

The methodology includes data preprocessing, gestational age normalization, and imputation, followed by feature engineering and model training. Evaluation through stratified cross-validation ensured robustness and generalizability. Post-processing steps refined outputs into interpretable risk scores, categorized for clinical relevance. Visualization tools such as ROC curves, feature importance charts, and confusion matrix enhanced transparency and supported clinician trust.

The system's rapid processing time (under 10 seconds) and integration-ready design make it suitable for real-time clinical deployment. It bridges the gap between routine prenatal screening and predictive analytics, offering a scalable, non-invasive tool for early ASD risk stratification. Feature importance analysis highlighted key predictors, reinforcing the biological plausibility of the model's decisions.

In conclusion, this project demonstrates that machine learning can effectively augment prenatal care by enabling early identification of autism risk. Future directions include expanding the dataset, incorporating genetic and maternal health variables, and validating the system across multiple clinical centers. This work lays the foundation for proactive, data-driven interventions aimed at improving long-term developmental outcomes.

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REGULATING DIGITAL BANKING: LEGAL STRATEGIES FOR RISK MANAGEMENT AND CONSUMER PROTECTION IN INDIA

P. Godhawari
Research Scholar, VISTAS

Dr. Azizunnissaa Begam
Research Supervisor, VISTAS

Abstract

The rapid growth of digital banking in India driven by innovations such as Unified Payments Interface (UPI), mobile wallets, and AI-enabled credit scoring has transformed financial services delivery while introducing unprecedented regulatory and operational challenges. Although the Reserve Bank of India (RBI) and allied regulatory bodies have implemented frameworks for digital payments, cyber security, and consumer protection, the pace of technological advancement often outstrips legal adaptation. This paper examines the evolving legal strategies for risk management and consumer protection in India's digital banking ecosystem, with a focus on compliance, fraud prevention, and dispute resolution.

The study begins by analysing the current regulatory architecture, including the Banking Regulation Act, 1949, Payment and Settlement Systems Act, 2007, and guidelines under the RBI's Master Directions on Digital Payment Security Controls (2021). It critically evaluates the efficacy of these measures in addressing cyber fraud, phishing, identity theft, and algorithmic bias in credit scoring. By reviewing recent judicial pronouncements, such as Reserve Bank of India v. Jayantilal N. Mistry (2015), and RBI's enforcement actions against non-compliant payment service providers, the paper identifies regulatory strengths and enforcement gaps.

A key emphasis is placed on strategic risk management through the integration of technology-neutral legal provisions, mandatory cyber security audits, and robust Know Your Customer (KYC) norms. The paper also explores international best practices from jurisdictions like the EU's Revised Payment Services Directive (PSD2) and the U.S. Consumer Financial Protection Bureau (CFPB) guidelines, assessing their adaptability to the Indian context.

*Consumer protection is addressed through the lens of **Sustainable Development Goal 16** (Peace, Justice, and Strong Institutions), underscoring that trust in digital banking is central to financial inclusion. The research proposes a hybrid regulatory model combining statutory provisions, self-regulation by industry players, and technology-enabled grievance redressal mechanisms such as AI-driven ombudsman services.*

Ultimately, the paper argues that effective regulation of digital banking in India requires a proactive, anticipatory legal framework that evolves alongside technological innovation. By harmonising legal certainty with innovation-friendly policies, India can strengthen both financial stability and consumer trust in the digital era.

Keywords: Digital banking- risk management - consumer protection – RBI - cyber law - fintech regulation - India.

1. Introduction

The digitalisation of financial services in India has redefined the traditional contours of the banking sector. The proliferation of mobile payments, Artificial Intelligence (AI)-based lending models, cloud-based core banking systems, and the revolutionary Unified Payments Interface (UPI), have collectively heralded a new era of financial innovation. Digital banking has driven

financial inclusion, streamlined service delivery, and generated competition among traditional and non-traditional financial institutions. However, this rapid transformation has simultaneously raised legal challenges relating to cyber-security risks, data protection, operational resilience, systemic stability, and consumer rights. India's regulatory authorities, principally the Reserve Bank of India (RBI), have employed a reactive rather than a proactive approach, constantly recalibrating existing laws to meet technological disruptions. This paper seeks to analyse the evolving legal strategies adopted in India to balance risk management and consumer protection in digital banking, critically examining operational, regulatory, and legal concerns and proposing reforms geared towards anticipatory governance.

2. Evolution of Digital Banking in India

Digital banking in India has evolved through a series of technological, regulatory and policy-driven transformations that began in the early 1990s following economic liberalisation. Traditional banks initially adopted computerisation and core-banking solutions to enable basic online services such as ATMs, internet banking, electronic fund transfers, and tele-banking. The launch of the **Digital India Mission (2015)** and **Jan-Dhan-Aadhaar-Mobile (JAM) trinity** marked a watershed moment by linking bank accounts to Aadhaar-based e-KYC, thereby expanding the customer base and enabling instant account openings. Innovations such as the **Unified Payments Interface (UPI)** in 2016, **Bharat Interface for Money (BHIM)**, mobile wallets, QR-code-based payments and prepaid payment instruments significantly boosted retail digital payments. Concurrently, private fintech companies collaborated with banks to offer AI-driven lending, robo-advisory services and neo-banking models, transforming customer service and credit delivery. Today, India stands as one of the world's fastest growing digital banking markets where cloud computing, big data analytics and API-based open banking are being integrated into regulatory sandboxes under the Reserve Bank of India's supervision, ushering in a new era of innovation-driven, inclusive finance.

3. Regulatory Architecture Governing Digital Banking

3.1 The Banking Regulation Act, 1949

The Bank Regulation Act (BRA) remains the primary legislative framework governing banking activities in India. Although drafted prior to the digital age, Section 35A empowers the RBI to issue directions regulating the operations of banks, allowing sufficient flexibility to encompass digital products. Amendments in 2020 enabled the RBI to supervise co-operative banks, thereby extending regulatory coverage to smaller digital banking entities.

3.2 Payment and Settlement Systems Act, 2007

The Payment and Settlement Systems (PSS) Act creates the statutory basis for regulation of payment systems, authorising the RBI to operate and regulate all forms of electronic transactions. Issuers of e-wallets, PPI licensees, and UPI participants fall under its ambit.

3.3 Information Technology Act, 2000

The Information Technology Act (IT Act) provides overarching legal validity to electronic contracts, digital signatures, and cyber security measures, further supported by Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or

Information) Rules, 2011. It criminalises identity theft, hacking, computer-related fraud, and unauthorised data access — all centrally relevant to digital banking security.

3.4 Master Directions & Guidelines of RBI

- *Master Directions on Digital Payment Security Controls (2021)* mandate multi-factor authentication, tokenisation, encryption and risk-based transaction monitoring for regulated entities.
- *Master Circular on Frauds (2016)* imposes obligations to report, detect and mitigate digital fraud.
- *Guidelines on Regulation of Payment Aggregators and Payment Gateways (2020)* were issued to bind non-banks offering payment services.

4. Risk Management in Digital Banking

4.1 Cyber Security Risks

Digital banking is exposed to sophisticated cyber threats such as phishing, malware, SIM swapping and ransomware. Despite RBI circulars mandating banks to appoint Chief Information Security Officers (CISOs), implement Security Operations Centres (SOCs), and conduct periodic audits, the frequency of cyber incidents continues to rise. The *Cosmos Bank* breach of 2018 involving SWIFT systems, and recent UPI frauds, illustrate systemic vulnerabilities.

4.2 Operational Risks

Technological and process-related failures in digital systems may halt services and jeopardise consumer confidence. RBI's directive in July 2022 compelling HDFC Bank to temporarily stop issuance of new credit cards due to repeated outages reflects strict operational risk regulation.

4.3 Third-party and Outsourcing Risks

Bank-fintech partnerships raise concerns relating to dilution of accountability. Under the *Outsourcing Directions (2023)*, the RBI holds banks ultimately responsible for lapses arising from third-party technical vendors. The legal principle of *non-delegable fiduciary duty* underscores this supervisory approach.

4.4 Regulatory and Compliance Risks

Regulation has struggled to keep pace with innovations in AI-driven products. Algorithmic bias in credit scoring and opaque decision-making processes raise novel regulatory concerns. Currently, RBI lacks explicit AI governance rules, and there is a growing need to ensure auditability, explainability, and non-discrimination.

5. Consumer Protection

5.1 Legal Framework

Consumer protection in India's digital banking sector operates under a multi-layered legal framework designed to safeguard users' interests as financial services increasingly move online.

- The **RBI's Ombudsman Scheme for Digital Transactions, 2019** provides a cost-free, specialised grievance redress mechanism where customers can lodge complaints related to unauthorised electronic payments, delays, and service deficiencies by system participants such as banks, mobile wallet providers and UPI facilitators.
- To streamline and strengthen oversight, the Reserve Bank introduced the **Integrated Ombudsman Scheme, 2021**, which consolidates earlier ombudsman schemes into a single and simplified structure, offering uniform protection across all regulated entities.
- Alongside these sector-specific mechanisms, the **Consumer Protection Act, 2019** plays a foundational role by covering product liability of service providers and extending its provisions to include e-commerce rules, thereby making digital banking platforms accountable for deficiencies in service.
- Complementing these is the **Information Technology Act, 2000**, which underpins online financial transactions by criminalising hacking, identity theft, unauthorised access and other online abuses that threaten the security and privacy of digital banking consumers.

5.2 Redress Mechanisms

The Ombudsman Scheme enables cost-free, quasi-judicial remedy for consumers facing issues related to unauthorised electronic transactions, delays, mis-selling, or non-adherence to RBI directions. However, despite the simplified procedure, awareness and accessibility remain limited. The RBI has piloted Chatbot-based assistance and artificial intelligence-enabled grievance handling.

5.3 Data Privacy Concerns

India presently lacks a dedicated data protection statute. In the absence of the long-pending *Digital Personal Data Protection Bill, 2023*, sensitive financial data held by digital banks is prone to misuse. Cases of unauthorised sharing of customer data with lending apps, spam calls and data scraping by payment aggregators highlight these vulnerabilities. Consumers have limited recourse, as the IT Rules establish only weak consent standards.

6. Comparative International Perspectives

6.1 European Union (PSD2)

The Revised Payment Services Directive (PSD2) requires strong customer authentication, permits open banking through APIs, and holds payment service providers accountable for fraud unless gross negligence is demonstrated by consumers. Data-sharing rules are shaped by the GDPR.

6.2 United States (CFPB)

The Consumer Financial Protection Bureau (CFPB) regulates digital financial products through disclosure obligations, supervisory enforcement, and consumer restitution orders. Fraud liability is capped under the Electronic Fund Transfer Act (EFTA), fostering robust consumer trust.

6.3 Lessons for India

India can draw lessons regarding explicit liability allocation, open application standards, and inclusion of fintechs as regulated entities instead of treating them as unregulated collaborators. Harmonisation of data privacy frameworks with financial regulations is essential.

7. Judicial Responses and Enforcement

Judicial pronouncements have significantly shaped digital banking regulation.

- In ***Reserve Bank of India v. Jayantilal N. Mistry (2015)***, the Supreme Court held that RBI's regulatory actions are subject to transparency under the Right to Information Act, enhancing accountability. More recently, High Courts have directed banks to refund unauthorised online transfers where negligence is shown.
- ***State Bank of India v. Rajesh Agarwal***, The Court ruled that banks must provide a fair opportunity for borrowers to be heard before classifying an account as a "fraud." This judgment emphasized adherence to principles of natural justice when reporting fraud—banks cannot unilaterally label cases as fraud without due process. The judgment now serves as precedent for numerous high court rulings reaffirming procedural fairness.
- **Supreme Court Mandates Bank Liability for Unauthorized Transactions**, In a landmark ruling, the Supreme Court upheld a Gauhati High Court ruling requiring banks (such as SBI) to fully refund customers for fraudulent or unauthorized transactions, unless they provide concrete evidence of the customer's negligence. The judgment reinforces the "zero liability" principle in digital transactions, shifting the onus to banks to validate any claim of customer fault.
- **Pragya Prasun & Ors. vs. UOI & Ors. and Related Cases (April 2025)**, The Court declared that *digital access*, including the ability to complete digital KYC, is an intrinsic component of the **right to life and liberty (Article 21)**. The judgment mandates accessible alternatives for individuals with disabilities (e.g., acid attack survivors, blind persons), including digital KYC accommodations, dedicated helplines, accessibility audits, and human review mechanisms.
- **Citicorp Consumer Rights Case (July 2025)**, The Supreme Court clarified that consumers retain the right to file complaints in consumer forums **even if an arbitration clause** exists in the contract. The consumer cannot be forced to choose arbitration—it remains their exclusive choice. The Court also emphasized that consumer forums must record reasoning for condoning delayed filings, particularly in long-drawn disputes.

The RBI has imposed penalties on Paytm Payments Bank and Mastercard for non-compliance with data localisation directives under Section 30 of the PSS Act and Section 46 of the BRA. However, enforcement remains inconsistent, with delays in action reducing deterrence.

8. Policy and Legal Reforms: The Way Forward

8.1 Technology-Neutral Laws

Laws need to be drafted using principle-based, technology-neutral language to ensure adaptability. For instance, imposing general duties to ensure "reasonable security controls" offers flexibility while retaining enforceability.

8.2 Mandatory Cyber Audits and Reporting

Annual audits, stress-tests, and compulsory reporting of cyber incidents should be legislated through a new Digital Banking Regulation Act. Non-compliant entities must be subject to tiered penalties and licence revocations.

8.3 Strengthening KYC and AML Norms

Robust e-KYC procedures integrating biometric authentication with risk-based profiling can reduce fraud. Banks should leverage advanced technological tools for real-time suspicious transaction monitoring.

8.4 Inclusive Consumer Protection

Tech-enabled grievance redress mechanisms such as AI-driven ombudsman platforms can expedite dispute processing. Adoption of "plain language" notifications regarding rights, liabilities and safe practices in vernacular languages is recommended.

8.5 Regulating Fintech Collaborations

Fintechs operating in the "shadow" of banks should either be brought under a flexible "light-touch" licensing regime or bound through enforceable regulatory sandboxes, ensuring supervised innovation.

9. Conclusion

Digital banking represents both tremendous promise and palpable peril. India's regulatory response thus far has been fragmented, reactive, and incremental. The convergence of banking, technology, and consumer rights demands a holistic, anticipatory legal framework. By adapting international best practices within the domestic context, enforcing strict cyber security obligations, safeguarding consumer data, and introducing agile legal principles, India can achieve a balanced pathway towards financial innovation, inclusion, and trust. Sustained regulatory vigilance, empowered by statutory reform and supported by technological advancement, is essential to ensure that digital banking evolves not just at the speed of technology, but at the strength of law.

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THE PROTECTION OF PLANT VARIETIES AND ITS IMPACT ON SUSTAINABLE DEVELOPMENT IN AGRICULTURE SECTOR

L. Keerthana

Research Scholar, VISTAS

Dr. Sincy Wilson

Assistant Professor, VISTAS

Abstract

Everyone is entitled to safeguard their lives, to ensure the right to life for that food plays a major role. Agriculture is an essential for the enrichment of human life and all beings. We all are obligated to protect and safeguard it. In recent times, due to rapid industrialization and urbanization many people were left cultivation and switch over to technical and technology or other related fields which they can able to survive. This drastic shift creates greater impact on agriculture and demand of food supply. The 2023-2024 the GDP over agriculture is 20.3% and currently 2024-2025 contribution towards GDP is 18.7%. To dissolve this problem, usage of advancement technology is inevitable. Therefore, we are urge to protect and promote sustainable agriculture only with the help of new plant variety for the enhancement and protection by increasing the new kind of varieties of plant and trees and scrubs, etc., this may also encourage the breeder and farmer's to involve in cultivation and creation of new varieties to promote sustainable flow of food chain. In this paper, we will discuss about how the intellectual property help as to attain sustainable goals pertaining agriculture sector.

Keywords: *Environment, Sustainable agriculture, Technology, Food security, New plant varieties, IPR.*

Introduction

By the way, Intellectual property is root cause for the birth of innovative development on the earth. It promotes technique solutions to the modern problems raised to drastic change over the environment & human development. Intellectual property is not only paved the way for technological development alone instead of that, it plays vital role in agriculture sector also. The productivity ratio of agriculture is drastically diminishing over the period of decades, to sort it out technological advancement has utilized as a part of cultivation (like usage of machinery in agriculture field to aid the cultivators) as also to increase their interest over the field of agriculture. Even though the productivity and yielding are not matched the expected ratio. At the pre-production stage, researchers and farmers seek to develop better products through processes like selective breeding or genetic modification. Many of the technologies or innovations are made to support human health, provide economic benefits, and prevent agricultural loss¹. IP took sustainability as a tool to promote agriculture for larger scale. On this massive plan, IP rights step in as advocates, creating environments that support innovation and sustainable practices by encouraging inventors and creators to come up with solutions that align with the SDGs. Patents, utility models, and registered designs protect inventions and contribute to leading innovation in various fields connected to the SDGs, such as agriculture, renewable energy, and healthcare.

¹ <https://iaas.org.sg/what-role-does-intellectual-property-law-play-in-agriculture/>

Sustainable Development Goals and Agriculture

The Sustainable Development Goals (SDGs), set by the United Nations, are like a collective to do list for the world, urging us to tackle various global challenges by the end of 2030. The Sustainable development is a continuous process to ensure the availability of resources to meet the needs of the public. Many international organizations and nations adapt some of the sustainable development goals in their policies and programmes. Especially focusing on the sustainable development Goal 2 aims to eradicate hunger by 2030, but the global hunger and food insecurity crisis has worsened since 2015 due to factors like the pandemic, conflict, climate change, and deepening inequalities. By 2022, 9.2% of the world's population was in chronic hunger, and 2.4 billion faced moderate to severe food insecurity. This crisis is a growing concern, as it hinders sustainable development and reduces productivity. Additionally, 2 billion people lack access to safe, nutritious food, and 148² million children experienced stunted growth in 2022 as per the Global Hunger Index. Coordinated global efforts are needed to address this critical humanitarian challenge. Therefore, UNFAO also indirectly adopts the sustainable development Goals in its objectives. *"Our goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives, combat hunger"*³. It is still an unachievable goal of UNFAO, and other allied international organizations were working to attain the goal of zero hunger and sustainable use of natural resources confronts increasingly complex governance challenges. More people die from hunger and malnutrition than from infectious diseases, making them the biggest dangers to public health. Hunger and related conditions claim the lives of 25,000⁴ people every day, including over 10,000 children. There are an estimated 854 million undernourished people in the globe, and an additional 100 million could become hungry and impoverished due to rising food prices. Those who must spend at least 60% of their income on food, such as the impoverished and displaced in urban areas, the landless in rural areas, pastoralists, and the vast majority of smallholder farmers, are especially vulnerable.

Therefore, the UN organization framed the Food and Agriculture Organization that leads international efforts to defeat hunger and to improve nutrition and food security. The FAO's underpinned the agricultural and nutrition research and provided technical assistance to member countries to boost production in agriculture, fishery, and forestry. It zeroed in on endeavors to foster high return strains of grain, kill protein lack, advance country work, and increment agricultural exports. After the implementation of UNFAO and SDG, the current hunger ratio is reduced to 1.2% compared to 2015- 2023. According to the 2023 global GHI (global hunger index) score is 18.3 considered moderate - down less than one point from the 2015 global score of 19.1. *The right to adequate food is being violated for nearly three-quarters of a billion people every day*⁵.

² <https://www.un.org/youthenvoy/2013/09/fao-food-and-agriculture-organization-of-the-united-nations/>

³ <https://www.fao.org/3/nl239en/nl239en.pdf>

⁴ <https://www.un.org/en/chronicle/article/losing-25000-hunger-every-day~:text=Each%20day%2C%2025%2C000%20people%2C%20including,from%20hunger%20and%20related%20causes.>

⁵ Global hunger index 2023, <https://www.globalhungerindex.org/pdf/en/2023.pdf>

When it's come to India, Global Hunger Index⁶ 2024 stated that India's score of 27.3 indicates a serious level of hunger and India ranks 105th out of 127 countries with sufficient data. As indicated in the above paragraphs, it is understood that achieving the goal of zero hunger need to adopt many technological innovation with the help of intellectual property laws in the field of agriculture to promote sustainable agriculture, for which a detailed study in the existing legal and policy framework is very much required. In this research study the researcher is looking at the existing legal and policy framework for supporting agrarian's in India.

Need for the Intersection of PVP with the SDG's in Agriculture Sector

The world cannot feed the entire world with available resources and lack of labor in agriculture, making technological advancement in agriculture necessary through proper legislation and international agreements. The TRIPS agreement enables biotechnological inventions to enhance resource sustainability by enforcing an international standard for domestic protection of inventions. Article 27 of the TRIPs agreement, binding for all WTO members, provides that patents should be available for any inventions, whether products or processes, in all fields of technology, provided they are new, involve an inventive step, and are capable of industrial application.

Biotechnology has rapidly developed and has great potential for solving many problems related to agriculture, industry, environment, and health, which are directly related to sustainable development. Sustainability is becoming the cornerstone of the economy of many countries, both developed and developing, and depends on the use of new technologies, innovations, entrepreneurship, and utilization of renewable resources. However, present agricultural biotechnology is characterized by its prohibitive characteristics, with new biotechnological inventions secured by licenses and other intellectual property rights (IPRs). As the development of agro-biotech moves to emerging nations, the responsibility for IPRs is now at issue. Most critical research organizations, public and private, have successfully considered and executed IPR techniques since the beginning of the 1990s. **By linking the sustainable development goals with IPR may lead to** Stimulating Innovation to Enhance Sustainability

The Plant Variety Protection (PVP) safeguards the breeders' rights, providing the legal assurance needed to invest in the development of improved crop varieties such as drought-resistant, nutrition-enhanced, and pest-resilient seeds. This innovation aligns directly with SDG 2 (Zero Hunger), enabling resilient, high-yield crops that bolster global food security and nutrition. For example, France's Ogura technology under PVP generated substantial benefits for both farmers and consumers.

Equitable Benefit Sharing & Genetic Diversity

Well-designed PVP systems uphold Access and Benefit Sharing (ABS), ensuring that benefits flow not only to breeders but also to farmers particularly crucial in preserving traditional knowledge and agricultural biodiversity. This supports SDG 2-Target 2.5, which emphasizes maintaining genetic diversity and fair benefit sharing.

⁶ <https://www.macrotrends.net/global-metrics/countries/ind/india/hunger-statistics>

Attracting Investment and Strengthening Resilience

PVP frameworks encourage market confidence and investments in research and development. Vietnam, for instance, experienced an 800% surge in R&D investments in plant breeding and a substantial GDP boost as a result of robust PVP policies. These investments translate into improved infrastructure, technological adoption, and resilient agricultural systems—advancing SDG 2 (Zero Hunger), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation, and Infrastructure).

Empowering Smallholders & Supporting Inclusive Growth

By incentivizing new varieties that are better suited for local conditions, PVP can help smallholder farmers—who form a significant share of producers in Asia and other regions boost productivity and income substantially. SDG 2-Targets 2.3 and 2.a emphasize doubling productivity and incomes among small-scale producers and increasing investments in rural infrastructure and research. Moreover, by supporting equitable access and genetic resource sharing, PVP can promote inclusive growth across gender and community lines.

Climate Resilience & Biodiversity Conservation

Breeder innovation protected under PVP including stress-tolerant and climate-smart varieties enhances adaptation to climate change, reduces reliance on chemical inputs, and conserves biodiversity through sustainable seed systems. This directly contributes to SDG 13 (Climate Action), SDG 15 (Life on Land), and SDG 12 (Responsible Consumption and Production).

Role of Plant Variety Protection in Sustainable Agriculture

The world population is currently approximately 7.5 billion and its growth rate is estimated to increase, posing a major threat to sustainability. One of the main challenges facing humanity today is how to feed the growing population, while protecting the environment and promoting social and economic development. Modern biotechnologies dependent on logical revelations offer novel methodologies for finding some kind of harmony between formative necessities and ecological protection. The main zones where its standards are working are as per the following.

Advantages Include

- Improved yield from crops.
- Reduced weakness of harvests to natural anxieties.
- Increased healthful characteristics of food crops.
- Improved taste, surface or presence of food.
- Reduced reliance on manures, pesticides and other agrochemicals.
- Production of immunizations

Plant Variety Protection in India

Plant variety protection provides a legal protection of a plant variety to a breeder in the form of Plant Breeder's Rights (PBRs) that are intellectual property rights which provide exclusive rights to a breeder of the registered variety. The Plant Variety Protection and

Farmers' Rights Act 2001(Plant Variety Act) was drafted in accordance with TRIPs Agreement requires WTO Members to introduce an “*effective system*” for the protection of plant varieties.

Article 27 3 (b) of the TRIPS agreement reads: The Member countries may exclude: “*Plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof.*”

This commitment by WTO members means that most developing countries that have not yet extended intellectual property rights to their agricultural sectors will have to do so. As a member of the WTO and a signatory of the TRIPS Agreement, India is obliged to provide protection for plant varieties through patents, special systems, or both. Like most developing countries, India decided to exclude patents on plants and plant varieties, but exercised a unique right of choice. A “sui generis” means effective plant variety protection. India enacted the Plant Variety Protection and Farmers' Rights Act (PPVFR) of 2001 for the registration of plant varieties.

Unregistered Plant Varieties in India

All plant varieties cannot obtain legal protection in India. According to the PPVFR Act of 2001, certain plant varieties are excluded from protection. In order to protect public order or public morals or the lives and health of humans, animals, and humans, it is necessary to prevent any species from commercial development of the species. Plants or varieties that avoid serious damage to the environment or varieties with termination technologies, or varieties that belong to species or genera not listed in the central government's notification, shall not be registered and protected in accordance with the law.

Term of Protection for Registered Plant Varieties

- 18 years for trees and vines.
- 15 years for other crops.
- The existing variety that has existed for 15 years from the date the central government notified the variety under the 1966 Seed Law.

What are the exemptions provided by law?

- 1. Exemptions for farmers:** farmers have the right to produce, conserve, use, re-sow, reproduce exchange, share or sell their agricultural products, including the seeds of the varieties protected by this law.
- 2. Researcher exemption:** Researchers may (i) use registered species for experiments. (ii) Use the variety as the initial source of the variety to create other varieties.

Generally speaking, farmers should be regarded as commercial breeders and should receive the same variety protection as them. But since the law adopts the registration standards of the UPOV Convention, namely novelty, uniqueness, uniformity and stability, it's not easy to apply to the registration of farmers' varieties, so it is not clear how effective the protection of farmer's varieties. The contribution of farmers will be in addition to granting farmer's rights to new varieties, the bill also recalls that farmers cannot be deprived of their remaining minimum rights. In addition, through the "benefit sharing" mechanism, the bill aims

to promote some potential profits of farmers who participate in the commercialization of registered plant varieties.

Biosafety Regulations

The use of genetically modified organisms in agriculture and medical care poses potential risks to human health, the environment, and biodiversity. To address these risks, many countries have enacted biosafety regulations, with international organizations like the Convention on Biological Diversity (CBD) taking initiatives to coordinate these regulations. The Cartagena Protocol on Biosafety was passed under the CBD's auspices in 2000, aiming to protect biodiversity from the potential risks posed by living modified organisms. India has passed the Biodiversity Act 2002, a comprehensive system for the protection and sustainable use of biological resources. The Act emphasizes the principle of permanent sovereignty over natural resources and recommends strict restrictions on foreigners' access to biological resources or related knowledge. The Act aims to protect biological diversity, sustainably use its components, and equitably distribute the benefits derived from the use of biological resources. Without the prior approval of the National Biodiversity Administration, the Act prohibits activities such as obtaining biological resources found in India for research or commercial purposes, transferring research results related to biological resources, and requiring intellectual property rights for inventions based on research on biological resources obtained from India. The Act does not include India's biological resources that are normally traded as commodities and excludes traditional use of Indian biological resources and related knowledge, cooperative research projects between India and foreign institutions, and uses by cultivators and breeders.

Other Legislative Framework in India

In India, the production, import, use, research, and release of genetically modified organisms (GMO) and products made through the use of such organisms are governed by rules notified by the Ministry of Environment and Forests (MOEF), Government of India. According to the Environment (Protection) Act of 1986 (EPA) on December 5, 1989. These rules and regulations, usually referred to as the 1989 rules, cover the field of research and the large-scale application of genetically modified organisms and products throughout India.

Challenges in Protection of plant variety Act, 2001

The Protection of Plant Varieties and Farmers' Rights (PPV\&FR) Act, 2001 faces multiple implementation challenges in India, which affect its overall effectiveness.

1. **Lack of Awareness:** One of the major issues is that a large section of farmers, especially small and marginal ones, remain unaware of their rights under the Act, including the right to register traditional varieties and claim benefit-sharing.
2. **Complex Registration Process:** The procedure for registering plant varieties, particularly farmer varieties, is complicated, requiring technical documentation and DUS (Distinctness, Uniformity, and Stability) testing, which many farmers find difficult to navigate without expert help.
3. **Inadequate Infrastructure:** The lack of well-equipped testing centers and trained staff delays the processing of applications and reduces access in remote areas.

4. **Weak Benefit-Sharing Mechanism:** Although the Act provides for benefit-sharing, the actual implementation is weak, and farmers rarely receive compensation when their genetic resources are used in commercial breeding.
5. **Legal Conflicts and Ambiguities:** The overlap and lack of coordination between the PPV&FR Act and the Biological Diversity Act, 2002, create confusion regarding access, registration, and benefit-sharing obligations, deterring stakeholders from active participation.
6. **Poor Enforcement and Monitoring:** Intellectual property rights under the Act are not robustly enforced, making it difficult to prevent unauthorized use or piracy of registered varieties.
7. **Underutilization of the National Gene Fund:** The Gene Fund, meant to support farmers and conservation initiatives, remains underutilized due to poor governance and lack of transparency.

Conclusion

Even though, there were certain minor lacunas in plant varieties act but still the usage and protection of plant varieties has not compromised and work effectively to protect the interest of farmers and breeders. But, only in a rigid manner. By Bridging PVP with the SDGs results in a synergistic framework. **PVP stimulates innovation, mobilizes investment, and ensures equitable benefit sharing**, while **SDGs provide a purpose driven roadmap** for achieving sustainability, resilience, equality, and food security. Together, they enable the development and access to improved, climate-robust, and nutritive crop varieties. Socio economic empowerment of smallholder farmers, including women and marginalized groups. Preservation of biodiversity via fair and knowledge-rich seed systems. Strengthened rural economies through innovation-led extension and infrastructure. Thus, integrating PVP into a broader SDG-aligned strategy is key to transforming agriculture into a sustainable, inclusive, and resilient sector.

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BUILDING AN INCLUSIVE GREEN WORKFORCE: STRATEGIC ANALYSIS OF INDIA'S POLICY AND INSTITUTIONAL LANDSCAPE

Dhatchayani Lakshmanasamy

*Assistant Professor, Crescent School of Law
B.S.Abdur Rahman Crescent Institute of Science and Technology, Chennai
dhatchayani@crescent.education*

L. Priya Dharshini

*Assistant Professor, Saveetha School of Law, SIMATS
priyadarshinil.ssl@saveetha.com*

DJ. Anvetha

*Student, Crescent School of Law
B.S.Abdur Rahman Crescent Institute of Science and Technology, Chennai*

Archana

*Student, Crescent School of Law
B.S.Abdur Rahman Crescent Institute of Science and Technology, Chennai*

*"Business cannot succeed on a planet that fails. Jobs cannot be sustained on a dying planet" –
United Nations Secretary-General Antonio Guterres.*

Abstract

This paper critically examines India's policy and institutional framework for fostering an inclusive green workforce in the context of its climate change commitments. Drawing on a qualitative and descriptive analysis of the National Action Plan on Climate Change (NAPCC), the Long-Term Low Emission Development Strategy (LT-LEDS), and initiatives of the Skill Council for Green Jobs (SCGJ), the study highlights both progress and persistent gaps. Findings reveal that while training programs have expanded significantly—particularly in solar energy and waste management—they remain uneven across sectors and regions, with limited coverage of emerging areas such as green hydrogen, circular economy practices, and sustainable agriculture. Moreover, inclusivity challenges persist, as women, persons with disabilities, and marginalized communities continue to face barriers to participation. The study argues that building an inclusive green workforce is central to India's decarbonization strategy and recommends diversifying training portfolios, mainstreaming gender-responsive policies, and strengthening institutional linkages between climate and skill development strategies. By embedding skill development at the heart of climate policy, India can simultaneously advance environmental sustainability, economic growth, and social justice.

Keywords: *Green Job, Training, Green economy, sustainable development, Skill development, and environmental justice.*

Introduction

Biodiversity holds significant economic value by providing essential resources and invaluable ecosystem services, critical for agricultural productivity and various industries (Sobrevila & Hickey, 2010). Recognizing the intricate relationship between economic

prosperity and environmental integrity, it becomes imperative to adopt sustainable practices that both preserve and enhance natural resources while simultaneously fostering human welfare (Bansard & Schröder, 2021). However, this vital natural asset faces formidable threats stemming from human activities such as rampant deforestation, over-exploitation of resources, pollution, invasion by non-native species, and the overarching challenge of climate change. This underscores the urgent need to safeguard it for the well-being of present and future generations (Sobrevila & Hickey, 2010).

The adverse impacts of climate change ripple across various sectors especially weather-sensitive sectors like agriculture construction, informal traders, etc, posing disruptions to livelihoods, particularly affecting vulnerable communities such as the impoverished and marginalized particularly those reliant on natural resources (Van Der Ree, 2019; Kimbrough, 2021). In light of escalating environmental challenges, the notion of prioritizing economic growth at the expense of environmental conservation is increasingly recognized as untenable (Al-Ammarat & Al-Mashaqaba, 2022). This paradigm shift acknowledges that sustainable development must integrate environmental protection as a cornerstone, ensuring economic, social, and environmental viability for more equitable, prosperous, and sustainable current and future generations (Sobrevila & Hickey, 2010). So, transition to a green economy is indispensable (Al-Ammarat & Al-Mashaqaba, 2022).

India's response to this imperative was articulated through the National Action Plan on Climate Change (NAPCC), launched in 2008 as a voluntary national commitment to address climate challenges while sustaining economic growth. The NAPCC presents a strategic framework that seeks to reconcile growth objectives with ecological sustainability by promoting inclusive development pathways sensitive to climate change impacts, particularly on vulnerable populations. It emphasizes integrating poverty alleviation with environmental stewardship, advancing energy efficiency through demand-side management, and accelerating the deployment of climate-resilient and low-carbon technologies.

The national framework provides both a policy mandate and an operational foundation for transitioning to a green economy. However, the success of such a transition hinges on the availability of the workforce equipped with green skills. In this context, understanding how India is fostering these skills and whether this process is inclusive and regionally balanced becomes critical to assessing the country's readiness for an equitable and sustainable economic future.

While there is extensive global literature on the role of green skills in enabling a just and sustainable transition, empirical studies in the Indian context remain limited. Existing works often focus on defining green jobs or mapping global best practices, but few provide a systematic analysis of India's policy and institutional framework for green workforce development. In particular, there is a lack of integration between climate policy frameworks such as the National Action Plan on Climate Change (NAPCC) and workforce strategies led by institutions like the Skill Council for Green Jobs (SCGJ). Moreover, inclusivity dimensions such as gender disparities, regional imbalances, and the concentration of training in a few sectors are often overlooked. This creates a gap in understanding how effectively India's green workforce development aligns with its broader climate commitments and sustainable development goals.

This study aims to critically examine the policy and institutional landscape that shapes green workforce development in India, with particular attention to the National Action Plan on Climate Change (NAPCC), the Long-Term Low Emission Development Strategy (LT-LEDS), and the Skill Council for Green Jobs (SCGJ). It further seeks to evaluate the alignment of India's green skill development initiatives with international best practices and domestic climate policy objectives. In addition, the study endeavors to identify key challenges and gaps, including issues of inclusivity, sectoral balance, and the anticipation of emerging skills, thereby providing a nuanced understanding of the strengths and limitations of India's green jobs framework.

This study employs a qualitative and descriptive research design. A comprehensive literature review was undertaken to establish the theoretical foundations and global context of green skills and workforce development. India-specific data on training programs, job roles, and certification initiatives under the Skill Council for Green Jobs (SCGJ) were systematically collected and analyzed to provide an in-depth understanding of the country's green workforce landscape.

Background of the Study

The concept of green economy is characterized by reduced carbon emission, efficient resource allocation, and social inclusivity, thus it prioritizes sustainability by fostering economic activities that take into consideration both environmental and social well-being. This approach aims to create new employment opportunities and industries focused on environmental solutions (Sudjono, 2023), ultimately contributing to economic expansion and fostering entrepreneurship. The transition to a green economy not only benefits the environment by improving its quality but also yields positive societal impacts. This includes enhanced health outcomes and a general improvement in quality of life within marginalized communities. As a result, the green economy has the potential to promote greater social equity and environmental justice (Özkaynak, 2019).

However, the move to a sustainable economy is not a simple sectoral adjustment, it represents a transformation of the labour market itself. It influences employment and labour market in four different ways. Firstly, they may spur the creation of new job opportunities, such as in the production of pollution-control devices, development of eco-friendly agricultural inputs, installation of solar energy systems, or provision of environmental consultancy services. Secondly, there may be a substitution of jobs, like a shift from reliance on fossil fuels to embracing renewable energy sources or from landfilling to recycling practices. Thirdly, job displacement without immediate replacement as a result of environment protection measures, as observed when the production of materials like polythene bags is banned. Lastly, transition necessitates reorientation and upskilling of existing job roles to align with emerging green technologies and employment opportunities (Carrion-Crespo, 2011). In effect, the transition towards a green economy offers promising opportunities for green jobs across diverse sectors (Martinez- Fernandez et al., 2010).

Concept of Green Job

Green jobs represent an essential and transformative strategy that simultaneously tackles climate change, preserves the environment, and promotes socially and economically

sustainable enterprises thereby offering a solution to the dual problem of mitigating poverty and reducing greenhouse gas emissions by creating decent employment opportunities (Al-Ammarat & Al-Mashaqaba, 2022).

Thus, according to ILO (2017), Green jobs are decent jobs that are instrumental in promoting sustainability through efficient consumption of energy and resources, limiting greenhouse gas emissions, minimizing waste and contamination, and protecting and restoring ecosystems, thus mitigating the impact of climate change by adapting to practices that reduce human impact on the environment. Moreover, by fostering the creation of new industries and job opportunities in the production of environmentally friendly goods and services they develop strategies for sustainable employment.

Policies aimed at mitigating unsustainable production practices may result in employment contraction within certain sectors, while those facilitating technological advancements are likely to foster job creation. In sum, investments and business development within the green economy sector drive demand for new skills and entrepreneurial aptitudes (Carrion-Crespo, 2011). This transition towards green job has the potential to address not only unemployment problem but also increases income prospects particularly in rural areas through conservation and sustainable use of natural resources (Al-Ammarat & Al-Mashaqaba, 2022).

Decent jobs, by definition, uphold fundamental human and labour rights, provide social protection, and enable workers to have a voice in decisions that impact their working lives and helps to foster cooperation and collaboration (Ghai, 2003). Green jobs, while beneficial for resource conservation, may not always ensure decent working conditions. In sectors like waste management and agriculture, achieving these standards presents significant challenges (Valenti et al., 2016). For example, positions in recycling contribute to easing pressure on natural resources but often involve hazardous and unsanitary work environments, posing risks to workers' health. they lack adequate protections and offer low wages. without satisfying the conditions of a decent job any job that promotes environmental sustainability cannot be called a green job (Van Der Ree, 2019). The other major difficulty in measuring the success of environmental justice and employment creation in green jobs. This is due to a lack of the conceptual clarity of the terms green and green employment and also measuring net job creation (Viola et al., 2016).

Skill Development in Advancing the Green Economy

The success of the green transition depends on countries fulfilling their Paris Agreement commitments through NDCs, yet many lack concrete plans for skills training. The right skills for jobs are an essential prerequisite for the transition to environmentally sustainable and socially inclusive economies. According to the ILO's 2019 report on skills for a green future, over 20% of countries omit human capital plans entirely, and fewer than 40% include concrete skill-building measures. This skills gap threatens the implementation of climate actions across sectors such as energy, agriculture, transport, and tourism.

It is estimated that the transition to energy sustainability by 2030 could generate almost 25 million new jobs globally, while 7 million jobs may be lost. Of those lost, 5 million could be recovered through labour reallocation, leaving around 2 million workers in need of reskilling to shift to other occupations, posing a significant unemployment risk without targeted reskilling. Moreover, most job creation is concentrated in mid-skill, male-dominated

occupations. Although this helps to offset the loss of mid-skill jobs caused by technological change, it also risks reinforcing existing occupational gender stereotypes. Without targeted measures to train and upskill women in relevant fields, they are likely to secure only a fraction of the jobs created, further widening gender disparities in the labour market. (ILO,2019)

The urgency for gender-responsive skilling is underscored by the existing magnitude of labour force participation gaps (Mininni & Hiteva, 2023). According to ILO (2022) gender gap estimates, women's labour force participation is significantly lower than men's across many countries for instance it is 50.9% in India. This is comparatively higher when compared to other developing countries like Bangladesh (43.9%), Indonesia 28% in 28%), China (12.7%) and South Africa (13.7%). The underrepresentation of women indicates untapped potential in the workforce. Addressing these disparities through inclusive training policies is critical to ensuring that women can access emerging green jobs.

These challenges and opportunities are equally relevant in rural areas, which provide diverse economic activities and have a vital role to play in the transition to environmentally sustainable economies and societies (Salonen, 2024, Igić et al., 2024). With the green transformation, new and decent jobs can emerge in sectors such as clean energy, sustainable agriculture, and environmental protection, but they must be inclusive, ensuring that all rural workers and employers benefit. Inclusive skills development programmes, supported by strong technical and vocational education and training (TVET) systems, can reskill and upskill rural workers, enabling them to adapt to shifting skill demands and seize opportunities created by the green transition (International Labour Office, 2022b).

Addressing these challenges also requires robust Skills Assessment and Anticipation (SAA) systems for the green transition, which provide information current and future skills needs of the labour market (skill demand) and the available skill supply. This mechanism can help to identify the skill requirements both between and within occupations an support effective policy making in areas like youth training, education, career guidance, employment, industrial, and migration policies. An effective SAA process begins with mapping existing approaches to assessing and anticipating skills and defining the objectives and terminology, thereby preventing duplication and enhancing policy relevance. Countries such as France, Norway, and Australia have institutionalized SAA mapping processes, creating publicly accessible databases of skills needs and training requirements (OECD,2023). In India, while agencies such as the NSDC, MSDE, and the Skill Council for Green Jobs undertake sector-specific skill gap assessments, the absence of a unified green skills mapping platform limits coordination and efficiency (PAGE, 2023). Strengthening such mechanisms could help India better align workforce development with its green transition goals.

The green transition has uneven regional impacts, making local-level application of SAA data essential. Globally, countries like Australia, finland have institutionalised systems to ensure SAA results are widely accessible. Finland's ForeAmmatti platform offers real-time, region-specific labour market data, including job forecasts, training opportunities, and skill requirements, accessible to policymakers, employers, education professionals, and individuals to translate the findings into targeted skills development strategies, thereby fostering more sustainable local economies. (OECD,2023).

This open-access model enhances transparency, supports decision-making at all levels, and enables a proactive approach to workforce planning (OECD,2023). The evidence

highlights that the success of a green transition depends not only on ambitious climate policies but also on the development of a skilled workforce capable of implementing them. Thus the “implementation capacity” of climate policy is a function of skills that translate environmental targets into achievements (Gill et al., 2024). However, challenges persist globally in achieving gender balance, addressing regional disparities, and ensuring that training reaches both emerging and traditional sectors of the economy.

These global challenges are particularly relevant for India, given its scale and diversity. As the third-largest emitter of GHGs and a country with significant regional disparities in employment, India’s green workforce strategy becomes a critical test case. The following section examines how India’s policy frameworks NAPCC and LT-LEDS and institutional actors like the Skill Council for Green Jobs (SCGJ) are attempting to address these skill and employment gaps.

India offers a particularly significant case for examining these issues. As the third-largest emitter of greenhouse gases and a rapidly growing economy, the country faces a dual challenge of sustaining economic growth for its vast population while meeting its climate commitments under the Paris Agreement. The CO₂ equivalent Green House Gas (GHG) emission from India stood at 31,320,28 Gg in 2019. The sector-wise contribution of GHG reveals that about 75.81% of emissions are from the energy sector, followed by the agriculture sector which accounts for 13.44% whereas industrial process and product use and waste account for 8.41% and 2.34% respectively (India-TNC-IAC, 2023). The nation has committed to an ambitious low-carbon pathway, aiming to achieve net-zero emissions by 2070 and accelerating the transition to a low-carbon economy by meeting 50% of energy requirements through renewable sources by 2030 and reducing the emissions intensity of GDP by 45% in the same period (SCGJ, Hnadbook 2024).

India’s Policy and Institutional Framework – NAPCC and *Lt-Leds*

In order to reduce GHG emission and to address the multifaceted impacts of climate change and ensure environmental sustainability alongside economic development the government of India introduced the National Action Plan on Climate Change (NAPCC) on June 30th, 2008 comprises “missions in specific areas of solar energy, energy efficiency, water, agriculture, Himalayan eco-system, sustainable habitat, green India, human health and strategic knowledge on climate change”. These national missions collectively form a comprehensive strategy for adaptation to climate change while fostering economic growth and environmental resilience. Table 1 presents the national mission to combat climate change.

Table 1: National Mission on the Climate Change

National Mission	Mission Objective
Solar mission	To diffusion of solar technology across the country
Enhanced energy mission	To foster innovative and sustainable business models (it includes initiatives like perform, achieve, and trade)
Sustainable habitat mission	To prepare comprehensive city development plans that address adaptation and mitigation concerns and enable energy-efficient and cost-effective transport planning

Water mission	To ensure integrated water resource management helping to conserve water, minimize wastage, and ensure more equitable distribution both across and within states.
Mission for Sustaining the Himalayan Eco-system	To prevent the melting of Himalayan glaciers and protect the biodiversity of the region
Green India mission	To increase carbon sinks
Sustainable Agriculture mission	To make agriculture more productive, sustainable, remunerative, and climate resilient by promoting location-specific integrated /composite farming systems, soil and moisture conservation measures; etc
Mission on Strategic Knowledge for Climate Change	To build a vibrant and dynamic knowledge system that would inform and support the objective of ecologically sustainable development.

LT-LEDS: India being a signatory of United Nations Framework Convention on climate change. It accordingly discharges its obligations towards low carbon development by formulating long-term low Greenhouse gas emission development strategies (LT-LEDS). The seven key sectors and issues that are elaborator in the LT-LEDs document are low carbon electricity system, low carbon transport system, promote resilient energy efficient and sustainable urban environment of adapting to climate changes, efficient and innovative low emission industrial system, removal of CO₂ enhancing forest and vegetation cover, the economic and financial aspect of Low carbon development.

Relevance of Green Skill for Achieving NAPCC & LT-LEDS Targets

As India advances toward becoming the world’s third-largest economy and achieving net-zero emissions by 2070 underscores the need for two critical enablers: advanced technology and a skilled workforce capable of meeting the demands of a green economy. For instance, as India moves towards a diversified energy mix through rapid on-grid and off-grid solar expansion, supported by policies such as the Production-Linked Incentive (PLI) schemes. These aim to boost domestic manufacturing of solar PV modules, promote electric and hydrogen vehicles, and localise EV components. Such measures are creating a high demand for skilled workers in installing, operating, and maintaining solar plants, as well as in battery, hydrogen, and EV technologies. Integrating skills development with these policies is essential to ensure smooth implementation and prevent workforce bottlenecks.

In response to this need, the Skill Council for Green Jobs, under the aegis of the Ministry of Skill Development and Entrepreneurship implements the skill and entrepreneurship training programme in India to address the growing manpower requirements in emerging climate-resilient technologies spanning across three key sectors namely renewable energy; environment, forest, and climate change; and sustainable development. The council was established in October 2015 with a mandate to design and implement capacity Building and Skill development interventions across a wide range of sectors.

Following which Green Skill Development Programme (GSDP) was launched in June 2017, on a pilot basis to meet skill gaps in the economy. It endeavours to enhance technical

knowledge of the skilled workforce with a focus on hands-on training covering diverse fields in both traditional and new emerging areas like electric vehicles, hazardous waste/Bio-medical waste etc. The GSDP covers a diverse spectrum of beneficiaries ranging from school and college dropouts to budding entrepreneurs and working professionals. Post skilling the trainees are assessed and facilitated in the placement. To ensure placement mechanism the programme centres were given approval only if they have provided more than 30%-35% placement in the past (MoEF&CC (2023, May).

The Skill Council for Green Jobs (SCGJ) has identified 11 broad sector categories that may experience significant changes in job requirements due to climate change mitigation and adaptation policies. These include the Energy Sector (solar, wind, hydro, green hydrogen, and bioenergy), Faecal Sludge and Septage Management (FSSM), waste management, paper bags, wastewater treatment, and rainwater harvesting. SCGJ Annual report 2022-23.

However, the current skill development infrastructure in India exhibits a relatively low level of maturity, particularly in fostering diversity and inclusion within the green economy. For instance, the level of skill development infrastructure is relatively stronger in upskill existing workforce across the solar value chain to meet industry demands and entry level workforce in waste management, battery manufacturing. But there is a significant gap in other sectors. For example, training facilities for entry-level workers in wind energy manufacturing and in the installation, production, and operations and maintenance (O&M) of bioenergy systems are currently very limited.

Similarly, there is also a growing call for targeted intervention to promote equitable participation. Establishing networks of women-led enterprises to provide after-sales services and operate electric vehicle (EV) charging centres which can promote simultaneously gender equity and green mobility. Upskilling waste management workers for the safe and efficient disposal of construction and demolition waste is equally critical, offering dual benefits of environmental sustainability and enhanced livelihoods.

The construction industry, currently an unorganized sector dominated by migrant workers, is undergoing a shift towards sustainable sourcing. Employment of local procurers with expertise in green materials is fostering the creation of more green jobs at the local level. These roles often involve operating advanced machinery for processing eco-friendly materials and managing locally sourced resources. However, this transition remains in its early stages, with only a few Skill Councils and green construction start-ups currently providing in-house training. To accelerate progress, it is crucial to establish dedicated platforms for certifying workers in these emerging skills, thereby enhancing the competencies of the marginalized sections, improving their overall well-being, and ensuring workplace safety.

The above scenario highlights the inclusivity gaps in India's green workforce, emphasizing the need to strengthen targeted training initiatives for women, persons with disabilities (PwDs), and marginalized groups to ensure equitable participation and make the country's green transition truly inclusive and sustainable.

Green Job Training and Certification Status based on Job Role

The data on trainings and certifications conducted under the Skill India Portal by the Skill Council for Green Jobs (SCGJ) from the financial year 2016-17 to 2024-25 reflects substantial growth over the years, with notable fluctuations in annual numbers. Overall, both cumulative

trainings and certifications have increased significantly, demonstrating the expansion of skill development initiatives in the green jobs sector. As of 2024–25, a total of 587,303 individuals have been trained, of which 561,229 have obtained certifications, highlighting SCGJ's sustained contribution to workforce development for green jobs in India.

For instance, in the financial year 2023–2024, under the National Apprenticeship Promotion Scheme (NAPS), a total of 4,674 apprentices were engaged across 10 diverse job roles. Of these, 73% were male, while only 27% were female, reflecting a significant gender gap in apprenticeship participation. There exists a marked unevenness in domain-wise training and certification within the green jobs sector. For the financial year 2021–2022, renewable energy and waste management emerged as the leading domains in terms of training participation, whereas other green job categories recorded comparatively poor performance in both training and certification outcomes. Within the renewable energy sector, solar energy overwhelmingly dominated training and certification activities. At the job role level, certifications were concentrated in roles such as Solar PV Installer (Suryamitra), Solar PV Installer – Electrical, and Solar PV Project Helper, while roles like Solar PV Maintenance Technician – Civil (Ground Mount) and Solar PV Maintenance Technician – Electrical (Ground Mount) saw significantly lower participation and certification rates, further underscoring the imbalance across sub-domains. (SCGJ Annual report 2023-24). Although the mission of the Skill Council for Green Jobs (SCGJ) is aligned with several national initiatives such as *Make in India*, the Green Hydrogen Mission, the National Water Mission, and the Smart Cities Mission, there is a disproportionate emphasis on the National Solar Mission. This over-prioritization risks limiting the balanced development of skills across other critical domains of the green economy.

The observed disparities in training participation, gender representation, and domain-specific skill development underscore critical gaps in India's green workforce. These patterns not only reflect structural and inclusivity challenges but also point to the urgent need for targeted interventions

Discussion and Conclusion

The analysis of global and Indian perspectives highlights that while the transition to a green economy offers immense potential for sustainable development, employment generation, and environmental conservation (Sudjono, 2023, and Muhammad, 2022), its success is critically dependent on skill development and workforce readiness. Skills, therefore, emerge as the "implementation capacity" of climate policy, bridging the gap between ambitious national targets and their realization on the ground (Gill et al., 2024). International experiences demonstrate that countries with well-integrated Skills Anticipation and Assessment (SAA) systems are better positioned to anticipate demand, reduce mismatches, and ensure inclusivity in green workforce development.

For India, this global evidence has strong implications. The country faces a dual challenge: on one hand, its high levels of GHG emissions dominated by the energy and agriculture sectors that are crucial to sustain growth and development. The National Action Plan on Climate Change (NAPCC) and the Long-Term Low Emission Development Strategy (LT-LEDS) provide the policy framework, but their operationalization requires systematic workforce alignment. The Skill Council for Green Jobs (SCGJ) plays a central role here, having trained over 500,000

individuals across multiple green job roles between 2017–2023. The dominance of training in sectors such as solar PV installation and waste management reflects a partial alignment with the NAPCC's missions, especially the Solar Mission and Sustainable Habitat Mission.

However, several gaps remain. First, the training portfolio is heavily skewed toward a few sectors. While significant progress has been made in renewable energy particularly in large-scale solar projects and the adoption of electric vehicles, the coverage of rooftop and other off-grid solar systems remains inadequate in the solar energy sector. Emerging areas such as green hydrogen, circular economy practices, and climate-resilient agriculture receive only limited attention. Moreover, key sectors such as transport, industry, housing, and water largely fall outside the purview of India's Nationally Determined Contributions (NDCs), highlighting opportunities for further policy integration (Climate Change Performance Index, 2025). Overall, this suggests that although India has made notable strides, its workforce strategy is not yet fully aligned with the diversity of its climate commitments. This underscores the importance of incorporating relevant green job roles into training programs, which are currently lacking in existing skill training initiatives designed by SCGJ.

Secondly, gender and inclusivity remain under-addressed. Despite the growing demand for skilled labor, women, persons with disabilities (PwDs), and marginalized communities continue to face barriers to entry and advancement due to limited access to training, certification, and placement opportunities. A systematic effort to correct this imbalance is lacking in the existing system. This highlights the urgent need to design and implement targeted training initiatives that not only equip these groups with the technical skills required for green jobs but also provide supportive mechanisms to ensure equitable participation and to unlock the full potential of the workforce (Igić et al., 2024), thus making India's transition to a sustainable, green economy genuinely inclusive and socially just.

Thirdly, the absence of an integrated, nationwide SAA system restricts India's ability to anticipate future skill needs across regions and sectors. There is a gap in information on the geographic distribution, skill requirements, and demographic characteristics of new green jobs that is essential for effectively planning the transition of workers into emerging green sectors (PAGE, 2023). Addressing this gap will require comprehensive data collection on formal, informal, and contractual workers, their socio-economic backgrounds, skill levels, career aspirations, and the potential impacts of transition on vulnerable groups. While positive and negative employment impacts of greening have been assessed for the renewable energy and electric vehicle sectors, similar analyses are needed for other sectors and industries undergoing green transitions, including identification of associated skill gaps. Without such foresight, there is a risk that skill development initiatives will continue to be fragmented.

The Rozgar Portal, developed by the Skill Council for Green Jobs, constitutes a significant technological initiative supporting India's green transition by providing a dedicated platform that links skilled professionals with employers in the green energy sector. By automating aspects of the recruitment process, the portal not only facilitates more efficient talent acquisition but also offers valuable data to SCGJ for designing targeted training programs that align with industry requirements. However, the platform is still in its early stages, with limited reach across various green sectors, inadequate integration with global labor market data, and low awareness among vulnerable and marginalized groups.

Thus, the discussion points to a paradox between India's ambitious climate and workforce policies, evolving institutional linkages between them. Strengthening these connections through broader sectoral coverage, inclusivity in training design, and the adoption of robust skills anticipation mechanisms will be crucial to achieving an equitable and effective green transition.

Conclusion

The study underscores that building an inclusive green workforce is not merely a labour market issue but a strategic imperative for India's climate policy implementation. Given the urgency of decarbonization, certain job roles may be phased out while green job roles are created. In this transition, it is imperative to ensure that marginalized and vulnerable sections of society receive due attention and necessary support. Moreover India's commitment to climate change mitigation efforts, is guided by the principle of equity and climate justice. In line with this, agriculture has been excluded from Long-Term Low Emission Development Strategy, recognizing the significance of the sector as a primary source of employment and in supporting a portion of the rural population.

Green jobs represent the nexus where environmental sustainability, economic development, and social inclusion intersect. While India's policy architecture through NAPCC and LT-LEDS provides a comprehensive framework for addressing climate change, the extent to which these commitments translate into outcomes will depend on the strength of its skill development ecosystem. the limitations in education and training have resulted in low-paying employment among the poor and marginalized, perpetuating poverty which underscores the need for a level playing field. The global best practices emphasize inclusivity, forward-looking skills anticipation, and the integration of gender-sensitive approaches.

To build a robust and inclusive green workforce, it is essential to expand training portfolios to encompass emerging sectors such as hydrogen technologies, the circular economy, and sustainable agricultural practices, ensuring that workforce development aligns with evolving climate priorities. Equally important is the mainstreaming of gender-responsive and regionally inclusive skilling strategies to guarantee equitable access to green jobs, particularly for marginalized and vulnerable populations. Policy interventions should be grounded in comprehensive assessments of skill requirements, with strong linkages established between educational and vocational training institutions and industry to ensure alignment between workforce capabilities and market demand.

The establishment of a dedicated Climate Fund to support state-led green initiatives, complemented by performance-based incentives for achieving emissions reduction targets and investments in green innovation, would further strengthen the national green skills ecosystem. Strategic prioritization of sectors such as green hydrogen, renewable energy, and waste management is critical, given their role in advancing climate goals and generating sustainable employment. Current interventions, however, remain insufficient in coverage and depth, limiting their potential impact. Expanding and diversifying training programs to cover a wide range of green job roles, alongside promoting sustainable agricultural practices, can simultaneously mitigate climate change, enhance income opportunities for rural populations, and advance environmental justice. Collaboration among government, academia, and industry is vital to scale training initiatives and increase the number of beneficiaries, facilitating a

transition toward a climate-positive economy that serves marginalized and vulnerable communities.

Finally, enhancing awareness and outreach efforts is critical, as low levels of program awareness continue to hinder progress (Muhammad, 2022). Investments that raise awareness and translate it into tangible participation are necessary to develop an effective, inclusive, and resilient green skills ecosystem. In sum, India's path to a sustainable and equitable green economy will depend on how effectively it can transform its demographic dividend into a skilled, inclusive, and climate-ready workforce. By embedding skill development at the heart of climate policy, India can simultaneously advance environmental sustainability, economic growth, and social justice, setting an example for other developing nations navigating similar transitions.

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A COMPARATIVE STUDY OF TERMINALIA CHEBULA AND MYRISTICA FRAGRANS USING PHYTOCHEMICAL ACTIVITIES

T. Shanthi

*PG Department of Chemistry
Arasu College of Arts & Science for Women, Karur, Tamil Nadu*

M. Boomika

*PG Department of Chemistry
Arasu College of Arts & Science for Women, Karur, Tamil Nadu*

M. Preethi

*PG Department of Chemistry
Arasu College of Arts & Science for Women, Karur, Tamil Nadu*

Abstract

A Comparative Study of Phytochemical activities typically investigate and contrast types and amount of phytochemical elements and analysis of Anti- inflammatory, Anti- Diabetic activities in the plant of Myristica Fragrans and Terminalia Chebula. Both Terminalia Chebula and Myristica Fragrans have potential health benefits and therapeutic applications due to their phytochemical activities. The Phytochemical analysis shows the presence of alkaloids, phenol, flavonoids and proteins, carbohydrates. A study on a both Extract Screened for Phytochemical and investigated for anti- diabetic activity revealed the presence of various bioactive compounds.

Keywords: *Terminalia Chebula Extract, Myristica Fragrans Extract, phytochemicals, Anti- Diabetic Activity.*

Introduction

Phytochemicals are naturally occurring compounds found in plants that contribute to their color, flavor, and disease resistance. Phytochemical are bioactive compounds produced by plants, exhibiting a wide range of biological activities and potential health benefits. Medicinal plants considered a rich source of ingredients which can be used in drug development and synthesis around the whole world medicinal plant a critical role in the development of human culture [1]. Every plant contains various chemical substances called phytochemicals, where these materials have activities that are good for the body and can function as compounds that can fight disease. Phytochemicals are chemical compounds that occur naturally in plants and have more specific functions [2-4]. Plant secondary metabolites have important roles in plant defense against pests and defense between other species. Humans use secondary metabolites as medicine, flavouring, and recreational drugs. Treatment using herbal plants is currently increasingly widespread using various types of plants [5-9]. Many of the drugs that are derived from the secondary metabolites are simple synthetic modifications or copies of these naturally obtained substances [10].

Materials and Methods

Collection of seed materials:

The seeds of *Terminalia chebula* and *Myristica Fragrans* were collected from Panjappatti village, Karur district in Tamil Nadu.

Preparation of seed extract:

The plant seeds were cleaned washed in distilled water and dried at room temperature in one week and ground into powder form. The powdered extract was subjected to successive extraction using ethanol.

Hot air oven extraction:

The powder was weighed 5g in 25 ml ethanol in 250 ml conical flask. The sample was settled with Hot air oven in 15 minutes. After the heating the sample was cooled and shaking at 3 hours. After shaking of the sample was filtered whatman filter paper. The filtrate was collected.



Fig 1 Before Hot air oven Extract



Fig .2. After Hot air oven extraction

Phytochemical Constituents

The Extract was tested for the presence of bioactive components by using following standard methods.

Qualitative Analysis

The phytochemical examined was conducted by extracts preparation using method as per the standard described.

Detection of Alkaloids

Extracts were dissolved in dil. Hydrochloric acid and filtered. The filtered acidified Extracts were then following tests

Wagner's Test

To 1 ml of filtrates were treated with Wagner's reagent brownish or reddish precipitate is formed, Presence of alkaloids.

Detection of Carbohydrates

Extracts were dissolved individually in 4ml distilled water and filtered.

Benedict's Test

To 1 ml of filtrates were treated with Benedict's reagent added and gently heated. Orange red precipitate is formed, Presence of carbohydrate.

Fehling's Test

To 1 ml of filtrates were hydrolysed with dil. Hcl, neutralized with alkali and heated with Fehling A & B solutions added. Red precipitate is formed, Presence of carbohydrate.

Detection of Glycosides

Borntrager's Test

To 1 ml of filtrate, 1.5 ml of chloroform was added and shaken. Chloroform layer was separated and followed by addition of 0.5 ml of ammonia solution (10%). Pink colour is formed, Presence of glycosides.

Detection of Saponins

Foam Test

The extract 1 ml was mixed with 1ml of distilled water, shaken vigorously and left undisturbed for 2-5 minutes. If the foam persists, it indicates the presence of saponins.

Detection of Phytosterol

Salkowski's Test

To 1 ml of Extracts were treated with chloroform and filtered. The filtrate was added with few drops of Con. H₂SO₄, shaken and allowed to stand for some time. The appearance of golden yellow colour.

Detection of Phenols

Ferric Chloride Test

To 1 ml of extract and 0.5-1ml of ferric chloride solution (5%) was added. A dark green colour indicates the Presence of phenolic compounds.

Detection of Flavonoids

Lead acetate Test:

To 1ml of extract were treated with few drops of lead acetate solution added. Yellow coloured precipitate is formed, Presence of flavonoids.

Detection of Terbenoids

Solkowski's Test

To 1ml of extract, 1ml of chloroform was added and mixed well. Add 0.5 ml of conc. H₂SO₄ to form a reddish brown layer indicating the presence of Terpenoids.

Detection of Aminoacids:

Ninhydrin Test:

To 1 ml of extract and added 0.5 ml of Ninhydrin solution, Purple colour is formed, Presence of amino acids.

Detection of Proteins:

Xanthoproteic Test:

To 1 ml of extracts were treated with few drops of Concentrated HNO₃ added. Yellow colour is formed, Presence of proteins.

Phytochemical Activities:

In Vitro Anti-diabetic activity: (Alpha-amylase inhibition assay)

To take different concentration of the sample in test tube. Add 250µl of α-amylase solution (PBS Solution; PH 6.8) and the mixture were incubated at 37°C for 5 minutes. After incubation 500µl of 1% starch substrate solution was added. Again the mixture was incubated at 37°C for 3 minutes. 500µl of DNS Reagent (1% Dinitro salicylic acid, 0.05% Na₂SO₃ and 1% NaOH Solution) added to the mixtures. The mixtures were boiled at 90-100°C for 10 minutes and the mixture was cooled. After cooling, absorbance was measured at 540 nm by using PBS as blank.

Inhibition of denaturation (%) = $\frac{AC-AS}{AC} \times 100$

Where, AC=Absorbance of control sample and AS = Absorbance of test sample

Result and Discussion

Qualitative Analysis

Phytochemical Constituent

Phytochemical analysis conducted on the plant extracts revealed the presence of constituents which are known to exhibit medicinal as well as physiological activities¹⁸. If the table 1 showed results for phytochemical constituent of Terminalia chebula and myristica fragrans ethanolic extract was observed. The Terminalia chebula ethanolic extract were presence of alkaloids, flavonoids, proteins and phenols. Absence of glycosides, phytosterols, terbenoids, saponins, carbohydrates and amino acids. Myristica fragrans ethanolic extract are presence of alkaloids, carbohydrates, Phenols, Proteins and Flavanoids. Absence of Saponins, Phytosterols, glycosides, aminoacids and terbenoids. If the symbol of “+++” defined high level activity of phytochemicals, its refers to a significant presence or concentration of a particular phytochemical compound that exhibits potent biological activity “++” defined medium level

activity of phytochemical, its refers to a moderate presence or concentration of a particular phytochemical compound that exhibits noticeable biological activity.

“+” is defined low level activity of phytochemicals, its refers to a small presence or concentration of a particular phytochemical compound that exhibits limited or subtle biological activity. “-” is defined absence of activity of phytochemicals, its refers to a undetectable levels of a specific phytochemical compound.

Table 1 Phytochemical Constituent

Test For Detection	Terminalia chebula	Myristica Fragrans
Alkaloids	+++	++
a)Wagner's Test		
Carbohydrates	-	+
a) Benedict's Test		
b) Fehling's Test		+
Glycosides	-	-
Saponins	-	-
a)Foam Test		
Phytosterol	-	-
a)Salkowski's Test		
Phenol	+++	++
a)FeCl ₂ Test		
Flavonoids	+++	-
a)Lead acetate Test		
Protein	+++	+++
a)Xanthoproteic Test		
Terbenoids	-	-
Amino acid	-	-
a)Ninhydrin Test		

In Vitro Anti-diabetic activity: (Alpha-amylase inhibition assay)

The anti-diabetic activity of the Terminalia chebula and Myristica Fragrans ethanolic extracts were determined by using inhibition of alpha amylase assay. . The ethanolic extract of Terminalia chebula shows that of the concentration were 20, 40, 60, 80, 100µg/ml increases the absorbance were 0.352, 0.331, 0.305, 0.256, 0.209 decreases and their inhibition rate such as 6.88 %, 12.43 %, 19.31 %, 32.28 %, 44.71 % increased. The ethanolic extract of Myristica fragrans shows that of same concentration were increases and their absorbance were 0.312, 0.263, 0.211, 0.170, 0.105 increased and its inhibition rate such as 17.46 %, 30.42 %, 44.18%, 55.03 %, 72.22 % increased. It has been the ethanolic extract of Terminalia chebula shows that the highest inhibition rate of 44.71 % at 100µg/ml concentration and the lowest inhibition rate of 6.88 % at 20µg/ml concentrations.

In Ethanolic extract of Myristica Fragrans shows that the highest inhibition rate of 72.22 % at 100µg/ml concentration and the lowest inhibition of 17.46 % at 20µg/ml concentrations. Chebulagic acid was taken as positive control of Terminalia chebula and malabaricone C was

taken as positive control of Myristica fragrans. The results showed that there was a dose dependent increase in percentage inhibitory activity against the alpha amylase.

Table 2: Terminalia chebula Ethanolic Extract

S.No	Concentration of the Sample	Absorbance	(%) of Inhibition
1.	Control	0.378	-
2.	20µg/ml	0.352	6.88
3.	40 µg/ml	0.331	12.43
4.	60 µg/ml	0.305	19.31
5.	80 µg/ml	0.256	32.28
6.	100 µg/ml	0.209	44.71

Table 3: Myristica Fragrans Ethanolic Extract

S.No	Concentration of the Sample	Absorbance	(%) of Inhibition
1.	Control	0.378	-
2.	20µg/ml	0.312	17.46
3.	40 µg/ml	0.263	30.42
4.	60 µg/ml	0.211	44.18
5.	80 µg/ml	0.170	55.03
6.	100 µg/ml	0.105	72.22

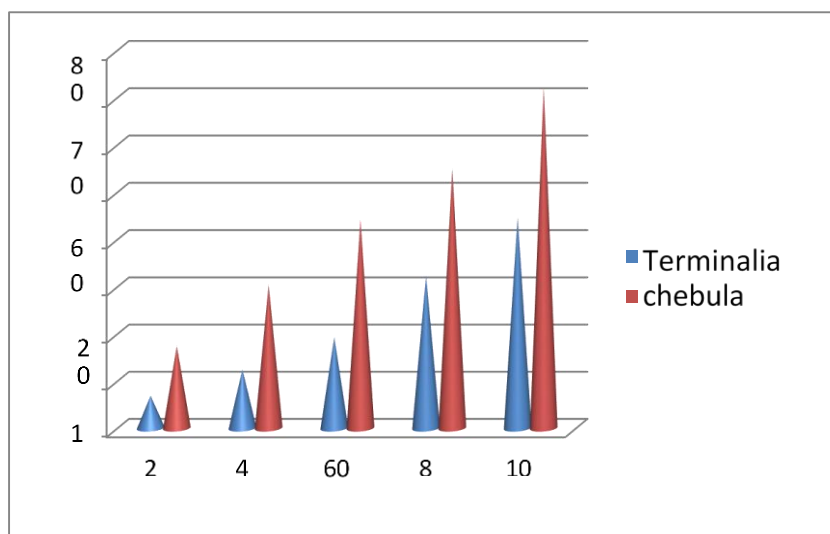


Fig.3. Comparison of Anti-diabetic activity of Terminalia chebula and Myristica Fragrans

Conclusion

- The two plants were found to be contains various medicinal properties.
- The Preliminary phytochemical analysis presented in Terminalia chebula such as

Alkaloids, Phenol, Flavonoids, Proteins.

- The Preliminary phytochemical analysis presented in *Myristica fragrans* such as Alkaloids, Carbohydrates, Phenol, Proteins.
- It has been prove to be effective as Anti-diabetic activities
- The *Terminalia chebula* ethanolic extract of anti-diabetic activity of inhibition is higher compare than that of *Myristica fragrans*.
- Both *Terminalia chebula* and *Myristica fragrans* have potential health benefits and therapeutic applications due to their phytochemical activities.

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IMPACT OF RURAL-TO-URBAN MIGRATION ON CHENNAI'S MUNICIPAL WATER DEMAND

Sona Mariam Thomas

*Research Scholar in Economics
Vels Institute of Science, Technology and Advanced Studies
tsonamariam@gmail.com*

Dr. S. Bhuvaneswari

*Assistant Professor, Department Of Economics
Vels Institute of Science, Technology and Advanced Studies
sbhuvaneswari.sms@velsuniv.ac.in*

Abstract

Water scarcity has emerged as a major challenge in a rapidly growing metropolitan city like Chennai. The city's rapid population growth, urbanization, and migration pressure its limited resources it leading to a gap between water supply and water demand. This study examines the status of water demand and supply in Chennai, focusing on the implications of rural-to-urban migration and uneven access, and the effectiveness of government policies in bridging the steady supply gap. Findings reveal that Chennai's current water demand is around 1,400 MLD, while supply is around 10 04 MLD, leaving a gap of 360 MLD.

The demand is estimated to increase sharply to 2,100 MLD by 2031 and 3,253 MLD by 2057 largely driven by urban growth and industrial expansion while long term residents receives a stable piped water supply peri-urban and migrant-dominated areas continue to face inequities and they are force to depend heavily on alternative expensive method like as tankers, bore wells, and packaged drinking water

With regard to this, the Government of Tamil Nadu and the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) have executed multiple interventions. These include desalination plants at Minjur, Nemmeli, and the under-construction Perur facility, along with tertiary-treated reverse osmosis (TTRO) plants supplying water to industries, and the introduction of smart metering and bulk metering schemes. These projects collectively aim to expand supply capacity by over 600 MLD. However, these measures, demand management, gaps in equitable distribution, and long-term sustainability persist.

The study points out that migration amplifies the water crisis, particularly in newly emerged municipal zones where infrastructure lags behind population growth. Addressing these challenges requires not only infrastructure expansion but also governance reforms that prioritise community participation prioritise equity, and conservation practices. Recommendations include diversifying water sources through rainwater harvesting and greywater reuse, accelerating desalination projects, improving household-level metering, and strengthening urban planning to integrate migration trends with water management policies.

Study points out that Chennai's water security relies on balancing social equity with infrastructure development, sustainable demand management. Building flexibility in urban water systems is essential for ensuring long-term sustainability, protecting livelihoods, and meeting the needs of both long-term residents and migrant populations.

Keywords: *Water demand, Water supply, Migration, Desalination*

1.0 Introduction

Chennai is a rapidly growing metropolitan city. Water scarcity has emerged as one of India's most critical challenges. The water demand has exceeded the sustainable supply of

water with a rising population, urban migration, and climate variability. For India's rising water crisis, Chennai is often referred to as the "ground zero" now facing recurrent shortages, culminating in the infamous "Day Zero" of 2019. When its major reservoirs went completely dry. Peri-urban migrant households are now facing a vulnerable water crisis due to inequitable water distribution; as a result, they are forced to switch to other alternatives, such as costly tankers, packaged drinking water. This study explores the household water consumption pattern and expenditure patterns in Chennai. It also assesses the socio-economic and environmental implications of unequal access

1.1 Background of the Study

One of the most critical challenges for rapidly growing metropolitan cities is water security, and Chennai represents a critical case of urban water stress. The city relies largely on the seasonal monsoon, and it lacks a source of a Perennial River. This makes the water supply system more critical according to the variability of rainfall. Over the past decades, Chennai has been facing rapid migration, population growth, and industrial growth, which have increased water demand, thus creating a gap between demand for water and supply of water. The Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) ensures safe drinking water, surface water, a project for rainwater harvesting, desalination, and wastewater reuse for industrial purposes. Despite these interventions, the current water demand is 1,400 MLD, which exceeds the available supply of water 1040 MLD, leading to an often water shortages. The study seeks to examine the status, initiatives, and challenges of Chennai's water demand-supply system, with a focus on the implications for sustainability, equity, and urban resilience.

1.2 Status of Migration, Water DEMAND and Supply in Chennai

Chennai has become one of the rapidly growing metropolitan cities in India, attracting a large number of m, migrants from rural areas of Tamil Nadu and other states. Chennai's water demand has steadily overtaken the supply, with current demand around **1,400 MLD** against an average supply of only **1,040 MLD**, leaving a gap of nearly **360 MLD**. **To point this out, the city has invested in water treatment plants and desalination plants, and tertiary RO plants for industries. Other initiatives to manage the water are like smart metering, and 24/7 supply pilots are in process.**

Table: 1 (CMWSSB), 2023

Year	Source / Plant	Capacity (MLD)	Cumulative Capacity (MLD)
1914	Kilpauk	270	270
1965	Surapet	14	284
1996	Redhills	300	584
2004	Veeranam	180	764
2008	Chembarambakkam	530	1,294
2010	Minjur Desalination	100	1,394
2013	Nemmeli Desalination	100	1,494
2022	Porur	6	1,500
2023	Kolathur	10	1,510

Chennai faces an imbalance between municipal water demand and water supply. City's current supply capacity is about 1,510 MLD, but depending upon the rainfall and reservoir shortage, the availability of water to supply daily fluctuates. So the current availability of water for the daily supply is only 1,04 while the demand is 1,400, there is a gap of 360 MLD.

Table 2: State Planning Commission Report 2024-2025

Sector of Employment	Average Duration of Employment	Duration of Present Employment							
		Up to 6 months		7 to 12 months		Above 1 year		Total	
		N	%	N	%	N	%	N	%
Manufacturing	1.3	103	23.1	244	54.8	98	22.0	445	100
Service	1.5	14	5.9	168	70.9	55	23.2	237	100
Construction	1.0	22	17.6	95	76.0	8	6.4	125	100
Agriculture	1.0	2	50.0	1	25.0	1	25.0	4	100
Total	1.3	141	17.4	508	62.6	162	20.0	811	100

The table shows 811 migrants across the country. The majority of the migrants that is 62.6% have been employed for 7-12 months, which shows a pattern of short to medium term migration. The manufacturing sector is the largest employer of migrants, agriculture sector shows very few migrants in urban Chennai. The manufacturing and service sector hubs like Sriperumbudur, Ambattur, and Sholinganallur have a high-density migrant population, which increases local water demand.

Table: 3 State Planning Commission Report 2024-2025

Reason for Migration	Number of Migrant Workers	%
Better Income	655	80.8
Family Situation	66	8.1
No Other Opportunities at Native Place	29	3.6
Oppression	27	3.3
Seeking Better Quality of Life	18	2.2
Lump Sum Money Requirement	15	1.8
Indebtedness	1	0.1
Total	811	100.0

Table 2 shows the report from the State Planning Commission, Government of Tamil Nadu. The report indicates that 81% of migrants migrated for better income, followed by family situation; most of the migration occurred due to economic reasons.

This widens the demand–supply gap, indicating a situation of water stress. This resulted in a gap of receiving water for peri-urban migrants and long-term migrants who receives municipal water while peri urban relies on expensive method like tankers, groundwater or packaged drinking water

2.0 Review of Literature

It is necessary to review the previous studies to have a clear perception of the present study. It will help in proper framing and useful analysis of the study.

Tiwari, P., Mitra, A. & Banerjee, R. (2021) examined that the major reason for the rise in demand for urban water in the major cities of India is due to a rapid increase in the population. Migration intensifies the population in the metropolitan region, which results in an increasing per capita demand for water, and this will lead to a depreciation of infrastructure.

Reddy, V.R. & Singh, S., 2019 looked into the evidence from Delhi, which shows evidence that due to a rise in the urban population, there was a deficit between actual supply and demand for water, which forced the households to find alternative water sources like tankers, groundwater, etc.

Globally, predictions specify that the number of urban residents facing water scarcity may double by 2050 Flörke, M., Schneider, C. & McDonald, R.I., 2018, underscoring the vulnerability of rapidly growing cities like Chennai.

Srinivasan, V., Konar, M. & Sivapalan, M., 2021. Analysed that due to variation in the rain, which often resulted in the high risk of flood and droughts, even though the city depends on monsoon-fed reservoirs, desalination plants, and groundwater extraction.

Sahu, P. (2019) examined during the period of water scarcity, the supply of water was rationed as low as 20 litres per person per day, which forced people to rely on private markets.

Narain, V., 2020. Analysed the peri-urban areas, which are dominated by migrant people who are often the last to receive network expansion, and they face inequities in access.

During shortages, groundwater extraction and the tanker economy dominate household supply, creating affordability challenges. Reports describe Chennai's situation as a form of "climate apartheid," where wealthier households can pay for water while poorer, often migrant families, struggle (Srinivasan, V., 2019). NITI Aayog's Composite Water Management Index has ranked Tamil Nadu among high-stress states, pointing to overexploitation of groundwater and insufficient management (NITI Aayog, 2018).

The literature reveals that migration, household size, and tenure in urban localities are the main factors for water demand.

3.0 Scope of the Study

The present study examines migration and municipal water demand in Chennai city and its peri-urban areas, with particular focus on households impacted by water scarcity. The study examines the current water demand and water supply levels (State Planning Commission, 2024). The study evaluates the water access challenges faced by migrant households compared with long-term residents. The study also reviews government interventions such as desalination, TTRO plants, and metering policies (CMWSSB, 2023). The study also examined the socio-economic dimensions, such as household expenditure on water and inequalities in access (UN-Habitat, 2020).

3.1 Significance of the Study

In Chennai, as a rapidly growing metropolitan city, water scarcity has emerged as one of the most pressing sustainability challenges. With a current demand of water of about 1,400 MLD is more than the supply of 1,040 MLD the city faces a deficit gap of 360 MLD of water in the city (State planning commission 2024) Migration, urbanization and climate change which lead to a rise in population which disadvantage the peri urban area and due to inequality in

water distribution. (CMWSSB, 2023). This study explores how interventions such as drinking water treatment plants, sewage treatment plants, desalination plants, tertiary treatment, and smart metering can manage Chennai's water scarcity.

3.2 Objectives of the Study

1. To analyse the status of water demand and supply in Chennai.
2. To examine the impact of urbanisation and migration on household water consumption and expenditure patterns.
3. To suggest policy measures for improving sustainable and equitable access to water resources.

4.0 Methodology

The study makes use of primary and secondary data. All the secondary data was collected from Government reports like the state planning commission and Chennai metropolitan, and the sewage treatment board. Primary data were collected from a survey conducted by the researcher. The sample was collected from **120 households**. On average, households had **3.5 family members** (SD = 1.5), including 2.5 adults and 1 child. The mean duration of residence in the current location was **12.6 years** (Median = 5, Range = 1–60 years). The average duration of water access was limited, and it was 6.1 hours per day. The median indicated inequality across households was only 2 hours. Average monthly water consumption was 2,650 litres with SD=4,032.while expenditure on water monthly was **monthly averaged 1,265 rupees** SD = 1,744 rupees. These values highlight both variability in supply conditions and substantial financial burdens

Table: 4 primary Source 2025

Variable	Mean	Median	Min	Max	Std. Dev
Years in location	12.6	5.0	1	60	19.0
Family members	3.5	3.0	1	7	1.5
Adults	2.5	3.0	1	5	1.1
Children	0.9	1.0	0	3	1.0
Supply hours/day	6.1	2.0	0	26	8.5
Drinking water (litres/month)	545	279	9	1,948	614
Total water (litres/month)	2,650	300	10	10,989	4,032
Monthly expenditure (₹)	1,265	855	176	6,731	1,744

Table 5. Multiple Regression Predicting Total Water Consumption (N = 120)

Predictor	Coefficient (β)	Std. Error	t-value	p-value	r with Total Water
Constant	-312.6	451.2	-0.69	0.493	—
Family Members	724.3	136.5	5.31	<.001 ***	.72 ***
Adults	112.7	142.9	0.79	0.430	.60 ***
Children	89.5	128.7	0.69	0.493	.41 **
Supply Hours/Day	54.9	32.1	1.71	0.089 †	.29 **

(Table 5, primary source 2025)

This model analyzes the predictors of total water use. The model was significant, $F(4,115) = 12.5$, $p < .001$, explaining 30.2% of the variance ($R^2 = .302$). Family size was the significant predictor ($\beta = 724$, $p < .001$), with each additional member increasing monthly demand by approximately 724 litres. Supply of water hours per day had a marginal positive effect ($\beta = 54.9$, $p = .089$).

Table X. Multiple Regression Predicting Monthly Expenditure (N = 120)

Predictor	Coefficient (β)	Std. Error	t-value	p-value	r with Expenditure
Constant	784.2	291.4	2.69	0.008 **	—
Family Members	110.4	84.5	1.31	0.192	.18
Years in Location	-5.8	6.7	-0.86	0.390	-.10
Supply Hours/Day	61.5	19.8	3.11	0.002 **	.35 **
Total Water Consumption	-0.079	0.041	-1.95	0.054 †	.20 *

(Table 6: primary source 2025)

Monthly Expenditure: A multiple regression analysis was conducted to find out if family size, years in location, supply hours, and total consumption predicted monthly expenditure (Table 2). The overall model was significant, $F(4,115) = 4.9$, $p = .001$, explaining 14.6% of the variance ($R^2 = .146$). Supply hour of water per day was the strongest predictor ($\beta = 61.5$, $p = .002$), indicating that each additional hour of supply increased monthly expenditure by approximately 62 rupees. Total water consumption showed a marginal negative effect ($\beta = -0.079$, $p = .054$), which means that high-consumption households may depend on cheaper alternatives (e.g., bore wells, shared sources). Family size ($\beta = 110$, $p = .192$) and years in location ($\beta = -5.8$, $p = .390$) were not found as significant predictors.

4.1 Discussion

The regression analysis examined critical understanding of how household attributes and water supply conditions in Chennai shape water supply conditions and water expenditure. Larger households with good family size consume more water, but. the expenditure patterns for them are less if they are long residents of Chennai.. Instead, the strongest predictor of spending is the number of supply hours per day, which implies that when water is available, consumption increases, but when supply is unreliable, households are forced to find some alternative for water, such as tankers or packaged drinking water.

A notable finding is that long-term residents may have better access to stable municipal supply or other cheap sources of alternatives like private wells, which reduces their dependence on expensive tanker or packaged drinking water. This aligns with broader urban water inequities, where newer migrant communities show that newer migrants settled in peri-urban areas face less access to the municipal water supply. The negative coefficient for total water consumption in the expenditure model further suggests that some high-usage households may depend on unregulated groundwater, which, while cheaper in the short term, is unsustainable and exacerbates long-term water stress.

The analysis also points up that a paradox in Chennai's water economy: while increased supply hours lead to higher expenditure, it does not mean equitable access. Instead, they may

reflect a dual system. Here, the wealthier group can access the other alternative, while the others need the policies regarding this. This underscores the need for policies that not only expand supply but also it should ensure fair water distribution, particularly which focusing on rapidly urbanising zones where migration-driven demand is growing fastest.

4.2 Findings

- The study reveals that Chennai faces a chronic water deficit. Around a gap of 360 MLD Water supply is uneven across the city, with a shortage in the supply of municipal water for peri-urban migrants
- Chennai relies heavily on non-traditional water sources like desalination **plants, groundwater, and wastewater reuse** due to the absence of perennial rivers
- Rural-to-urban migration contributes significantly to water demand in newly added municipal areas.
- The government has implemented multiple projects, like **TTRO plants, smart water metering, bulk metering, and 24×7 equitable water supply pilots**. However, gaps remain. (World Bank, 2021).

4.3 Recommendation

1. Desalination and reuse: Speed up the completion of projects like the Perur desalination plant and expand tertiary water reuse for industries to reduce freshwater dependence (CMWSSB, 2023).
2. Equity-based Distribution: Ensure equitable supply of municipal water to peri-urban and low-income migrant households by extending pipeline coverage and prioritising underserved areas (Agarwal & Narain, 2019).
3. Diversify Sources: Promote, greywater reuse, rainwater harvesting and decentralised water solutions to complement large-scale projects (UN-Habitat, 2020).
4. Policy Integration: Link urban planning with water management policies and migration management to account for population growth (Planning Commission of India, 2011).
5. Community Engagement: Encourage local participation in water governance to enhance accountability and adoption of sustainable practices (Narain & Singh, 2020).

5.0 Conclusion

Chennai's water crisis demonstrates the challenges of managing urban water systems due to the rapid rise in population, urbanization, and climate variability. The persistent demand and supply gap for water has affected the peri-urban migrants disproportionately, forcing them to rely on costly alternatives such as tankers and packaged drinking water (State Planning Commission 2024). However, desalination and wastewater reuse have expanded the city's water supply capacity, and inequities in distribution remain a critical challenge (CMWSSB, 2023). Addressing this issue requires not only infrastructure expansion but also governance reforms, equitable allocation of resources, and sustainable demand management. Strengthening resilience in Chennai's water system will be vital for ensuring long-term water security, social equity, and urban sustainability (World Bank, 2021).

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AN IMPACT OF AI CHATBOTS ON CUSTOMER SATISFACTION IN HDFC BANK IN CHENNAI CITY

V. Sangeetha

*Research Scholar, Department of Commerce
VISTAS, Old Pallavaram Chennai
sangeethavijayakumar94@Gmail.Com*

Dr. C. Saraswathi

*Associate Professor, Department of Commerce
VISTAS, Old Pallavaram Chennai*

Abstract

Artificial intelligence is advancing quickly in the present era and is accessible to a large number of individuals worldwide. Artificial Intelligence (AI) will replace humans with computer programs to provide human-like intelligence and return choice for specific tasks. The Banking sector is undergoing a rapid transformation with the integration of Artificial Intelligence .AI is rapidly transforming the banking industry, revolutionizing how banks operate and interact with their customers. By offering services like chatbots, fraud detection, investment optimization, and financial counsellors, artificial intelligence (AI) assists millions of customers and representatives in managing their finances. Among the top banks in India utilizing AI, HDFC Bank is notable for its creative approach to client interaction, especially in urban areas like Chennai.

Introduction

The technology that makes robots resemble human intelligence, known as artificial intelligence, is becoming a crucial component of the banking sector. Science fiction has evolved. However, what is artificial intelligence (AI) and how is it applied in the banking industry. Artificial Intelligence (AI) comprises diverse technologies such as computer vision, natural language processing, and machine learning, which collaborate to analyse information, make judgments, and automate procedures. Artificial intelligence (AI) is being utilized in banking to boost security, offer individualized financial solutions, and improve customer experience. As customers increasingly demand faster service, tailored communication, and seamless digital experiences, AI-powered solutions such as chatbots, predictive analytics, fraud detection systems, and personalized financial advisories have become central to HDFC Bank's strategy. These technologies not only help in improving efficiency but also play a crucial role in enhancing customer satisfaction and trust, especially in urban centres where digital banking adoption is high.

Benefits of Chatbots in Banking:

1. Personalize customer interactions

By personalizing customer interactions, you can meet customer expectations regarding response times and answer quality. With natural language understanding and 24/7 availability, you can meet the demands of a diverse customer base and overseas customers.

2. Detect and prevent fraud

Banking chatbots can help you reduce your risk of fraud by analysing customer spending habits and detecting unusual payments. Any detected outliers are promptly reported to your customer for verification, safeguarding you and your customers.

3. Manage high levels of transactions

Conversational chatbots can answer basic questions about balances, transactions, and due dates, eliminating a bottleneck for your live customer service agents. This helps you meet customer expectations timely, even during periods of high inquiries.

4. Customer education

Chatbots in the banking industry are designed to educate customers about available financial solutions and answer any relevant questions.

HDFC Bank in AI (Chatbot):

HDFC bank has been a pioneer in leveraging AI to transform its customer service, operations, and cybersecurity. Some key AI initiatives include:

- **EVA Chatbot:** Launched in 2017, EVA is India's first AI-based banking chatbot powered by Senseforth. It responds instantly to millions of customer queries across multiple channels, improving customer service response times and reducing the need for human intervention. EVA learns and gets smarter from interactions and is planned to handle real banking transactions soon.
- **Customer service and fraud detection:** HDFC bank uses AI-powered chatbots to handle routine queries in real time and machine learning algorithms for detecting suspicious transactions, helping prevent fraud.
- **Generative AI platform:** Enhance customer experience, improve staff productivity, and enable real-time credit decisioning through multiple high-impact AI programs.
- **Cybersecurity:** The bank is rapidly moving toward becoming an AI-first enterprise to strengthen its cybersecurity by deploying AI bots that enhance threat detection and response capabilities.

Objectives of the Study

- To assess the level of customer satisfaction with the promptness of chatbot responses.
- To analyse the relevance of chatbot replies in addressing customer queries and concerns.
- To investigate the extent to which chatbots meet customer expectations in delivering helpful and need-based information.

Scope of the Study

This study examines how consumer satisfaction is affected by chatbots powered by artificial intelligence (AI), particularly HDFC Bank's EVA. It seeks to comprehend how chatbot technology contributes to overall customer experience and loyalty, increases response times, and improves customer service delivery.

Review of Literature

Savitha Rajendran, Vincent Tawiah (2024) Recent studies emphasize the growing adoption of chatbot technology in Indian banking, particularly by institutions like HDFC Bank, to enhance customer service and virtual engagement. Research examining customer satisfaction with HDFC Bank's chatbot services has highlighted the importance of several influencing factors. Key findings show that System Quality and Trust significantly enhance customer satisfaction, aligning with existing literature that suggests a reliable, user-friendly system and perceived trustworthiness are critical in digital banking interactions. In contrast, Situational Factors, Service Quality, and Intention of Use were found to be non-significant, suggesting that traditional service quality metrics may not fully capture the chatbot user experience. The study used a quantitative cross-sectional design with regression analysis to investigate these variables. It contributes to the academic discourse by identifying context-specific factors that drive or hinder satisfaction in banking chatbots. The research underscores the need for ongoing user feedback integration and system improvements to refine chatbot services and better meet customer expectations in the digital banking ecosystem.

Suresh Raghavan, Ramesh Pai (2021) Customer engagement has emerged as a crucial factor in the banking sector, with prior studies indicating that fully engaged customers contribute up to 36% more revenue than unengaged ones. The advent of digital technology has reshaped the way banks operate, emphasizing the need for innovative digital strategies to retain customers. HDFC Bank stands out for its early and effective adoption of such digital initiatives, including Artificial Intelligence (AI) tools like the EVA chatbot, to enhance customer experiences. The objectives of the study centred on analysing HDFC Bank's strategic engagement initiatives, its AI applications, and the impact of omnichannel marketing on customer satisfaction. The research is exploratory in nature and relies on primary data from HDFC's official platforms and secondary sources like McKinsey, PwC, and Statista. Findings reveal a significant transformation in HDFC's operational efficiency, customer base, and satisfaction metrics, with 95% of transactions occurring through digital platforms. The bank's strong performance indicators, including a 16% year-on-year growth and a Net Promoter Score (NPS) of 67, suggest that its digital engagement strategies have effectively driven customer retention and loyalty. These outcomes align with earlier literature on the benefits of digital transformation and customer-centric banking approaches.

Geeta Narula, Rakhi Narula (2021) The Indian banking industry has embraced technological innovations to enhance service delivery and customer satisfaction. One of the most transformative developments in this space is the integration of Artificial Intelligence (AI)-powered chatbots. These chat interfaces are designed to simulate human conversation and are increasingly used by banks to handle customer queries, provide information on banking products, assist in transactions, and facilitate round-the-clock support. Various studies have acknowledged that the use of chatbots significantly contributes to improving the overall banking experience by offering convenience, speed, and efficiency.

Research Methodology

A descriptive research design was adopted to conduct the study. Data collection was done through primary as well as secondary sources. Primary data was collected with the help of structured questionnaire. Simple random was the sampling design adopted to conduct the

survey. Secondary data was collected with the help of research papers, articles and reports related to the topic. Statistical tool was applied Correlation, Chi-square and Anova test. Sample size was 102.

Hypothesis

There is no association between occupation satisfaction with promptness of Chatbots responses.

There is no statistically significant difference between age groups and chatbots response clear & understandable

Thers is a strong positive correlation between chatbot's ability to meet user needs plays an important role in overall user satisfaction.

Descriptive Statistics

Table:1 Frequency Distribution of Gender of the Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	18	17.6	17.6	17.6
	male	84	82.4	82.4	100.0
	Total	102	100.0	100.0	

Table 1 reveals that, 82.4 per cent are Male and 17.6 per cent are Female. Male bank customers were slightly higher in number as compared to female bank customers

Table: 2 Frequency Distribution of Age of the Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-27	6	5.9	5.9	5.9
	28-37	44	43.1	43.1	49.0
	38-47	45	44.1	44.1	93.1
	48-57	7	6.9	6.9	100.0
	Total	102	100.0	100.0	

Table 2 reveals that, 5.9 per cent of bank customers belonged to the age group between 18-27 years, 43.1 per cent to the age group of 28-37 years, 44.1 per cent age group of 38-47 years and 6.9 per cent age group of 48-57 years. The majority of the bank customers belonged to the group of 38-47 years.

Table: 3 Frequency Distribution of Occupation of the Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	2	2.0	2.0	2.0
	Self employed	13	12.7	12.7	14.7
	Employed	80	78.4	78.4	93.1
	Retired	0	0.0	0.0	0.0
	Others	7	6.9	6.9	100.0
	Total	102	100	100	

Table 3 reveals that, 78.4 percent of the customers belong to employed ,12.7 percent of the bank customers belong to self-employed;2 percent of the bank customers belong to student and 6.9 percent belong to others.

Table 4: Did the Chatbots Response Clear & understandable and Age Group of Respondents

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.713	2	.357	2.192	.07
Within Groups	16.110	99	.163		
Total	16.824	101			

Table 4 results show that, P value of 0.07 is less than the commonly used significance level of 0.05, indicating that null hypotheses should be rejected. Therefore, that there is no statistically significant difference between age groups in how they rated the clarity and understandability of the chatbot's responses ($F(2, 99) = 2.192, p = 0.07$).

Table 5			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.159	6	.227

Table 5 reveals that, chi square calculated value is 8.159, $p=0.227 > 0.05$ Level of significance and table at 5% level of significance with 6 degrees of freedom is 12.59 The calculated value is $8.159 < \text{table value } 12.59$. Hence null hypothesis is rejected, so it can be inferred, that there is no association between Occupation and satisfaction with promptness of Chatbots responses.

Table 6: Correlate between satisfaction with chatbot performance and chatbot delivering helpful information.

6. Did the chatbots meet your expectation in delivering helpful information based on your needs?	Pearson Correlation	1	0.7
	Sig. (2-tailed)		.000
	N	102	102
7. How satisfied are you with the chatbot performance during office hours?	Pearson Correlation	1	0.7
	Sig. (2-tailed)		0.00
	N	102	102

Table 6 reveals that, strong positive correlation ($r = 0.7$) between users feeling that the chatbot met their expectations in providing helpful information and their satisfaction with its performance during office hours. This relationship is statistically significant ($p = 0.001$), indicating that users who found the chatbot helpful were also more likely to be satisfied with its performance. This suggests that the chatbot's ability to meet user needs plays an important role in overall user satisfaction.

Conclusion

This study focused at how customer satisfaction was influenced by AI-powered chatbots, particularly HDFC Bank's EVA. Customers' opinions of the chatbot's ability to offer useful information and overall satisfaction with its performance during business hours are strongly and statistically significantly positively correlated. This demonstrates that improving customer satisfaction greatly depends on the chatbot's capacity to deliver pertinent and helpful information. Overall, the results reveal that AI chatbots, such as EVA, can successfully enhance banking customer service by offering prompt and beneficial support, improving the customer experience, and possibly boosting customer loyalty.

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SOCIO-CULTURAL AND POLITICAL CONTEXTS OF KERALA MIGRANTS IN THE UNITED ARAB EMIRATES: ADAPTATION, IDENTITY, AND COMMUNITY LIFE

Dr. KT. Mohamed Musthafa

*Assistant Professor, Department of Sociology
Farook College (Autonomous), Kozhikode, Kerala
drmohamedmusthafakt@farookcollege.ac.in*

Abstract

There are two main reasons why labour migrants remain in a host country for a long time. The first is the presence of favourable conditions for migrants in the host land, and the second is the existence of compelling circumstances in which migrants have no alternative but to stay. The socio-cultural and political circumstances of the host country are significant factors in the success of any migration. Kerala has had a long-standing connection with the GCC countries, maintaining at least 50 years of migratory relations with the UAE. Malayalees have consistently chosen the UAE as a preferred migration destination. The socio-cultural, political, and economic aspects of the UAE have influenced Malayalee migrants to reside there for extended periods. According to the Kerala Migration Survey 2023, Kerala has 2.15 million (21,54,275) migrants worldwide, of whom 38.6 per cent are in the UAE. The majority of migrants from Kerala continue to choose the UAE as their migration destination. The main objective of the present study is to examine the socio-cultural and political conditions of Kerala migrants in the UAE. The study is based on both primary and secondary data, applying qualitative and quantitative methods for data collection. Primary data were collected from Malayalee migrants across the seven emirates of the UAE using surveys and interviews. Secondary data sources include journals, articles, and newspapers.

Keywords: Kerala Migration, UAE, Malayalee, Host land, Adaptation, Identity, Community life

Introduction

There are two possibilities for labor migrants to stay in host land for a long time. First being any favorable situation to migrants in host land and the second being compulsory situations in which the migrants have to stay in host land due to the absence of alternative options. The UAE is a favorite destination for migration across the world. "Dubai is like a bus, an air conditioned- bus. Get on the bus, don't bother if you get a seat or not. Then gradually you will settle down, things will move on" (Vora, 2008, p. 380). The socio-cultural and political circumstances of host land are significant aspects in the success of every migration. Kerala has been in a long term connection with GCC countries and has had at least 50 years of migratory relationship with the UAE. Malayalees have chosen the UAE as a favorite destination of migration. The socio-cultural, political and economic aspects of the UAE have influenced the Malayalee migrants to stay in the UAE. One of the respondents stated that "Al Karama" should be considered as the 15th district of Kerala. It has the largest Malayalee community in Dubai with several Malayalee restaurants and shops. All the Kerala food items are available here in Al Karama. Highly qualified and skilled labor enjoy an appropriate social status in the UAE. The surroundings of the semi-skilled and unskilled migrants are not as friendly. "Large proportions of semi-skilled and unskilled Indian laborers are suffering harsh conditions in Gulf and often they are denied even basic labor rights" (Pethiyagoda, 2017, November 21). This chapter is

mainly looking towards the socio-cultural and political status of Malayalee migrants in the UAE.

Socio-Cultural and Political Circumstances of Kerala Migrants in the UAE

The socio-economic, political, cultural and geographical surroundings of the UAE are entirely different from the surroundings of Kerala. The UAE is an Islamic state, and they have their own rules and regulation for the smooth functioning of the nation. The circumstances of the UAE are new experiences for Malayalee migrants. And it is difficult to live in a new circumstance entirely different from their home town experiences. But the history of Kerala Gulf migration shows that Malayalee migrants assimilated the culture of host land in a given time and made a base for Malayalees in the UAE. Two aspects are crucial in Kerala Gulf migration: first, the natives of the UAE received Malayalee migrants with all respect, and secondly, Malayalee migrants adjusted with the natives of the UAE quite well. Malayalee migrants' capabilities and dedication to work made them different from other foreign workers. So it is essential to analyze the different factors which directly connects to the Malayalee migrants' life in the UAE.

Methodology

The present study is based on both primary and secondary data, using both qualitative and quantitative methods. Primary data were collected from the seven emirates of the United Arab Emirates: Abu Dhabi, Ajman, Dubai, Fujairah, Ras Al Khaimah, Sharjah, and Umm Al Quwain. Surveys, as well as structured and unstructured interviews, were applied for data collection. The researcher collected data from 310 respondents across the UAE. Stratified sampling was applied for selecting the respondents. Journals, articles, and newspaper reports were used for collecting secondary data.

Isolation as a Foreigner in the UAE (Table 1.1)

Isolation From Others as a Foreigner	Yes	No	Total
Number of Respondents	43	267	310
Percent of Respondents	14%	86%	100%

Kerala Gulf migration is a male-oriented process and in which male members of the family migrated to the Gulf while their family stayed in home town. Often this situation of having to stay away from family led to much mental illness like depression, anxiety, and other mental related diseases. In this context, two aspects have to be discussed about the present study. Firstly the isolation of Malayalee migrants from their family and homeland has to be discussed and secondly, their isolation in the UAE has to be examined. The nature of the job and tough circumstances of the host land will also lead to isolation from the surroundings of the host land. In the present study, 86 percent (267) of respondents replied that they don't have the feeling of isolation as a foreigner in the UAE. But 14 percent (43) respondents stated that they felt isolated as a foreigner and that meant to be alert at all times, making them realize the value of citizenship of a nation. These respondents revealed that they have to carry around their documents everywhere, to be prepared to show whenever the authority asked for it.

Discrimination to Malayalee Migrants as a Foreigner in the UAE (Table 1.2)

Facing Discrimination as a Foreigner	Yes	No	Total
Number of Respondents	19	291	310
Percent of Respondents	06%	94%	100%

The discrimination and isolation in host land towards foreign laborers will negatively affect the flow of migrations and the migration process won't continue in the long term. Neha Vora (2008, p. 382) has rightly pointed out that "In fact, many people told me that it was precisely the lack of difference between India and Dubai that made it a favorable destination for migration". Now the UAE is treated as a world labor migration destination, and people from all over the world are working and living in the UAE. "Eighty-eight percent of the UAE population was born in another country, and the vast majority of migrants in the UAE are economic migrants, not refugees, says a World Economic Forum Report" (Khaleej Times, 2017, May 17). It shows that some positive elements are working in favor of labor migrants in the UAE. In the present study, 94 percent (291) of respondents do not feel any discrimination as a foreigner in the UAE. One respondent even stated that the UAE gives more importance to the ability of the individual more than his or her nationality and religion etc. At the same time, six percent (19) of respondents are feeling discriminated against as a foreigner. Mike Davis (2006, p. 65) pointed out that "the UAE is also a miniature Raj in a more important and notorious aspect. The great mass of the population are South Asian contract laborers, legally bound to a single employer and subject to totalitarian social controls".

Role of Profession in Gaining Social Status in the UAE (1.3)

Profession Plays an Important Role in Gaining Social Status in Host Land	Yes	No	Total
Number of Respondents	124	186	310
Percent of Respondents	40%	60%	100%

The nature of the job is a critical aspect of the host land. Unskilled workers do not get consideration while skilled and semi-skilled laborers do. The nature of employment plays a vital role in the UAE. In the present study (Table 4.3), 40 percent (124) respondents stated that the nature of the profession plays an essential role in gaining any social status in the UAE. Membership in Malayalee cultural associations and office bearer posts of these associations are also based on the economic status of the migrants. But 60 percent (186) of respondents state that all are engaged in different types of jobs and all the jobs have their own importance. These respondents don't think that jobs play a significant role in the social status of migrant laborers in the UAE and membership in the cultural association is not based on employment and salary. Majority of the Malayalee migrants do not have time to spend in extra activities. So they won't attend the programs of cultural associations. The important aspect is that the most Malayalee migrants are not bothered about their social status in the UAE and they are only trying to make maximum savings. Khadria (2010, p.67) rightly observed that "life, in general, is comfortable only for professionals and white-collar workers, and they are the ones who maintain contacts with compatriots and nationals, form associations and participate in socio-cultural activities".

Advantages and Disadvantages as Malayalee in the UAE

Advantages and Disadvantages as Malayalee Migrants in the UAE (Table 1.4)

Advantage as Malayalee Migrant	Yes	No	Total	Disadvantage as Malayalee Migrant	Yes	No	Total
Number of Respondents	167	143	310	Number of Respondents	19	291	310
Percent of Respondents	54%	46%	100%	Percent of Respondents	06%	94%	100%

In a recent study, 54 percent (167) of respondents think that Malayalee labor migrants have some advantages among the natives of the UAE. Natives consider Malayalee migrants as more effective and hardworking with the ability to fulfill tasks in a given time. But 46 percent (143) of respondents state that they don't have any advantage as Malayalee migrants. Respondents argued that they get appreciation if they work properly. From where they come does not matter at all.

Malayalees are visible in all areas of the UAE and almost all working sectors. Natives have a positive approach to Malayalee migrants and they expect good results from them. Only six percent (19) of respondents suffer disadvantages because of the Malayalee identity. They said that owners expect more perfection and are always trying to compare their work with the previous Malayalee employees. Ninety-four percent (291) of respondents did not experience any disadvantages as a Malayalee migrant laborer in the UAE. From the discussion with the UAE citizens, it is understood that they are happy with Malayalee migrant laborers and are impressed with their performance and dedication to work. But at the same the UAE citizens are bothered about the payment of Malayalee laborers. They know that Malayalees receive more remuneration than other nationalities in the same job. Malayalee migrants are always worried about the basic required facilities of the employee such as food and accommodation which turns out to be expensive for the employer and often leading to the appointment of other nationalities with low remuneration for the work.

Relationships of Malayalee Migrants in the UAE

Relation with Other Foreigners and Relation with the UAE Citizens (Table 1.5)

Relation With Other Foreign Migrants	Friendly Relation	Just a Relation	Purpose Base Relation	Total	Relation with UAE Citizens	Friendly Relation	Purpose base Relation	Total
Number of Respondents	254	20	36	310	Number of Respondents	198	112	310
Percent of Respondents	82%	06%	12%	100%	Percent of Respondents	64%	36%	100%

UAE is the land of migrants from India, Bangladesh, Pakistan, Sri Lanka, Afghanistan, Nepal, the Philippine, and Thailand, etc. It is an ocean of migrants belonging to different religions, languages, and regions. So mingling with other nationals is an inevitable aspect in daily life. Often migrants are interdependent with each other for their smooth living in the UAE. They would have to share rooms, a kitchen, and even workplaces. So beyond the boundary of nationality, strong relations formulate between migrants from different nations.

Malayalee migrants keep a good relationship with other foreigners in the UAE. In the present study, 82 percent (254) of respondents are maintaining an intimate connection with foreigners and six percent (20) of respondents hold just a relationship only. Twelve percent (36) of respondents keep just a need base relationship with foreigners particularly as part of their job.

Relation with the UAE Citizens

Ninety percent of the UAE's population are foreigners, mainly from South Asian countries. (Vora, 2010). Foreign laborers have contact with the UAE citizens because of the “Kafala” (sponsorship) system.

“Under the Kafala system, a migrant worker's immigration status is legally bound to an individual employer or sponsor (kafeel) for their contract period. The migrant worker cannot enter the country, transfer employment nor leave the country for any reason without first obtaining explicit written permission from the kafeel. The worker must be sponsored by a kafeel to enter the destination country and remains tied to this kafeel throughout their stay” (<https://www.ilo.org/dyn/migpractice/docs/132/PB2.pdf>).

Only the UAE citizens can take visa for foreign workers. The UAE citizens have a good relationship with foreign laborers and vice versa. But often relationships depend on the skill, earning and qualification of migrants in host land. Semi-skilled and unskilled workers are always out of the framework. The present study shows that (Table 1.5), 64 percent (198) of respondents keep a friendly relation with locals. Respondents also mingle with other foreigners than citizens. Thirty-six percent (112) from the present study revealed that they have only a purpose-based relationship with the UAE citizens. Respondents think that an equal distance with locals is essential in the long term migration process.

Approaches of the UAE Citizens to Malayalee Migrants (Table 1.6)

Approaches of UAE Citizen to Migrants	Friendly Approach	Approach to Fulfill their Needs	Total
Number of Respondents	273	37	310
Percent of Respondents	88%	12%	100%

The presence of large scale international migrants in the UAE shows their hospitality and tolerance towards foreigners. Neha Vora (2010, p. 46) rightly “In Dubai, where foreigners are estimated to make up close to 90 percent of the population, the division between citizen and foreigner seems at first glance to be very rigid, defining the daily lives of the city's resident”. The UAE is considered as one of the favorite destinations for labor migrants. Beyond job opportunities, other social factors like approaches of locals to foreigners may influence the acceleration of migration to the UAE. In the present study (Table 1.6), 88 percent (273) of

respondents are stating that UAE citizens keep a friendly approach to Malayalee migrants. Respondents didn't feel any differences in native's approach to foreign laborers. Twelve percent (37) of respondents are stating that natives contact foreign laborers only for some definite purposes. Beyond the fulfillment of their requirements, they don't have any relationship with migrant workers, especially with semiskilled and unskilled laborers.

Obstacles to Interact with the UAE Citizens (Table 1.7)

Obstacles to Interact with the UAE Citizens	Yes	No	Total
Number of Respondents	46	264	310
Percent of Respondents	15%	85%	100%

The migration exchanges cultural aspects from sending area to receiving area and vice versa. Language is an essential tool to communicate with each other. Hindi is one of the familiar languages in the UAE, and natives also speak Hindi. Often the language is an obstacle for migrants to interact with natives. But migrants are trying to learn Arabic as part of their existence within a short period of their migration in the UAE. The majority of Malayalee migrants are also learning Hindi after they migrated to the UAE. In the present study (table 4.7), 85 percent (264) of respondents don't have any obstacles to mingle with natives. Fifteen percent (46) of respondents have some barriers to mingle with natives. Often the language and nature of the job pose as a constant obstacle to mingle with natives.

Malayalee Migrants and the UAE Festivals

Participation in the UAE Festivals (Table 1.8)

Participation in the UAE Festivals	Yes	No	Total
Number of Respondents	282	28	310
Percent of Respondents	91%	09%	100%

The UAE has different festivals and celebrations and it is very popular among locals and nationals. "The home to many global cities of the Middle East, there is a slew of different kinds of cultural and religious festivals in the UAE that should be witnessed while holidaying at this city of Sheikhs" (Anand, 2018, October 22). The UAE has a lot of socio-cultural, religious and commercial festivals like "UAE Awafi Festival, National Day Festival, Eid Al Fitr, Eid Al Azha, Prophet Birthday, Dubai Shopping Festival, Dubai World Cup, Dubai Marathon, and Dubai Jaz Festival, etc" (Anand 2018, October 22; Joe, 2018, April 23). All the festivals happen annually, and a significant level of participation is a unique feature of these celebrations. In the present study (4.7), 91 percent (282) of respondents actively participate in the festivals in the UAE. Participants are mostly foreigners, and there is no restriction to attend the festivals. Malayalees have a lot of festivals in Kerala regionally as well as generally. Now they actively participate in the celebrations of host land in the memory of homeland festival. But nine percent (28) of respondents do not participate in the festivals. They have the desire to celebrate, but they do not get time after their duty and quite often the participation in these celebrations is quite expensive. Binod Khadria (2010) observed that often unskilled and semi-skilled laborers couldn't attend the festival of host land because of their nature of the job and financial status.

Obstacles to Mix with Malayalee Migrants (Caste, Politics and Wealth) (Table 1.9)

Obstacles to Mix with Malayalee Migrants	Yes	No	Total
Number of Respondents	19	291	310
Percent of Respondents	06%	94%	100%

Caste, politics and economic status, etc. are very visible in all societies and often act as an obstacle to mix. The UAE is also not free from this social injustice. Often association and get together programs are formulated by members of a particular caste or politics or wealth group in the host land. This type of obstacle is comparatively invisible among the Malayalee migrants in the UAE. In the present study (table 1.8), 94 percent (291) of respondents say that there are no obstacles like caste, politics and economic status while mingling amongst the Malayalee migrants in UAE. Political discussions and debates are more common in the UAE than Kerala and happen by keeping mutual respect and understanding of each other. Respondents in the present study state that they don't feel economic status as an obstacle to mingle with each other in their friendship circle which includes unskilled, semi-skilled and highly professional Malayalees from different parts of Kerala. According to Anwar Naha, the President of Kerala Muslim Cultural Center, Dubai observed that visibly there are no obstacles to mingle among the Malayalee migrants in the UAE based on caste, religion, politics and wealth. In the present study, six percent (19) of respondents state that often individual earnings become the obstacle to mingle with other Malayalee migrants. Generally, barriers are not noted to mingle among the Malayalee migrants in the UAE. But it cannot be said that there are no obstacles to mingling among the Malayalee migrants. Caste, religion, politics and wealth may influence the relationship of Malayalee labor migrants, but it is not visible.

Religious Practices and Malayalee Migrants in the UAE

Obstacles to Observe Religious Practices (Table 4.10)

Obstacles to Observe Religious Practices	Yes	No	Total
Number of Respondents	03	307	310
Percent of Respondents	01%	99%	100%

The UAE is an Islamic state, but they accommodate other religious believers also. UAE has given permits to construct temples and churches in Dubai and Abu Dhabi. They also provide facilities to other religious believers to observe their religious practices. The UAE has a religious policy and within the policy, they consider other religious believers also. “The Middle East’s first traditional Hindu stone temple to be built in Abu Dhabi will feature intricate architecture and delicate carvings that will retell the ancient stories from Indian scriptures about peace and spirituality” (Badam, 2018, February 17). In the present study, 99 percent (310) of respondents are observing their religious practices without any obstacles. Muslim respondents use the mosque to perform religious practices. Hindu respondents often worship in their rooms and visit the temple on particular days. Christian respondents go to churches in the early mornings or evenings of Sunday because Sunday is a working day in the UAE. One percent (three) of respondents face some obstacles to observe religious practices because of their working hours or the nature of their jobs.

Malayalee Migrants and the Rules and Regulations of the UAE

Rules and regulations of the UAE are entirely different from Kerala in its nature and implementation. "The core principle of the UAE law is based on Islamic Sharia and most legislations have been formulated with a mix of Islamic and European concepts of civil law. It has common roots in Egyptian Legal code established in the 19th and 20th Centuries" (Khedr and Alnuaimi, 2018, January). Alcohol is prohibited for Muslims in the UAE and non-Muslims can use alcohol with a license. Otherwise, they will have to succumb to punishments. So it is necessary to understand the rules and regulations of host land for a better life for the migrants.

Active Rules and Regulations in the UAE (Table 4.11)

Rules and Regulation of the UAE are Active	Yes	No	Total
Number of Respondents	220	90	310
Percent of Respondents	71%	29%	100%

Rules and regulations in the UAE are actively strict in its implementations. The UAE government strictly observes the activities of the people to avoid troubles and problems because the UAE is the destination of foreign laborers and it accounts for 90 percent of the total population of migrants from different parts of the world. They ensure security for its people through various methods. They provide equal preference to both citizens and foreign nationals for their security. Seventy-one percent (220) of respondents in the present study is stating that the rules and regulation of the UAE are very active in its implementation. Authority updates the rules and regulations from time to time, and it informs people through newspapers and other media. If anybody violates the rule, he or she will be punished immediately in the form of penalty, imprisonment, or even termination of visa depending on the nature of the crime and the violation of the rule. But 29 percent (90) of respondents stated that rules and regulations are active, but the implementation is not that stringent.

Discrimination While Implementing Justice Between Citizens and Foreigners (Table 4.12)

Equal Justice for all Beyond Foreigner and Citizen	Yes	No	Total
Number of Respondents	279	31	310
Percent of Respondents	90%	10%	100%

The UAE is trying to implement justice to all its people without discrimination between foreigners and citizens. But often in the case of foreign semi-skilled and unskilled migrant laborers, lots of criticism has arisen. "Article 25 of the UAE constitution assures that all are equal before the implementation of the law and there will be no discrimination between citizens of the union based on race, religious belief, nationality or social status" (Khedr and Alnuaimi, 2018, January). The majority of the foreign workers in the UAE are unskilled or semi-skilled. Migrants' governance is maintaining through Kafala system in the UAE and it gives more power to employers on employee. But often the Kafala system leads to exploitation by employers because of the full control over the employees. An employee cannot move to another job or leave the country without the written consent of the employer (Sponsor). Mainly unskilled and semi-skilled laborers are victims of the Kafala system. But the UAE is trying to

provide better legal services to foreign laborers. The UAE has passed a new law in favor of domestic workers. Previously they were excluded from the protection offered under the UAE labor law. The new rule ensures domestic workers clarity regarding duty time, salary, holidays and annual leave with payment (Human Rights Watch, 2017, June 7). In the present study, 90 percent (279) of respondents are stating that government authority is stringent in implementing rules without the biases of foreigners and locals. These respondents stated that the majority of the foreign laborers work in the UAE without any fear because of the strict implementation of rules and regulations. But 10 percent (31) of respondents are stating that the implementation of rules and regulations is different for locals and foreigners. Often priority goes to the locals. So labor migrants are exploited under the Kafala system. The UAE has a national labor law, but often unskilled and semi-skilled laborers do not get the benefit of the law, at least in the regularity of their payment.

Awareness about Legal Punishments in the UAE (4.13)

Awareness About the Punishment of the UAE	Yes	No	Total
Number of Respondents	301	09	310
Percent of Respondents	97%	03%	100%

The UAE is taking strong procedures to stop crimes and violation of rules. They are trying to bring awareness among the natives and foreigners about the punishment for violation of rules and committing crimes. Article 28 of the UAE constitution explains "Penalty is personal, an accused person is presumed innocent until his conviction is proved before a court of law wherein the necessary guarantees of the right of the self-defense are secured. The law shall describe the cases in which the presence of a counsel for a defense shall be assigned and physical and moral abuse of an accused person is banned" (Khedr and Alnuaimi, 2018, January). The UAE has formulated a clear framework for the implementation of rules, regulations, and consequent punishments. More than government advertisement, cultural organizations among the foreign laborers are the ones creating awareness among their people about the laws and punishments of the UAE. Malayalam newspapers, channels, and radio are very powerful among the Malayalee community in the UAE. These media bring awareness among the Malayalee migrants about the existing rules and regulations, fine and punishment, new rules, etc. daily. In the present study (Table 4.13), 97 percent of respondents are aware of the punishment in the country for violation of rules. Respondents stated that it is difficult to live in the UAE without knowing the rules and penalties. So foreigners need to be bothered and aware of the rules. Punishments are based on the degree of violation of rules. Penalty, imprisonment, deportation and capital punishment etc. are few existing punishments in the UAE. They update rules and regulations from time to time. Three percent (nine) of the respondents in the present study are not that much aware of the punishment for the violation of rules. These respondents are mostly new migrants in the UAE and are trying to learn about the existing rules and punishments. A respondent stated that he has been working as a driver since 2010, and drivers should be updated about the traffic rules of the UAE from time to time as the penalty for traffic violations is very high. The driver has to pay the fines from his own hands, and it will also be marked negatively in his license. New drivers often paying more than 50 percent of their salary as fine because of the traffic violation. Authorities are trying to create awareness regarding this.

Malayalee Migrants are More Obedient in Host Countries than Home Town (Table 4.14)

Malayalees are more Obedient in Host Land than Home Town	Yes	No	Total
Number of Respondents	254	56	310
Percent of Respondents	82%	18%	100%

Migrants must be aware of all the punishments for the violation of rules in host land. A migrant can't leave the UAE without getting punished upon violating rules. All crimes will be recorded in their ID and it will show during the visa renewal process or while leaving the country. Migrants know very well that it is essential to obey the rules of host land and that otherwise, the consequences will be very high. In the present study (Table 4.14) 82 percent (254) of respondents state that Malayalee migrants are more obedient in the UAE than Kerala. Often the feeling of foreign nation and awareness of punishments compel Malayalee migrants to obey the rules of the country. Compared to the implementation of rules and regulations in the UAE, Kerala is less strict and a lot of indirect options exist to avoid punishment such as political recommendation, spoliation of evidence and bribery etc. If any case is registered against anyone at all, it takes years to reach court and hear the final verdict. "According to National Judicial Grid, a total of 22.9 lakh cases are pending in lower courts which are ten years or older in which 5.97 lakhs cases are civil and 16.92 lakh cases are criminal in nature" (Times of India, 2018, September 18). Eighteen percent (56) of respondents stated that this is a false allegation against Malayalee migrants that they obey rules in host land and violate those of homeland. These respondents added that Kerala also strictly implements rules and regulations. Often some intervention does happen by politicians or influential people. It is nothing new and similar things happen in the UAE also. Bribery and recommendation to avoid cases are happening in the UAE too but not that much. Malayalee migrants are very obedient to host land's rules and regulations than the home country. This is so because they would not be able to continue in the host land without obeying their rules and regulations. Another factor is that punishment is very strong and the fine is 100 percent or 200 percent more in the UAE than in Kerala which the semi-skilled and unskilled migrants are unable to pay with their limited salary. So they try their best to avoid the situation of violation of rules. "Article 27 of the UAE constitution explains that the law will define all the crimes and punishment, and no penalty will be declared for any crime or act before the appropriate law has been promulgated" (Khedr and Alnuaimi, 2018 January). The Law is trying to give justice to victims in all possible manners without the discrimination of locals and foreigners.

Cultural Associations and Malayalee Migrants in the UAE

Several Malayalee cultural associations work across the UAE. They are not only focused on reproducing the cultural activities of the homeland but also try to interfere with the problems of Malayalee migrants. "The UAE has a system of registering the social organization of the expatriate community and, within the guidelines laid down by the UAE government, such association can function freely" (<http://www.indembassyuae.gov.in/eoi.php?id=UAE>). The registered association extends support to required Malayalee migrants in the UAE. Indian Embassy noted that "there are six registered associations in Abu Dhabi namely Indian Social and Cultural Center, Abu Dhabi Malayalee Samajam, Kerala Social Center, Indian Islamic Center, Indian Social Center and Indian Ladies Association" (Ibid). Other smaller cultural

associations are working with the affiliation of a registered association. They are organizing different cultural programs by bringing eminent artists from Kerala. It creates a significant relationship among the Malayalee migrants in host land and it helps them to recall their hometown memories and reduce the tension of the hectic work. NORKA Roots has circulated the list of recognized Malayalee associations abroad, and it includes 49 registered associations in different countries (Government of Kerala, 2018). Among the 49 recognized Malayalee Associations, 44 associations are in six GCC countries and makeup 90 percent of the total recognized Malayalee associations (ibid). Fifteen recognized Malayalee associations are working across the UAE and these Malayalee associations are visible and active in all seven emirates of the country. Indian Association Sharjah, Kerala Muslim Cultural Centre, Kerala Social center and Indian Islamic Center, etc. are prominent recognized Malayalee associations in the UAE. These associations provide economic support to the required section of the people in both Kerala and UAE. Associations try to interfere with the issues of Malayalee migrants, and they try to bring the attention of authorities to issues faced by Malayalee migrants in the UAE. They have massive scale participation of Malayalee migrants, and 34 percent of theses recognized Malayalee associations work in the UAE (ibid).

Membership in Malayalee Cultural Association in the UAE (4.15)

Membership in any Cultural Associations in the UAE	Yes	No	Total
Number of Respondents	133	177	310
Percent of Respondents	43%	57%	100%

In the present study (Table 4.15), 43 percent (4.15) of respondents are members of different Malayalee associations. According to them, Malayalee associations are very active in the UAE and the office bearers of the association have contacts with local authorities. It helps to solve different problems related to work and travel documents. Malayalee associations provide various services to Malayalee migrants and other nationals free of cost or with minimum charges. Members have to pay a fixed amount to the association every month and the amount depends on the ability of the member. The amount received is used for the social and economic welfare of members in host land and if required, for people in homeland. Associations are trying to solve the problems of Malayalees in host land within their limits. Fifty-seven percent (177) of respondents in the present study are not members of any Malayalee assocoations.

There is a criticism that a majority of the associations work as affiliated agents of political parties in their home town and they work with a clear vision to develop their political agenda among the Malayalee migrants in the UAE. Often association collects money from Malayalee migrants as social philanthropy by contributing to the development of home town. But it reaches home town as political philanthropy and political parties use most of it for their vote banking politics.

Respondents in the present study added that politics are visible in the activities of Malayalee associations in both homeland and host land. The office-bearers of the association will be highly politically connected people. Respondents noted that according to the nature of the job of the semi-skilled and unskilled laborers, they do not have enough time to spend in association works. So they keep away from these types of activities, but they have the

membership with fixed monthly payments to the association. Often the political element of home town influences the activities of associations in host land. Similarly, they have a high influence in the UAE.

Malayalee Migrants and Media in the UAE

Media have a vital role to play among the migrants in host land and often media help them to recreate the space of home town in host land. “Media play an important role in the reconstruction of cultural identities of Diaspora and helps negotiate a borderline existence between the home country and the host country” (Jacob and Venkataraghavan, 2018, p. 1). Malayalam media are very active and influential among the Malayalee migrants across the UAE. Several Malayalam newspapers, television and radio channels are working across the UAE. Malayalam media have become successful in the endeavor of influencing the Malayalee community in the UAE. Media have helped them to update the moments of both homelands and host land from time to time. Malayalam newspapers are the largest circulating newspapers in the regional language of a foreign country in the UAE. Four Malayalam newspapers namely “Gulf Madhyamam, Malayala Manorama, Mathrubhumi and Siraj’ have their own editions in the UAE. Apart from these, other Malayalam newspapers also circulate in the UAE. All Malayalam channels are telecasted in the UAE with a special Gulf edition news bulletin. Malayalam channels show different programs for Malayalee migrants in the UAE. “Asianet, Media one, Kairali, Jaihind, Reporter, Surya TV, Jeevan, and Flowers”, etc. are important Malayalam channels telecasting in the UAE. Radio programs are very influential among the Malayalee migrants in the UAE. There are a number of Malayalam radio channels working across the UAE namely “Asianet radio AM 657; Voice of Kerala AM 1152; Radio Asia AM 1269, Hit FM 96.7, Super FM 94.7 and Gold FM 101.3, etc” (Saeed, 2012, July 12). The whole media has certain restrictions and regulations to work in the UAE. But Malayalee media are trying to work effectively as a bridge between home town and host land within their limitations. Different programs in media connecting home and host land gives relaxation to Malayalee migrants in the UAE. Malayalam media also creates awareness of the new rules, regulations and traffic issues etc. among the Malayalee migrants in the UAE.

Various Media Using by Respondents in the UAE (Table 4.16)

Media	News Paper only	TV Channel only	Radio only	Both Newspaper & TV	Newspaper, TV & Radio	Other sources	Total
Number of Respondents	49	99	94	21	26	21	310
Percent of Respondents	16%	32%	30%	07%	08%	07%	100%

The present study (table 4.16) shows that newspapers, television and radio channels are influential media among the Malayalee migrants in the UAE. Sixteen percent (49) of respondents in the present study uses newspaper (e-paper and hard copy) only to know the news and updates in the UAE. These respondents argued that reading newspapers are an entirely different experience compared to listening and watching the news. The newspaper was

the only media to know the news of the home town in the last decades of the 20th century. But the advancement of television and radio channels reduced the number of newspaper readers among the Malayalee migrants in the UAE. Thirty-two percent (99) of respondents watch television channels to know the news of both homeland and host land. Thirty percent (94) of respondents listen to radio channels to update their day to day information about the UAE and Kerala. Both television and radio channels give equal priority to news and entertainment programs. So more Malayalee migrants are attracted to television and radio channels. When compared to the percent of respondents watching television and listening to radio channels, the percent of the newspaper readers is less. In the present study, a respondent revealed that Malayalee migrants in the UAE do not get time to read newspapers in the morning and they find time to read and listen only after their duty and most probably that will be late night. Seven percent (21) of respondents use both television and newspaper to know the news.

Eight percent (26) of respondents use newspapers, television and radio channels to know the news and enjoy the entertainment programs. Malayalam media, especially television and radio channels telecast variety entertainment programs for Malayalee migrants, and often Malayalam media get a higher rating from the Middle East than Kerala and other parts of the world. Seven percent (21) of respondents in this study depends on other sources like social media for news and entertainment. Often the cultural entertainment programs have a good response from Malayalee migrants in the UAE. Malayalam media are trying to reduce the cultural distance between the home town and host land. Yu shi (2005) has pointed out that migrants are forming communities in host land to remember the departed memories and media practices will help communities and recall the memories of home town.

Malayalee Migrants and Social Media in the UAE

The first decade of the 21st century witnessed the revolution of social media across the world. This revolution was benefitted the most by the labor migrants from different parts of the world. Social media has reduced the distance between home town and host land and the cost of the communications also. Social media helped to create a significant level of network among the migrants in host land which was not very easy previously. Dekker and Enbersson (2012, p. 2) observed that the "Communications methods contributed by social media transformed the migration networks and thus mobilized migration through four unique functions. Firstly it strengthened strong ties with family, relatives, and friends; secondly created ties with an individual that can help in the process of migration and integration; thirdly it created a network of possible ties, and fourthly it created an insider knowledge on the process of migration".

Social media helped to find out better opportunities in host land, and a lot of WhatsApp and Facebook groups are working for it. It helped to make a community feeling among the migrants in host land. "Facebook, WhatsApp, Skype, Instagram, Twitter, Gmail", etc. are the leading social media in the 21st century. Facebook and WhatsApp are the most popular social media among the Malayalee migrants in the UAE. One of the reasons behind this popularity is that Facebook and WhatsApp apps are users friendly and anyone can use it without a complicated process. Migrants can use social media to keep relation with the people they have met offline, and it further helps to find a new network in the strangest destination (McGregor and Siegel, 2013).

Membership in social media groups (Table 4.17)

Membership in Social Media Group (Facebook, Whatsaap)	Yes	No	Total
Number of Respondents	245	65	310
Percent of Respondents	79%	21%	100%

An important aspect behind large scale migrants using social media is that it connects the families and friends under a common platform by avoiding the obstacle of distance. Another thing is that social media reduced the distance between the home town and host land at a larger scale and made life more alive. The migrants who didn't have any technical skills also are very familiar with the usage of social media among the Malayalee migrants in the UAE. The present study (table 4.17) shows that 79 percent (245) of respondents are active members of different social media platforms mainly Facebook and WhatsApp. The social media groups are mostly based on family circle, friends circle, community circle, political circle, job circle, charitable circle, and sports circle in both host land and homeland. Migrants update their day to day activities through social media groups especially news regarding job vacancies and new job opportunities. Often it is also found that the over usage of social media lead to a lot of socio-economic and family problems. Twenty-one percent (65) of respondents of the present study are not that active in social media groups. They know the social media groups, but their nature of jobs and personal interests keep them away from the social media group. A respondent revealed that now social media is wasting a lot of free time and bring troubles to others than good intentions. The basic intention behind social media is to strengthen the tie among the people, but unfortunately often it leads to breaking the relationship of people. Even so, social media has influenced on Malayalee migrants at large scale in the UAE. It made a lot of positive aspects among the migrants, and often social media groups of migrants contribute as part of social philanthropy to required sections of the society in both homelands and host land. The majority of Malayalee migrants in the UAE are single migrants staying away from their families. So the advancement of social media helps them to connect regularly with family and friends. The low cost of the internet also increases the users of social media in the UAE.

Most importantly, social media made Malayalee migrants' life more live to their families. Migrants can communicate with each other if they require any help and they can also help other migrants through social media contacts. In the last decades of the 20th century, communication was very expensive and often communication of migrants limited to family only. But the advancement of social media made a new step in the lives of the migrants. However, the over usage of social media is creating a lot of psychological and economic troubles among migrants. Authorities, media, and Malayalee cultural associations are warning migrants from time to time about the fake activities of social media.

Welfare Activities in Host land

Participation of Welfare Activities in the UAE (Table4.18)

Participation in Welfare Activities in the UAE	Yes	No	Total
Number of Respondents	127	183	310
Percent of Respondents	41%	59%	100%

UAE is the center of the labor migrants from across the world. The laborers are different from person to person in terms of qualification, job, and earnings. Migrants face many problems like struggling to find out jobs, migrants in jail without proper documentation and migrants are cheated by agencies or companies, suffering accidents without financial assistance from companies, etc. The migrants come from different parts of the world. But they are ready to help others by keeping away the differences of religion, nationality, and race, etc. But often forgery is noted in the name of welfare activities in the UAE. In the present study (4.18), 41 percent (127) of respondents are participating in the welfare activities in the UAE. They participate through the different Malayalee associations working across the UAE. Mainly they supply the foods in labor camps during necessary times and provide emergency assistance to required migrants especially in the incidence of death. To send the dead body from the UAE to the homeland has a lot of legal procedures. Often it is the Malayalee social workers who are actively involved in finishing procedures and sending the body to home town. In the present study 59 percent (183) of respondents are not directly part of the welfare activities in the UAE. They do provide financial assistance to conduct these welfare activities but the nature of their job and lack of time remains as obstacles to participating in the welfare activities. The welfare activities of the Malayalee community has been appreciated by the UAE authority. Because often the welfare activities reduce the duties of authorities. The welfare activities of the Malayalee migrants are one of the important aspects behind a large number of Malayalee migrants in the UAE as it mobilizes new migrants to the UAE without the risk of migration at low cost.

Conclusion

Socio-cultural and political surroundings of the UAE is entirely different from that of Kerala. So to adjust in the new environment is a difficult task for new migrants in the UAE. Often the Malayalee migration networks in the UAE helps migrants to mix with host land. The majority of respondents did not face any serious isolation and discrimination as foreign laborers in the UAE. Migrant's profession plays a major role in their status in the UAE. Malayalee migrants have been visible in the UAE since the origin of migration to the UAE from different parts of the world. Being a Malayalee migrant in the UAE has both merits and demerits. Malayalee migrants have a good relationship with natives and other nationals and natives do consider Malayalee laborers with respect except in a few cases. A large portion of respondents did not feel any obstacles to mingle with native people in the UAE. Respondents are participating in the cultural and commercial festivals of the UAE, and it makes Malayalee migrants closer to host land. There are no obstacles like religion, caste, and region to mingle within the Malayalee community. But often the nature of the job creates limitations to mingle with other Malayalee and non-Malayalee migrants. Non-Muslims Malayalee migrants have the option to perform their religious practices within the terms and conditions. Rules and regulations of the UAE are stringent and active in its implementations. But often lack of attention from authority leads to the exploitation of foreign laborers, especially domestic and unskilled workers. It is noted that Malayalee migrants obey the rules and regulations of the UAE better than that of Kerala. They are aware of the punishment and consequences of violation of rules in the UAE very well

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BRIDGING THE GENDER GAP IN PROPERTY OWNERSHIP: A CRITICAL ANALYSIS OF WOMEN'S INHERITANCE RIGHTS UNDER INDIAN LAW

KK. Nakshathra
Research Scholar, VISTAS

Dr. Sincy Wilson
Research Supervisor, VISTAS

Abstract

Property ownership is a fundamental component of economic independence and social empowerment, yet women in India have historically faced systemic barriers to exercising their inheritance rights. Despite significant legal reforms most notably the Hindu Succession (Amendment) Act, 2005 which granted daughters equal coparcenary rights in joint Hindu family property, entrenched socio-cultural norms, procedural hurdles, and lack of awareness continue to impede gender parity in property ownership. This paper critically examines the legal framework governing women's inheritance rights in India, analysing statutory provisions under personal laws (Hindu, Muslim, Christian, and Parsi) alongside constitutional guarantees of equality and non-discrimination.

Through doctrinal analysis and case law review, the study evaluates how landmark judgments, including Vineeta Sharma v. Rakesh Sharma (2020) and Prakash v. Phulavati (2016), have shaped the interpretation and enforcement of women's inheritance rights. It further explores gaps in legal implementation, such as the disparity between formal equality in law and substantive equality in practice, particularly in rural areas where customary practices often override statutory rights. The paper also investigates the intersectionality of gender, caste, and economic status in determining women's access to property, highlighting how marginalized groups face compounded disadvantages.

*In light of India's commitments to **Sustainable Development Goal 5** (Gender Equality) and **Goal 10** (Reduced Inequalities), the paper argues for a multi-pronged strategy that combines legal reform, gender-sensitive property registration procedures, targeted legal aid, and public awareness campaigns. It proposes policy innovations such as mandatory joint titling in government housing schemes, digitisation of land records with gender disaggregated data, and stricter penalties for denial of lawful inheritance.*

By situating women's inheritance rights within the broader discourse on gender justice and legal empowerment, this research underscores that bridging the gender gap in property ownership is not only a matter of legal compliance but also a catalyst for social transformation and economic resilience.

Keywords: Women's inheritance rights, property ownership, gender justice, Hindu Succession Act, customary law, India, SDG 5.

1. Introduction

Property ownership has historically been a central determinant of economic power, social status, and personal autonomy. In patriarchal societies such as India, where property has traditionally been passed down through male heirs, women's exclusion from ownership has reinforced multiple dimensions of inequality. This exclusion is not merely an outcome of outdated customs, but a structural barrier that limits women's participation in economic decision-making, perpetuates dependency, and undermines their security in cases of marital breakdown, widowhood, or family disputes.

While the framers of the Indian Constitution embedded the principles of equality and non-discrimination in the nation's supreme law, the translation of these principles into personal

laws, property codes, and daily practice has been uneven. Legislative milestones — notably the Hindu Succession (Amendment) Act, 2005 — have marked significant progress, placing daughters on an equal legal footing with sons in matters of coparcenary rights. However, de jure equality has yet to translate into de facto equality.

Persistent social attitudes rooted in notions of family honour, administrative procedures that are opaque and intimidating, and lack of awareness about legal entitlements continue to obstruct effective enjoyment of these rights. As a result, gender justice in property ownership remains as much a socio-cultural challenge as it is a legal one.

This paper situates women's inheritance rights within the broader discourse on *gender justice, legal empowerment, and sustainable development*, examining constitutional provisions, statutory reforms, judicial interventions, and prevailing barriers. It also proposes policy measures that focus not only on legal reform but also on implementation strategies that are sensitive to socio-cultural realities.

2. Literature Review

Extensive work in gender and property rights scholarship demonstrates the transformative power of asset ownership for women. Agarwal (1994) highlighted that land ownership strengthens women's livelihood security, reduces vulnerability to poverty, and enhances their status in the family and community.

However, even after the Hindu Succession (Amendment) Act, 2005, implementation gaps have allowed discriminatory customs to persist—especially in rural India. Studies by Bhasin (2006) and UN Women (2023) reveal the importance of shifting societal attitudes along with legal reform.

3. Constitutional and Legislative Framework

3.1 Constitutional Mandates

- Article 14: Equality before the law.
- Article 15(1): Prohibition of discrimination on grounds of sex.
- Article 15(3): Permits positive discrimination in favour of women.
- Directive Principles (Article 39): Advocates for equal right to resources.

3.2 Hindu Succession Law

The Hindu Succession Act, 1956 initially entrenched gender inequalities in property rights. The 2005 amendment corrected this by:

- Granting daughters equal coparcenary rights as sons.
- Applying rights regardless of marital status.

Key Judgments:

- Vineeta Sharma v. Rakesh Sharma (2020): Rights accrue by birth.
- Danamma v. Amar (2018): Rights apply even if the father died before 2005.

3.3 Muslim Law

Provides guaranteed shares to women (usually half that of men), but socio-cultural barriers remain significant.

3.4 Indian Succession Act, 1925

For Christians and Parsis, largely gender-neutral provisions exist, but practice still reflects patriarchal bias.

4. Ground Realities and Barriers

1. Cultural Norms: Women encouraged or pressured to relinquish property to brothers.
2. Lack of Legal Awareness: Many women unaware of legislative changes.
3. Procedural Complications: Land mutation and registration processes deter assertion of rights.
4. Weak Enforcement: Administrative reluctance or delays in implementing court orders.
5. Data Deficit: Limited gender-disaggregated statistics on ownership.

5. Sustainable Development Goals (SDG) Perspective

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, lay out a comprehensive framework for nations to pursue equitable, inclusive, and sustainable progress by 2030. Among these, SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities) are especially relevant to the discourse on women's property and inheritance rights.

SDG 5: Gender Equality

Focuses specifically on "undertaking reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property." The global indicator assesses the proportion of women with ownership or secure rights over agricultural land. In the Indian context, bridging the gender gap in property ownership is a litmus test for progress toward SDG 5.

- Empowerment: Secure inheritance rights increase women's autonomy, bargaining power in households, and capacity to participate meaningfully in local governance.
- Protection against poverty and violence: Asset ownership acts as a safety net against destitution, homelessness, and is correlated with lower rates of domestic violence.
- Intergenerational Impact: When women own property, children and future generations benefit from increased stability and access to education and healthcare.

SDG 10: Reduced Inequalities

- SDG 10 aims to "reduce inequality within and among countries," including by promoting the social, economic, and political inclusion of all, irrespective of gender. Equal inheritance rights help narrow the wealth gap and improve women's position in broader society.
- Wealth Distribution: Ensuring daughters inherit property directly reduces gendered disparities in asset ownership.
- Social Inclusion: Property ownership fosters social participation and access to credit, entrepreneurship, political life, and decision-making.

SDG 16: Peace, Justice, and Strong Institutions

Women's access to property is a justice issue. SDG 16 emphasizes the need for accountable institutions and access to legal support for all. Strengthening legal frameworks and ensuring

non-discriminatory enforcement are critical components—aligning with India’s constitutional mandate and international obligations.

- SDG 1 (No Poverty): Secure property rights help lift women and children out of poverty, providing a foundation for long-term economic resilience.
- SDG 2 (Zero Hunger) and SDG 8 (Decent Work and Economic Growth): Land and property rights contribute to agricultural productivity and opportunity for independent economic activity.
- SDG 11 (Sustainable Cities and Communities): Women’s ownership supports inclusive urban development and secure housing tenure.

India’s Progress and Challenges

India reports gradual improvements in the share of women holding land titles, but the numbers remain low by global standards (UN Women, 2023; World Bank, 2023). The government has initiated schemes such as joint titling in housing projects and digitization of land records, yet large-scale social change requires eliminating discriminatory norms and streamlining administrative systems (Kelkar, 2016).

Achieving SDG Targets in India will Require:

- Uniform legal reforms across personal laws
- Active data collection and national surveys on gender and asset ownership
- Investment in legal literacy and community-level advocacy
- Collaboration with civil society, local governance institutions, and judicial bodies to monitor implementation

6. Global Insights

Across the world, numerous countries have implemented innovative policies and programs to promote women’s access to property and inheritance rights—demonstrating that legal reform must be supplemented with administrative action and social mobilization:

- Rwanda established mandatory joint property registration for married couples in its 2004 Land Law; as a result, women’s names appear on over 60% of newly issued land titles, up from less than 20% previously (Muther, 2021; World Bank, 2023). This policy was successful because it was paired with nationwide community awareness campaigns, simplifying registration procedures, and strong enforcement of statutory rights.
- Ethiopia implemented large-scale rural awareness campaigns about land rights, and introduced gender audits in land registration offices. Studies show a significant increase in women’s documented ownership and willingness to assert inheritance claims, supported by local paralegal services and active engagement of women’s organizations (Muther, 2021).
- Nepal revised its inheritance code in 2018, granting unmarried daughters equal rights to family property, which was previously restricted. Initial outcomes suggest increased claims and a shift in family attitudes, though the process is ongoing.
- South Africa combines legal reform with progressive constitutional rights. The country’s constitution explicitly prohibits gender-based discrimination in inheritance

(Section 9), and courts have consistently upheld women's property claims despite some customary resistance (Oxfam India, 2018).

- Bangladesh introduced land allocation programs for poor and landless women, promoting their economic empowerment and social status. Combining legal reforms with targeted government programs accelerated real change in women's ownership patterns (Kelkar, 2016).

These examples show that bridging the gender gap requires:

- Appropriate legal frameworks
- Simplified, accessible administrative processes
- Widespread public education initiatives
- Support from civil society organizations
- Continuous monitoring and data collection

India's efforts can be strengthened by incorporating these global best practices, ensuring that women's inheritance rights are protected and realized in both law and reality.

7. Role of the Judiciary

Judiciary in India has played a pivotal role in pushing the boundaries of women's inheritance rights, often interpreting the law progressively and providing relief from discriminatory customs:

- The Supreme Court of India in *Mary Roy v. State of Kerala* (1986) struck down Travancore Christian personal law provisions that denied equal inheritance rights to women, making the Indian Succession Act applicable regardless of customary law. This landmark decision significantly advanced constitutional equality in inheritance for Christian women.
- In *Vineeta Sharma v. Rakesh Sharma* (2020), the Supreme Court clarified that daughters have coparcenary rights by birth, irrespective of whether the father was alive at the time of the 2005 amendment—removing previous ambiguity and cementing daughters' rights as fundamental and not contingent on family circumstances.
- The Court in *Danamma @ Suman Surpur v. Amar* (2018) held that the 2005 amendment applies retroactively if the property disposition had not occurred before amendment, again reaffirming the broad reach of statutory rights for daughters.
- Lower courts and State High Courts have frequently intervened against societal pressures that coerce women to relinquish inherited property. Judicial activism has extended to ordering administrative authorities to expedite mutation and registration of property in women's names, penalizing family members or officers who obstruct due process (Patel, 2019).
- Indian courts have retreated from accepting customary practices that conflict with statutory gender equality, emphasizing that constitutional values must prevail over tradition (Nongkynrih, 2011).

Judicial interpretations, together with explicit statutory reforms, have been critical in empowering women. Continued accessibility to the courts, increased legal aid for inheritance

disputes, and awareness-generated by high-profile judgments remain essential for meaningful progress..

8. Policy Recommendations

1. **Uniformity Across Personal Laws** — Harmonise inheritance rights to meet constitutional equality standards.
2. **Mandatory Joint Titling** — Include women's names in all property documents in government allotments.
3. **Digitised Land Records** — With gender-tagged fields for transparent monitoring and reporting.
4. **Legal Aid and Helplines** — Village-level facilitation centres offering free legal advice.
5. **Public Awareness Campaigns** — Involving media, NGOs, and local governance bodies.
6. **Penalties for Unlawful Denial** — Criminalising coercion against women to surrender rights.

9. Conclusion

Bridging the gender gap in property ownership is not merely a legal reform exercise — it is a transformative agenda that addresses economic inequality, social justice, and women's strategic empowerment. Property is more than an asset; it is a source of dignity, independence, and security. When women have secure rights to property, the benefits ripple outward — strengthening family welfare, widening economic participation, and contributing to community resilience.

India's legislative strides, particularly the 2005 amendment to the Hindu Succession Act, have created a robust legal foundation. Yet, as the lived realities reveal, laws alone do not dismantle entrenched cultural norms or administrative bottlenecks. For genuine transformation, reform efforts must be holistic: harmonising personal laws, improving administrative workflows for ownership transfer, creating gender-tagged land records, and ensuring functional district-level legal support to women.

Equally important is the cultural dimension — shifting the collective mindset from viewing women's inheritance as an optional "goodwill gesture" to recognising it as an unconditional legal and human right. Public campaigns, grassroots engagement, and role-model-driven narratives can help normalise the exercise of these rights.

Ultimately, enabling women to claim and control their rightful share of property is a prerequisite for India to achieve the vision of *Sustainable Development Goal 5 (Gender Equality)* and *Goal 10 (Reduced Inequalities)*, and to realise the constitutional promise of equality not just in law books, but in every household. The question is no longer whether women should inherit equally — but how swiftly and effectively society can ensure they do.

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AI-POWERED BANKING FRAUDS AND DATA PROTECTION CHALLENGES IN INDIA: A LEGAL AND REGULATORY PERSPECTIVE UNDER EMERGING CYBER LAW FRAMEWORKS

R. Akshaya

Research Scholar

Vels Institute of Science, Technology and Advanced Studies, Chennai

Dr. A. Suganthini

Research Supervisor

Vels Institute of Science, Technology and Advanced Studies, Chennai

Introduction

The banking sector in India is undergoing a profound transformation driven by the adoption of Artificial Intelligence ("AI") technologies. From predictive analytics in credit scoring to real-time fraud detection and biometric authentication, AI is redefining financial services with unprecedented efficiency and personalization. However, these advancements are accompanied by a surge in sophisticated cyber threats, where malicious actors exploit the same AI capabilities to perpetrate large-scale frauds. AI-powered banking frauds—such as deepfake-enabled identity theft, AI-driven phishing, and algorithmic transaction manipulation—pose unique risks that traditional cybersecurity models struggle to detect and mitigate.

These emerging threats are compounded by complex data protection challenges. AI systems thrive on massive datasets containing sensitive personal and financial information, raising pressing concerns over privacy, cross-border data transfers, and algorithmic accountability. While India has enacted significant legislative measures, including the *Digital Personal Data Protection Act, 2023* ("DPDP Act") and continues to rely on the *Information Technology Act, 2000* ("IT Act"), there remains no comprehensive AI-specific legal framework. The Reserve Bank of India ("RBI") and the Indian Computer Emergency Response Team ("CERT-In") have issued sectoral guidelines, yet these too lack provisions tailored to the peculiar vulnerabilities of AI-enabled banking systems.

This paper examines the intersection of AI-driven banking frauds and data protection in India under the lens of the country's evolving cyber law framework. It analyzes fraud typologies, regulatory and judicial responses, and identifies gaps in current governance. Drawing from comparative international practices, the paper proposes policy recommendations aimed at strengthening AI risk management in the Indian banking sector, ensuring that innovation and security progress in tandem.

1. Emergence of AI-Driven Banking Frauds: Typologies, Techniques, and Risk Trends

The proliferation of Artificial Intelligence ("AI") in the banking sector has brought unparalleled efficiency in customer service, fraud detection, and financial analytics. However, these same technologies have been weaponized by cybercriminals to perpetrate sophisticated banking frauds. AI-driven frauds represent a paradigm shift from conventional cybercrime, replacing manual deception with automated, adaptive, and scalable methods.

A. Typologies of AI-Driven Banking Frauds

AI-enabled fraud can be classified into several key typologies. First, *synthetic identity fraud* involves the creation of entirely fictitious identities by combining real and fabricated personal information, often trained through AI algorithms to bypass Know Your Customer ("KYC") checks. Second, *deepfake-enabled impersonation* uses generative adversarial networks ("GANs") to mimic facial features and voice patterns, enabling unauthorized access to biometric authentication systems. Third, *AI-powered phishing* employs natural language processing ("NLP") to create highly personalized and convincing fraudulent messages, evading traditional spam filters. Fourth, *algorithmic transaction manipulation* leverages automated trading bots or AI-driven malware to exploit systemic vulnerabilities in payment gateways.

B. Techniques and Tools Used

Cybercriminals increasingly deploy open-source AI frameworks such as TensorFlow and PyTorch to develop attack models. Machine learning algorithms are trained on leaked datasets to recognize and replicate legitimate transaction behavior, making fraudulent activity difficult to detect. Deepfake technologies, such as FaceSwap and Descript Overdub, facilitate visual and audio identity spoofing. Additionally, reinforcement learning agents can adapt fraud strategies in real-time to bypass evolving bank security protocols.

C. Indian Context and Case Illustrations

In India, while specific jurisprudence on AI-powered fraud is nascent, cybercrime reports from the Reserve Bank of India ("RBI") indicate a sharp rise in technologically sophisticated frauds. According to the RBI's *Annual Report 2022–23*, frauds related to cards and internet banking constituted over 40% of reported cyber incidents in the banking sector⁷. A notable example involved an AI-powered voice cloning scam in 2023 targeting a Mumbai-based corporate account, where fraudsters replicated a company executive's voice to authorize fund transfers⁸. While such incidents may not yet be formally adjudicated in courts, they demonstrate the operational risk of AI misuse.

D. Global Trends and Comparative Perspective

Globally, AI-driven fraud incidents have been reported in the United States, United Kingdom, and Singapore. The 2020 case involving a Hong Kong bank, where deepfake audio was used to impersonate a company director in a USD 35 million heist, underscores the scale of the threat⁹. These cases highlight that AI-enabled fraud is not constrained by geography, as AI models can be trained and deployed remotely.

E. Risk Trends and Future Projections

With the rapid adoption of AI-based financial services, including chatbots for customer service, algorithmic lending platforms, and biometric authentication, the attack surface for cybercriminals will expand. The *World Economic Forum's Global Risks Report 2024* ranks AI-

⁷ Reserve Bank of India, *Annual Report 2022–23*, ch. IX (May 30, 2023).

⁸ Shayan Ghosh, *AI Voice Cloning Scams Rattle Indian Banks*, *Livemint* (Apr. 12, 2023).

⁹ BBC News, *Scammers Clone Company Director's Voice in \$35 Million Bank Heist* (Feb. 17, 2021).

generated misinformation and fraud as among the top five global digital threats¹⁰. In India, the integration of AI into Unified Payments Interface ("UPI") systems and instant loan disbursement platforms further heightens exposure to such risks.

In conclusion, AI-driven banking frauds represent a sophisticated evolution of financial crime, necessitating a multidimensional regulatory and technological response. Without robust detection frameworks and legal safeguards, the potential for widespread consumer and institutional losses will continue to escalate.

2. Data Protection Challenges in the Age of AI: Implications for the Banking Sector

The integration of Artificial Intelligence ("AI") into banking operations has revolutionized data-driven decision-making, enhancing fraud detection, credit scoring, and customer engagement. However, these advancements have also exposed banks to unprecedented data protection risks. AI systems thrive on large volumes of personal and financial data, and their functioning often requires continuous data collection, analysis, and storage. This dependency creates unique vulnerabilities that traditional cybersecurity and data protection laws struggle to address.

A. Nature of Data Vulnerabilities in AI Banking Systems

AI-enabled banking tools frequently access sensitive personal identifiers, including Aadhaar numbers, PAN details, biometric data, and transaction histories. This data is often stored in centralized databases, making them prime targets for cyberattacks. Moreover, AI algorithms, particularly machine learning models, may inadvertently expose personal data during model training or inference stages, especially if proper anonymization techniques are not implemented. In addition, *model inversion attacks*—where an attacker reconstructs sensitive information from AI outputs—pose a substantial risk in financial services.¹¹

B. Regulatory Landscape in India

The *Digital Personal Data Protection Act, 2023* ("DPDP Act") is India's primary statute for personal data governance. Under Section 4, it mandates that data fiduciaries process personal data only for lawful purposes with explicit consent.¹² Banks, as significant data fiduciaries, are bound by heightened compliance obligations, including appointment of Data Protection Officers (Section 10) and implementation of robust security safeguards (Section 9). The Act also restricts cross-border data transfers except to jurisdictions notified by the central government (Section 16), creating operational challenges for banks that rely on global AI cloud services.

The *Information Technology Act, 2000* ("IT Act") and its subsidiary rules, particularly the *Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011*, also govern banking data security. Section 43A of the IT Act imposes liability on corporate entities for negligence in implementing reasonable security practices.¹³

¹⁰ World Economic Forum, *Global Risks Report 2024*, at 35 (Jan. 2024).

¹¹ Nicolas Papernot et al., *The Limitations of Deep Learning in Adversarial Settings*, *IEEE European Symposium on Security and Privacy* 372 (2016).

¹² *Digital Personal Data Protection Act, No. 22 of 2023*, §§ 4, 9, 10, 16 (India).

¹³ *Information Technology Act, No. 21 of 2000*, § 43A (India).

C. Overlap and Gaps in Protection

While the DPDP Act provides a consent-based framework, it lacks explicit provisions addressing AI-specific risks such as bias, algorithmic transparency, or explainability. Similarly, the IT Act's provisions on "reasonable security" are technology-neutral and do not directly account for AI-driven threats like adversarial attacks or data poisoning. Furthermore, India does not yet have a sector-specific AI governance framework for banking, unlike the European Union's proposed *AI Act*.

D. Cross-Border Data Transfer and Cloud-Based AI Risks

Many Indian banks utilize AI models hosted on global cloud platforms, creating jurisdictional and compliance complexities. The absence of reciprocal data protection adequacy agreements means that banks must implement contractual safeguards, such as standard contractual clauses, to meet DPDP Act requirements. However, these measures may be insufficient to prevent exposure in the event of a breach on foreign soil.

E. Enforcement Challenges

Even when breaches occur, enforcement is complicated by the transnational nature of AI infrastructure. Identifying the precise locus of data leakage—whether at the algorithmic level, during data preprocessing, or in third-party vendor handling—is often difficult. This uncertainty delays regulatory action and complicates consumer redressal.

In conclusion, AI-driven banking innovations have amplified both the scale and complexity of data protection challenges. Without AI-specific legal provisions, Indian banking law remains reactive rather than preventive. Future legislative efforts must integrate AI risk management into the core of data governance frameworks to ensure the security, privacy, and trust essential to financial systems.

3. Legal and Regulatory Framework Governing AI in Financial Cybersecurity

The rapid integration of Artificial Intelligence ("AI") into the Indian banking sector has necessitated a reevaluation of existing legal and regulatory frameworks. While AI brings efficiency to fraud detection, credit analysis, and customer engagement, it simultaneously poses new cybersecurity challenges that existing laws only partially address. India currently lacks a dedicated AI law; instead, financial AI systems operate under a combination of general cyber laws, sectoral regulations, and data protection norms.

A. Core Legislative Instruments in India

The *Information Technology Act, 2000* ("IT Act") remains the primary statute governing cyber activities in India. Section 43A imposes liability on corporate bodies, including banks, for negligence in implementing "reasonable security practices" to protect sensitive personal data.¹⁴ Section 66 criminalizes fraudulent or dishonest use of computer resources, encompassing AI-enabled frauds.¹⁵ Additionally, the *Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011* prescribe mandatory security controls relevant to AI systems handling financial data.

¹⁴ *Information Technology Act, No. 21 of 2000, § 43A (India)*.

¹⁵ *Id.* § 66.

The *Digital Personal Data Protection Act, 2023* ("DPDP Act") adds another compliance layer, requiring explicit consent for personal data processing (Section 4), mandating security safeguards (Section 9), and imposing breach notification obligations (Section 8(6)).¹⁶ Since AI banking tools rely heavily on customer profiling and predictive analytics, these provisions are directly applicable.

B. Sector-Specific Regulatory Directives

The Reserve Bank of India ("RBI") has issued multiple guidelines relevant to AI-driven financial cybersecurity. The *Cyber Security Framework for Banks* (2016) mandates real-time fraud monitoring systems, secure application development, and periodic vulnerability assessments.¹⁷ The *RBI Master Directions on IT Framework for the NBFC Sector* extend similar requirements to non-banking financial companies. Notably, while these guidelines encourage the adoption of advanced analytics, they do not explicitly address AI-specific risks such as adversarial attacks or model manipulation.

C. Role of CERT-In

The Indian Computer Emergency Response Team ("CERT-In") operates under Section 70B of the IT Act and is responsible for incident reporting and cyber threat intelligence dissemination. In 2022, CERT-In issued directives requiring service providers to log all ICT system activities and maintain records for 180 days.¹⁸ These provisions are particularly relevant for AI banking systems, as audit logs are crucial for tracing algorithmic decision-making in fraud investigations.

D. Gaps in AI-Specific Regulation

Despite the applicability of existing laws, there is no statute in India that comprehensively regulates AI design, deployment, and accountability. Critical issues such as algorithmic transparency, bias mitigation, explainability, and AI-specific liability for financial losses remain unaddressed. In contrast, the European Union's proposed *Artificial Intelligence Act* (2021) classifies AI used in credit scoring and fraud detection as "high-risk" and subjects it to mandatory compliance audits.¹⁹ Similarly, Singapore's *Model AI Governance Framework* emphasizes explainability and accountability, which could serve as templates for Indian reforms.

E. The Way Forward

To address these gaps, India may consider amending the IT Act or enacting a dedicated AI Governance Act for the financial sector. Such a framework could mandate AI audit trails, adversarial testing, ethical risk assessments, and sector-specific AI certifications. Harmonization with the DPDP Act and RBI cybersecurity directives will be essential to create a cohesive legal environment that protects both financial stability and consumer trust.

¹⁶ *Digital Personal Data Protection Act, No. 22 of 2023, §§ 4, 8(6), 9 (India).*

¹⁷ *Reserve Bank of India, Cyber Security Framework for Banks (June 2, 2016).*

¹⁸ *Ministry of Electronics and Information Technology, Directions Relating to Information Security Practices, Procedure, Prevention, Response, and Reporting of Cyber Incidents (Apr. 28, 2022).*

¹⁹ *Commission Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence, COM (2021) 206 final (Apr. 21, 2021).*

In sum, while existing Indian laws provide a partial shield against AI-related banking cyber risks, the absence of AI-specific statutory provisions leaves critical vulnerabilities unaddressed. A proactive regulatory approach is necessary to safeguard the integrity of AI-driven financial systems.

4. Judicial Response and Case Law Analysis on AI-Related Banking Frauds in India

The judicial landscape in India regarding Artificial Intelligence ("AI")-driven banking fraud is still in its formative stage. While no landmark decision has yet dealt exclusively with AI-enabled financial crimes, courts have adjudicated multiple cases involving advanced cyber fraud techniques that share operational similarities with AI-driven threats. These decisions provide valuable insights into how Indian courts may approach issues of admissibility, liability, and evidentiary standards when AI-related disputes eventually arise.

A. Indian Judicial Trends in Cyber Fraud Cases

One of the earliest judicial recognitions of the severity of cyber fraud in the banking sector came in *SBI v. R. Sudhakar*, where the Madras High Court held that banks have a duty to implement adequate technological safeguards to prevent unauthorized transactions.²⁰ Though not AI-specific, the ruling underscores judicial willingness to impose liability on financial institutions for lapses in cybersecurity.

In *Puneet Kumar v. State of Karnataka*, the Karnataka High Court dealt with a phishing scam where the accused used sophisticated software to steal login credentials and execute fraudulent transfers.²¹ The Court emphasized that electronic evidence must comply with Section 65B of the *Indian Evidence Act, 1872* ("Evidence Act") for admissibility. This procedural requirement will be equally relevant in AI-related frauds, particularly where deepfake audio/video or algorithmic decision logs are presented as evidence.

Similarly, in *Bharat Sanchar Nigam Ltd. v. Telecom Regulatory Authority of India*, the Delhi High Court stressed the importance of technological neutrality in regulation, an approach that could inform future AI jurisprudence by focusing on function over form.²²

B. Evidentiary Complexities in AI Banking Fraud

AI-generated content, such as deepfake audio authorizing fund transfers, raises novel evidentiary challenges. The authenticity of such material depends heavily on expert forensic analysis, which courts have recognized in cybercrime matters. Section 45A of the Evidence Act permits expert opinion on electronic evidence, yet Indian jurisprudence lacks a standardized protocol for verifying AI-generated data.

Chain of custody is another critical factor. In *Anvar P.V. v. P.K. Basheer*, the Supreme Court reinforced that electronic evidence must be accompanied by proper certification under Section 65B(4).²³ In AI-related frauds, this means not only securing transaction logs but also preserving algorithmic audit trails to demonstrate how the AI system reached its decision.

²⁰ *State Bank of India v. R. Sudhakar*, (2018) 6 MLJ 769 (Madras HC).

²¹ *Puneet Kumar v. State of Karnataka*, 2018 SCC OnLine Kar 1084.

²² *Bharat Sanchar Nigam Ltd. v. Telecom Regulatory Auth. of India*, (2014) 3 SCC 222.

²³ *Anvar P.V. v. P.K. Basheer*, (2014) 10 SCC 473.

C. Comparative Perspective from Foreign Jurisdictions

Internationally, courts have begun grappling with AI-driven fraud cases. In *United States v. Barrera*, U.S. authorities prosecuted a case involving AI-enhanced voice phishing that resulted in unauthorized bank withdrawals.²⁴ Similarly, in a 2020 Hong Kong incident, fraudsters used deepfake audio to impersonate a company executive, tricking a bank into releasing USD 35 million; while the matter was settled without formal litigation, it highlights the magnitude of AI-powered deception.²⁵

D. Anticipated Judicial Approach in India

Given the judiciary’s trend toward holding institutions accountable for security lapses and its insistence on strict evidentiary compliance, it is likely that Indian courts will adopt a cautious yet firm approach to AI-related frauds. Courts may also push for legislative reforms or judicial guidelines to clarify AI evidence admissibility, liability allocation, and forensic verification protocols.

While AI-specific banking fraud jurisprudence is yet to develop in India, existing case law on cyber fraud provides a procedural and doctrinal foundation. As AI-based crimes escalate, Indian courts will inevitably confront questions of algorithmic accountability, expert evidence reliability, and cross-border enforcement — issues that demand a harmonized legal and technological response.

5. Policy Recommendations for Strengthening AI Risk Management in Banking

As Artificial Intelligence (“AI”) becomes a core component of India’s banking infrastructure, policy interventions must evolve from reactive incident management to proactive risk prevention. AI-powered banking frauds present multi-layered threats — technological, legal, and operational — that require integrated governance. The following recommendations aim to strengthen AI risk management in India’s banking sector through a combination of legal reforms, regulatory guidance, technological safeguards, and public awareness measures.

A. Legislative Reforms

First, India should consider enacting a dedicated *AI Governance Act* with sector-specific provisions for financial services. This statute could define “high-risk AI” in banking — including systems for fraud detection, credit scoring, and biometric authentication — and mandate periodic compliance audits. Inspiration can be drawn from the European Union’s *AI Act* (2021), which subjects high-risk AI systems to mandatory conformity assessments.²⁶ The Act should also address algorithmic transparency, bias mitigation, and clear liability allocation between AI developers, deployers, and financial institutions.

²⁴ *United States v. Barrera*, No. 20-CR-00492, 2020 WL 5535720 (S.D.N.Y. Sept. 15, 2020).

²⁵ BBC News, *Scammers Clone Company Director’s Voice in \$35 Million Bank Heist* (Feb. 17, 2021).

²⁶ Commission Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence, COM (2021) 206 final (Apr. 21, 2021).

Second, amendments to the *Information Technology Act, 2000* could explicitly include "AI-assisted fraud" within the definition of cyber offences under Section 66, ensuring clarity in criminal prosecution.²⁷

B. Strengthening Regulatory Oversight

The Reserve Bank of India ("RBI") could issue an *AI in Banking Cybersecurity Framework*, integrating AI-specific controls into its existing *Cyber Security Framework for Banks* (2016). These controls should include:

- **Mandatory AI audit trails** to track decision-making logic and fraud detection triggers.
- **Adversarial testing** of AI systems to simulate potential attack vectors before deployment.
- **Third-party AI vendor regulation**, requiring banks to assess compliance with the *Digital Personal Data Protection Act, 2023* ("DPDP Act") before outsourcing AI functions.²⁸

The Indian Computer Emergency Response Team ("CERT-In") could develop sectoral threat intelligence hubs to share AI-related cybercrime data among banks, regulators, and law enforcement agencies.

C. Technological Safeguards

To counter AI-powered frauds, banks should deploy:

- **Blockchain-based KYC systems** to ensure immutable identity verification.
- **Real-time anomaly detection models** trained on both legitimate and adversarial datasets to enhance detection accuracy.
- **Secure federated learning** to train AI fraud detection models without centralized data pooling, thus reducing breach risk.

D. Law Enforcement Capacity Building

AI-related banking frauds demand specialized investigation skills. Law enforcement agencies should establish **AI Forensics Units** trained to analyze algorithmic behavior, detect deepfake manipulation, and trace synthetic identities. Partnerships with Interpol and other cross-border agencies will be crucial, given the transnational nature of AI-enabled crimes.

E. Public Awareness and Consumer Protection

Consumer awareness campaigns must be intensified to educate the public on AI-enabled fraud schemes such as voice cloning scams and AI-generated phishing emails. Section 8(3) of the DPDP Act, which mandates that data fiduciaries ensure accuracy and fairness in processing, can be operationalized through public engagement strategies.²⁹

²⁷ *Information Technology Act, No. 21 of 2000, § 66 (India).*

²⁸ *Digital Personal Data Protection Act, No. 22 of 2023, § 10 (India).*

²⁹ *Id.* § 8(3).

F. International Cooperation

Given the global nature of AI threats, India should actively participate in international AI governance forums, such as the OECD's *AI Principles* and the G20 Digital Economy Working Group, to harmonize cybercrime prosecution standards and facilitate cross-border evidence sharing. In sum, AI-powered banking fraud requires a shift from siloed compliance to a comprehensive governance model integrating legislation, regulation, technology, enforcement, and education. These recommendations, if implemented cohesively, can fortify India's financial sector against emerging AI risks while fostering public trust in AI-enabled banking innovations.

Conclusion

The integration of AI into India's banking ecosystem has brought both transformative opportunities and unprecedented risks. While AI has enhanced operational efficiency and security capabilities, it has also equipped cybercriminals with advanced tools to commit complex, scalable, and often undetectable frauds. These developments challenge the adequacy of India's existing legal and regulatory frameworks, which—though robust in certain respects—remain largely technology-neutral and ill-equipped to address AI-specific threats.

The *Information Technology Act, 2000*, the *Digital Personal Data Protection Act, 2023*, and RBI's cyber directives collectively provide a foundation for banking cybersecurity and data governance. However, the absence of explicit provisions on AI transparency, algorithmic accountability, and liability distribution leaves significant gaps. Judicial interpretations in cyber fraud cases have laid procedural and evidentiary groundwork, but jurisprudence on AI-enabled crimes is still nascent.

Going forward, India must adopt a proactive, multi-stakeholder approach to AI governance in banking. This entails enacting AI-specific legislation, enhancing sectoral regulations, mandating AI audit trails, and empowering law enforcement with AI forensic capabilities. Equally important are public awareness campaigns to build consumer resilience against AI-enabled scams. The risks posed by AI in banking are not merely technological—they are systemic, implicating trust in the financial system itself.

A balanced legal and regulatory framework, aligned with international best practices yet tailored to India's unique socio-economic context, will be crucial in ensuring that AI serves as a safeguard rather than a threat. Only through coordinated legal, regulatory, technological, and societal action can India fortify its banking sector against the evolving frontier of AI-powered cybercrime.

Suggestion

1. Strengthen the Research Gap Statement

- Clearly articulate **why this topic is timely and important now** — e.g., rapid AI adoption in Indian banking, recent AI-enabled fraud incidents, and the gap between technology growth and lawmaking speed.
- Cite the RBI's most recent fraud data and global reports (like WEF 2024) to quantify the urgency.

2. Use Live Case Studies

- Include at least **two real-world Indian incidents** of AI-related frauds (even if reported in news rather than court judgments).
- Present them briefly as "Case Snapshots" with details of modus operandi, affected parties, and financial impact.

This will make the topic relatable to both legal and technical audiences.

3. Emphasize Comparative Analysis

Include a **short comparative box/table** showing how India's approach differs from:

- EU AI Act (classification of "high-risk" AI)
- Singapore's Model AI Governance Framework
- US NIST AI Risk Management Framework
- Helps your audience see where India is ahead and where it lags.

4. Include a Visual Risk Model

A diagram showing **how AI-powered banking fraud works**:

- Data collection
- AI model training
- Fraud execution (deepfake, phishing, transaction manipulation)
- Impact and legal gaps

This will make the paper more engaging in a conference presentation.

5. Expand the Policy Recommendations

Add **clear, actionable steps** for:

- RBI (AI-specific banking compliance directives)
- CERT-In (AI cyber threat intelligence sharing)
- Legislature (AI Governance Bill)
- Banks (technical safeguards, employee AI awareness training)

The more **practical** and **implementable** your suggestions, the stronger your impact.

6. Include a Section on Ethical AI in Banking

Even though your focus is fraud, mention **ethical AI principles** (fairness, transparency, accountability) and how they could reduce AI abuse.

This shows forward-thinking beyond just criminal enforcement.

7. Tie it to Sustainable Development Goals (SDGs)

Link to SDG 9 (Industry, Innovation and Infrastructure) and SDG 16 (Peace, Justice and Strong Institutions) to make the topic internationally relevant for policy and academic audiences.

MILLENNIAL ENGAGEMENT AND BRAND LOYALTY: ANALYSING THE IMPACT OF CONSUMER INTERACTIONS IN THE DIGITAL ERA

R. Keerthika

Research Scholar

ST. Peter's Institute of Higher Education and Research

Dr. A. Manorselvi

Professor

ST. Peter's Institute of Higher Education and Research

Abstract

In modern quick online world, firms interact with their customers in very different ways. Millennials have become the most influential consumer segment among all generations due to their high engagement with online platforms. This study analyses the role of consumer interactions such as social media engagement, feedback and digital responsiveness on millennial engagement and brand loyalty in Chennai. This research explores how these interactive platforms shape millennial consumer behavior, ultimately impacting their loyalty towards brands. Data were collected from 79 respondents out of 100 millennials approached, using a structured questionnaire. The respondents were chosen using purposive sampling from various localities in Chennai. The questionnaire covered aspects like frequency of brand interaction, emotional connection, and repeat purchase behavior. Percentage analysis and chi-square tests were used to examine the relationship between variables such as Consumer Interactions and Brand Loyalty among millennials. Correlation test were used to Relationship between brand loyalty and millennial engagement. Findings indicate that millennials are highly influenced by interactive, timely and emotionally relevant brand communication. A significant correlation was found between higher interaction and greater brand loyalty, emphasizing the need for brands to develop two-way digital communication strategies. The results offer important managerial implications for digital marketers and brand managers. Businesses need to not only create content but also build meaningful, real-time conversations to maintain a loyal millennial customer base. The study contributes to the growing body of literature focusing on customer-brand relationships in the digital landscape and provides insights specifically relevant to urban consumers.

Keywords: *Consumer Behavior, Consumer Interaction, Millennial Engagement.*

Introduction

In the era of digital transformation, consumer interactions with brands have evolved beyond traditional channels, becoming more dynamic and immediate. Social media platforms and digital tools have given millennials a space not only to purchase but also to engage, share, and influence. Millennials, known for their tech-savviness and brand consciousness, often rely on two-way communication, social proof, and direct brand interactions before building loyalty. In this context, consumer-brand engagement plays a pivotal role in shaping long-term loyalty. This study focuses on understanding how these interactions influence brand loyalty among millennials in Chennai. With more brands shifting towards digital-first strategies, exploring the depth and quality of consumer interactions becomes essential in ensuring repeat business and advocacy in this demographic. **Joy, M., George, L., & Sharma, B. (2025)** have determined the Social media has drastically changed millennials connect with brands, shifting away from traditional media like TV and print. Platforms such as Instagram, YouTube, TikTok, and

Twitter now play a central role in brand discovery, evaluation, and loyalty. Unlike older generations, millennials actively engage with brands sharing feedback, following influencers, and expecting real-time interaction. This blurring of brand and user content pushes marketers to adopt more authentic, transparent, and value-driven approaches. As a result, social media is now a powerful driver of brand awareness, trust, and lasting loyalty.

Millennials are not just passive consumers; they actively seek connections with brands that align with their values, preferences, and digital lifestyle. These consumers value personalized experiences, quick communication, and seamless service. They are more likely to interact with brands on digital platforms, share feedback, and even co-create content. As a result, consumer-brand digital interactions have become a key determinant in shaping millennial engagement and long-term brand loyalty. Consumer engagement, especially in the digital space, refers to the emotional and behavioural connection that consumers build with brands through ongoing interactions.

When managed effectively, such engagement can lead to enhanced brand perception, trust, and customer retention. Digital interactions also provide brands with real-time feedback, helping them adapt their strategies to meet consumer expectations more effectively. **Muhammed Zakir Hossain M and Kibria, H (2024)** have explores the social media influences brand loyalty and provides insights for marketers to build lasting customer relationships in the digital era.

Brand loyalty, on the other hand, is no longer built solely through product satisfaction or traditional advertising. In the digital era, it is largely influenced by how consumers perceive a brand's presence online, how responsive the brand is to consumer needs, and how consistent and personalized the communication is.

Millennials, being tech-savvy and socially conscious, demand more transparency, authenticity, and involvement in brand narratives. This shift compels businesses to move beyond transactional relationships and foster meaningful interactions that lead to emotional connections and repeated patronage. This study aims to analyse how consumer-brand digital interactions impact millennial engagement and ultimately their loyalty to brands. It focuses on understanding the behavioural and psychological drivers of engagement, the role of technology in facilitating these connections, and the measurable outcomes in terms of loyalty indicators such as repeat purchases millennials and advocacy.

By studying a demographic that is both influential and digitally fluent, this research provides valuable insights into the future of marketing. It also sheds light on how brands can design engagement strategies that not only capture attention but also build lasting relationships.

Review of Literature

- Shreya Jaiswal (2025) has investigate the brand loyalty influences consumer decision making in the digital age. Her research explores how emotional bonds and personal connections foster brand loyalty and examines the role of digital tools such as social media, online shopping platforms, personalized advertisements, and customer reviews in shaping brand choices. The study finds that loyal customers repeatedly purchase from the same brand, disregard competitors, and promote the brand positively online. These consumers support brand growth through word-of-mouth and advocacy. The

research also highlights current challenges, like the ease of switching brands given the wide array of choices and information online. Using past studies and real business reports, it sheds light on how digital tools and brand loyalty impact purchasing behaviour. The insights provided are valuable for businesses seeking to retain customers and strengthen their brand in a dynamic online marketplace.

- Teresa Fernandes (2020) has examined the Millennials interact with their favourite brands on social media, highlighting a gap in research on this topic. The study investigated whether Millennials are simply passive followers or if they actively engage with and remain loyal to brands they love. Using an online survey with 343 millennial social media users, the research focused on brands that were self-chosen and held emotional significance. The results revealed an interesting contrast a while Millennials expressed strong affection and loyalty toward these brands, their actual online engagement was limited. It was also found that brand experience plays a crucial role in developing emotional attachment, which in turn influences both engagement and loyalty. The study provides practical recommendations for marketers aiming to use social media effectively to connect with Millennials and strengthen brand relationships

Scope of the Study

- Focuses on millennial consumers who purchase online brands.
- Qualitative and quantitative methods, with 79 respondents.
- Hypothesis using descriptive statistics and the chi- square test for relationship analysis.

Research Gap

While existing studies have explored digital marketing and consumer engagement, there is limited research focusing specifically on how different forms of digital interaction such as social media engagement, feedback, and responsiveness influence brand loyalty among millennials in an urban Indian context like Chennai. This study addresses the gap by analyzing the direct relationship between interactive brand communication and millennial loyalty, using real consumer data and statistical tools.

Objective of the Study

1. To examine impact of consumer brand digital interactions on millennial engagement.
2. To Know association between brand loyalty and millennial engagement.
3. To assess the relationship between income level of respondents and Millennials towards brand engagement.

Research Methodology

The methodology brand loyalty in this study combines analytical and descriptive elements, using primary data. This study utilized random sampling to select members who purchase online brands. Research objectives is based on self- administered questionnaire. Data was collected from millennial consumers to test hypothesis Chi-square and descriptive statistics (percentage analysis) were used to test the hypothesis using data gathered from millennial

consumers. To summarize the data, descriptive statistics (percentage analysis) were responded, relationship between Consumer interactions and brand loyalty among millennials using hypothesis testing (chi-square test).

Research Design

This study adopts a descriptive research design, aimed at analyzing the relationship between Consumer interactions and brand loyalty among millennials. It helps in understanding current patterns, behaviors, and attitudes of millennials toward brand engagement on digital platforms.

Sampling Technique

The study uses non-probability convenience sampling, focusing on millennials aged 28-43 who are active digital consumers.

Sample Size

A total of 120 questionnaires were distributed, and 79 valid responses were collected from millennials in Chennai.

Data Collection Method

Primary data was collected using a structured questionnaire with Likert scale questions to assess consumer interaction, engagement levels, and brand loyalty.

Need of the Study

- Millennials have unique digital consumption patterns and are redefining brand loyalty through values like authenticity, digital engagement, and social proof.
- Brands must understand these patterns to retain millennial customers and improve engagement strategies.
- There is a clear shift from transactional to emotional and value-based loyalty especially important in a competitive digital marketplace.
- Provides actionable insights for marketers to adapt to new consumer expectations.

Data Analysis

Table 1.1 (Demographic Profile of the Respondents)

S. No	Demographic Profile	Particulars	Number of respondents	Percentage (%)
1	Age	28-35	28	35.44
		36-40	36	45.55
		41-43	15	18
		Total	79	100
2	Gender	Male	33	41.78
		Female	46	58.22
		Total	79	100

3	Educational Qualification	Below sslc/hsc	20	25.31
		Diploma	6	7.6
		UG	30	38
		PG	14	17.72
		Professional Degree	9	11.4
		Total	79	100
4	Annual income	Below 100000	26	33
		1 lakhs-2lakhs	18	22.8
		2lakhs-3lakhs	20	25.31
		3lakhs-4lakhs	10	12.65
		Above 4lakhs	5	6.3
		Total	79	100
5	Marital Status	Single	14	17.72
		Married	65	82.27
		Total	79	100
6	Online Shopping (per month):	0-2times	10	12.65
		3-5 times	25	31.64
		More than 5 times	44	55.7
		Total	79	100

Source: Primary Data

Chi-Square Testing

Hypothesis 1

H₀1: There is no significant difference between Annual income of the respondents and the Millennials towards brand engagement.

Table Number 2.1: Observed Frequency

Annual income / option	Strongly Agree	Disagree	Neutral	Agree	Strongly disagree	Total
Below 100000	5	9	4	3	2	23
1 lakhs-2lakhs	5	3	7	7	7	29
2lakhs-3lakhs	2	4	4	3	0	13
3lakhs-4lakhs	1	2	1	7	0	11
Above 4lakhs	0	0	2	0	1	3
Total	13	9	18	20	10	79

Source: Primary Data

Table Number 2.2: Expected Frequency

Expected value = Row Total X Column Total / Grand Total						
Annual income / option	Strongly Agree	Disagree	Neutral	Agree	Strongly disagree	Total
Below 100000	3.785	5.241	5.241	5.823	2.911	23.00
1 lakhs-2lakhs	4.772	6.608	6.608	7.342	3.671	29.00
2lakhs-3lakhs	2.139	2.962	2.962	3.291	1.646	13.00

3lakhs-4lakhs	1.810	2.506	2.506	2.785	1.392	11.00
Above 4lakhs	0.494	0.684	0.684	0.759	0.380	3.00
Total	13.000	18.000	18.000	20.000	10.000	79.00

Source: Computed Data

Chi-Square Test

Table Number 2.3

Chi- square X^2 Test = (Observed Value - Expected Value) ² / Expected Value				
Observed Frequency (O)	Expected Frequency (E)	O - E	(O - E) ²	(O - E) ² / E
13	13.000	0	0	0
9	18.000	-9	81	4.5
18	18.000	0	0	0
20	20.000	0	0	0
10	10.000	0	0	0

$$\Sigma (O - E)^2 / E = X^2 = 0.040$$

Degree of Freedom = (Column - 1) (Row - 1) => (5-1) (5-1) => 4*4=16

Significance level (α) = 0.05

X² Tabular Value = 26.296

X² Calculated Value = 0.040

Tabular Value > X² Calculated Value.

Since the value for the above table calculated value is 0.040, we accept the Alternative Hypothesis and reject the Null Hypothesis. So, there is association between the income level of respondents and Millennials towards brand engagement.

Correlation

Relationship between brand loyalty and millennial engagement

Null Hypothesis (H₀):

There is no significant relationship between millennial engagement and brand loyalty.

Alternative Hypothesis (H₁):

There is a significant positive relationship between millennial engagement and brand loyalty.

Table 3.1: Correlation Between Brand Loyalty and Millennial Engagement

Variables	Mean	Std. Deviation	Pearson Correlation (r)	Sig. (2-tailed)
Millennial Engagement	4.12	0.65	0.648	0.000
Brand Loyalty	4.06	0.72		

Since Pearson correlation = 0.648, there is a moderately strong positive correlation between millennial engagement and brand loyalty.

The result is statistically significant with **p = 0.000 < 0.05**, indicating a real association between the two variables.

Inference

The correlation analysis reveals a strong positive relationship between millennial engagement and brand loyalty, with a Pearson correlation coefficient of 0.648. This indicates that as millennial engagement with a brand increases, their loyalty to that brand also tends to rise. The significance value ($p = 0.000$) confirms that this relationship is statistically significant. Therefore, the more emotionally and actively millennials interact with a brand—through social media, feedback, or digital channels the more likely they are to remain loyal and committed to that brand. This finding highlights the importance of meaningful engagement strategies for brands targeting the millennial segment.

Major Findings

- The result of Pearson correlation statistically significant with $p = 0.000 < 0.05$, indicating a real association between the two variables.
- There is association between the income level of respondents and Millennials towards brand engagement.

Suggestions

- Emphasize authenticity, ethical practices, and social responsibility in branding and communications.
- Utilize personalization and community-building activities to create meaningful online experiences.
- Facilitate and encourage user-generated content and peer recommendations to leverage social proof.
- Gather and incorporate regular feedback from millennial customers to adapt quickly to changing expectations.

Conclusion

The study confirms that consumer interactions, especially via digital platforms, significantly influence brand loyalty among millennials. Engagement is no longer a passive activity but a strategic factor in brand success. Companies focusing on authentic, timely, and meaningful interactions are better positioned to cultivate loyalty. For brands targeting millennials, investing in engagement strategies is not option it's critical for long-term growth.

Millennials are highly influenced by interactive and personalized digital experiences, which significantly impact their loyalty toward brands. The study concludes that consistent, emotionally engaging, and responsive brand interactions foster stronger connections, leading to repeat purchases and advocacy. To maintain loyalty in the digital era, brands must prioritize meaningful two-way communication and create value-driven engagement strategies tailored to millennial preferences.

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SOURCES AND LEVELS OF INFORMATION SEARCH BEHAVIOUR AMONG CONSUMERS OF DURABLE GOODS

Dr. Tabitha Durai

Assistant Professor, Department of Commerce,
Madras Christian College, University of Madras

H. Lalitha

Research Scholar, Department of Commerce,
Madras Christian College, University of Madras

Abstract

Information Search (IS) behaviour is one of the oldest and most dynamic areas of consumer research. It affects various aspects of the consumption process, from choice of alternative to post-purchase emotions such as satisfaction and dissonance. This paper aims to identify the purchase patterns for durable goods and the various sources that consumers use to perform IS. In addition, it aims to ascertain level or amount of IS behaviour exhibited by the consumers among various categories of durable goods. Both pre and post purchase IS behaviours were analysed, along with on-going search behaviour. Questionnaire was administered to 100 consumers of durable products. Offline external information search model proposed by Schmidt and Spreng (1996) and Online Consumer Information Search (OCIS) model proposed by Rose and Samouel (2009) were adapted to ascertain the various antecedents of IS. It was found that advertisements, social media and product reviews were the most utilised sources of IS in the pre-purchase, post-purchase and on-going phase of the consumption process. Also, maximum search was conducted for home appliances. This paper analyses IS behaviour of Indian consumers, which is relatively unexplored. Marketers can ensure favourable consumer interaction by ensuring brand loyalty and repurchase intentions through a proper understanding of consumer expectations and can also bring about consumer delight by manipulating the various aspects of consumers' IS behaviour. This paper is of importance and relevance to marketers in that it can help them broadcast their brand information in a way that positively influences their choice of product, which is important in this age of information overload. In other words, it can help marketers and sellers 'craft dynamic narratives in the digital age'.

Keywords: pre-purchase, post-purchase, perceived cost and benefits, social media, IS behaviour models.

1. Introduction

Search is "the motivated activation of knowledge stored in memory or acquisition of information from the environment" (Engel *et al.*, 1995). Information Search (IS) is the second of the five stages of the purchase decision-making process, helping consumers choose among different alternatives and influencing post-purchase behaviour (Flavián-Blanco *et al.*, 2011). It takes place both internally (within the consumer's mind) as well as externally (Rose and Samouel, 2009). Huang *et al* classify external IS as pre-purchase searches (online and offline), on-going searches and post-purchase searches. Pre-purchase searches are undertaken to get better deals, whereas on-going searches are undertaken outside the purchase process, presumably for knowledge-seeking and pleasure; post-purchase searches are done to reassure/support the purchase decision made (Bloch *et al.*, 1986). Each type of IS can be regarded as a subset of consumers' total search activity. Olshavsky and Wymer (1995) state that the various sources of information search are marketer-controlled, reseller information,

third party independent organisations, interpersonal sources and direct observation & inference. Jun and Park (2016) categorise the sources of IS as personal (family/friends/acquaintances), commercial (seller/reseller), public (newspapers, magazines, TV etc.) and experience sources. These sources may be used online as well as offline to solicit information.

The amount of information searched has four antecedents – perceived ability to search, motivation to search, perceived benefits of search and perceived costs of search. The first two constitute the 'psychological paradigm' of ISB and the other two the 'economical paradigm'. The former affect the latter by impacting the motivation to search (Schmidt and Spreng, 1996). The factors influencing perceived ability to search are education level, prior subjective knowledge and ability to use the internet (Schmidt and Spreng, 1996; Rose and Samouel, 2009). The factors relating to motivation are enduring involvement, need for cognitions, enthusiasm for shopping motivation to use the internet which stems from several factors such as ease of use (Gefen *et al.*, 2003) and perceived usefulness (Yang and Lester, 2004)

There is a strong relationship between perceived benefits of IS and the levels of search undertaken (Srinivasan and Ratchford, 1991). The factors comprising perceived benefits of IS are subjective knowledge, satisfaction with previous purchase, perceived financial sacrifice, perceived risks, situational involvement, choice rule, perceived product differences, need for justification, optimum decision and size of evoked set. The factors relating to perceived cost of search are subjective knowledge, size of evoked set (Bettman *et al.*, 1991) and time for search; accessibility of information, and time constraint.

1.1. Information Search Behaviour for Durable Goods

Jun and Park (2016) define durable goods as those whose use is expended over the long term as the convenience obtainable from their use gradually decreases. Characteristics of durable goods include comparatively higher price, long term use, infrequent purchase and higher deliberation/involvement in purchase decision-making process. The Indian consumer durables market is a growing industry that is expected to reach US\$ 34.5 billion by 2029 (IBEF, 2025). The major components of this industry are electronics, home appliances, and kitchenware; the other components being furniture, vehicles and jewellery. For durable goods, ISB is an important element of the purchase decision process, predicting sales trends (Punj and Staelin, 1983). Consumers search and process more information for durable goods than for convenience goods (Schaninger and Sciglimpaglia, 1981).

While ISB has been studied in various contexts, relatively fewer studies have examined it in relation to durable goods in India. This study contributes by exploring this specific setting. The aims of this study are to identify the respondents' purchase pattern for durable goods, and the sources of IS most used by respondents in the pre-purchase, post purchase and on-going stage of IS. It examines the relationship between the category of durable good and the level of IS, by analysing whether the amount of information searched differs across product categories. Thus, the following hypothesis is framed:

H_0 = There are no significant differences in the IS score among the durable product categories.

ISB, in general, is of significance to marketers and public policy-makers. Marketers' influence on consumers' purchase decision can be exerted not only at the final stages of the

decision-making process but at the second stage i.e. information searching stage too. If a particular brand puts up palatable information in a form easily processed by consumers, there is a higher chance that their product will be chosen by the consumers. Similarly, public policy-makers, on a better understanding of consumers' information search behaviour, can push towards increased accessibility and availability of product information (Schmidt and Spreng, 1996). This study analyses consumers' search behaviour across a vast variety of durable product categories, and contributes to research on this area in India.

2. Methods and Measures

The study participants and their characteristics are detailed in this section. It also explains the instruments and procedures followed for data collection, and describe the statistical tools used. The variables of the study were based on Schmidt and Spreng's External IS Model (1996) and Rose and Samouel's Online Consumer Information Search Model (2009). The level of IS is gauged using consumers' perceptions on the various antecedents to IS. Schmidt and Spreng's model (1996) states the following:

Amount of External IS = F (Perceived ability to search + Motivation to search) where motivation to search is increased (+) by perceived benefits of search and decreased (-) by perceived costs of search.

A self-structured online questionnaire was administered online to 100 consumers of durable goods from Chennai in South India. The respondents were selected using non-random, convenience sampling technique. Of the respondents, nearly two-thirds of the respondents were women (61%). Majority of the respondents were of the age group 41-60 (43%), and half of them (51%) were graduates.

3. Results and Discussion

Statistical analysis was done using percentages and non-parametric Kruskal-Wallis test and post-hoc Dunn's Test. The results are presented for each objective as follows:

3.1. Purchase Pattern for Durable Goods

The particulars of the respondents' purchases – product category in which recent purchase was made, and time elapsed since purchase – were collected and percentage analysis was conducted.

Table 1: Respondents' Purchase Pattern for Durable Goods

Category	Variable	Percentage of respondents
Durable Product purchased	Electronics	30
	Home appliances	16
	Kitchenware	15
	Furniture	8
	Vehicles	12
	Jewellery	19
Time since purchase	Less than a week ago	10
	Two to four weeks ago	14
	Four to six weeks ago	18
	More than six weeks ago	58

Source: Computed data

From the Table 1, it is clear that electronics was the most purchased category of durable goods (30%), followed by home appliances (16%) and kitchenware (15%). Furniture was the least purchased category of durable goods (8%). The finding that electronics had a clear lead is another proof of its growth in India (IBEF, 2025). A vast majority of respondents (58%) had purchased the durable goods more than a month and a half ago.

3.2. Sources of Information Search for Purchase of Durable Goods

The respondents' preferred sources for IS during the pre and post purchase stages, along with on-going searches are tabulated and discussed.

Table 2: Sources of IS for Purchase of Durable Goods

Source of IS	Time of IS (%)		
	Before purchase	After purchase	Ongoing search
Personal	18.51	14.48	14.69
Advertisements	19.81	11.72	15.17
E-commerce/resellers websites	15.58	18.62	16.11
Social media	15.26	19.31	18.48
Product Reviews	14.94	17.24	18.48
Experience	15.91	18.62	17.06

Source: Computed data

From the Table 2, advertisements were the most used source of IS in the pre-purchase period (20%), reiterating their influence on purchase decisions due to their flexibility and ability to disseminate required information. In the post-purchase period comprising of emotions like satisfaction, social media was the most utilised source of IS in the, with 19.3% of the respondents preferring it. It is closely followed by e-commerce/reseller websites and direct experience, utilised by 18.6% of respondents each. Social media in marketing is a well-researched area that requires increasing attention and focus (Dwivedi *et al.*, 2015). The use of e-commerce websites in this stage alters consumers' loyalty and perceived risk (Wang *et al.*, 2016). More than half (58%) the consumers had bought the product more than 6 weeks before answering the questionnaire which may account for direct experience as a major source of IS.

Respondents with an on-going interest in the product categories used social media and product reviews (online and offline) equally (18.5% each). This underlines the importance of company presence on social media to help present a favourable, formative and informatively accurate narrative about the product. As much as consumers use social media, they also depend on increasingly popular product reviews. These findings are proof of the convenience and ease of access of online sources of information.

3.3. Levels of Information Searched for purchase of Durable Goods

The maximum and minimum IS score for each of the product categories are tabulated as follows:

Table 3 – IS scores for Purchase of Durable Goods

Product category	IS score	
	Lowest	Highest
Electronics	31	61
Home appliances	33	62

Kitchenware	38	54
Furniture	38	51
Vehicles	27	60
Jewellery	27	49

Source: Computed data

The Table 3 shows that among the various product categories, maximum IS was conducted for home appliances (IS score = 62), followed by electronics (IS score = 61) and vehicles (IS score of 60), due to constant development and evolution of many alternative brands with complex features in all price ranges. The lowest IS was also for vehicles along with jewellery (IS score = 27). This may be due to a high level of internal search (i.e.) actual knowledge about the product reviewed from one's own memory, showing high existing product awareness.

3.4. Information Search Behaviour for Categories of Durable Goods

Kruskal-Wallis test was conducted to find out if there was any difference among the different product categories in terms of amount of IS.

Table 4: Median and Mean rank of IS scores

Product category	IS score	
	Median	Mean rank
Electronics	49	61.68
Home Appliances	43	41.81
Kitchenware	44	41.4
Furniture	43.5	41.69
Vehicles	51	68.25
Jewellery	44	39.84

Source: Computed data

The Kruskal-Wallis H test indicated that there was a significant difference in the amount of IS among the different product categories, χ^2 (df: 5) = 15.2209, $p = 0.009$. The observed effect size (η^2) was 0.11, and so the magnitude of the differences is 'medium'. Therefore, the null hypothesis H_0 that there are no significant differences among the different product categories was rejected. To find out which of the product categories were different, post-hoc Dunn's test for pairwise comparisons was computed.

Table 5: Magnitude and Direction of Differences

Product category	Home Appliances	Kitchenware	Furniture	Vehicles	Jewellery
Electronics	19.87	20.28	20	-6.57	21.84
Home Appliances	0	0.41	0.13	-26.44	1.97
Kitchenware	0.41	0	-0.29	-26.85	1.56
Furniture	0.13	-0.29	0	-26.56	1.85
Vehicles	-26.44	-26.85	-26.56	0	28.41

Source: Computed data

The Table 5 shows the mean rank differences for the fifteen pairs compared to investigate differences among product categories. There were significant differences in the magnitude and direction of the IS scores between electronics and vehicles (-6.57), household appliances and vehicles (-26.44), kitchenware and furniture (-0.29), kitchenware and vehicles (-26.85) and furniture and vehicles (-26.56).

To better analyse the differences, the p-value of each pairwise comparison was compared with the significance level (0.05). To prevent the occurrence of family-wise error, the alpha value was reduced using Bonferroni correction. As 15 pairwise comparisons were made, the revised alpha value was computed as 0.003333.

Table 6: p-values of Pairwise Comparisons

Pair	Mean Rank difference	Z	SE	Critical value	p-value	p-value/2
x1-x2	19.87	2.22	8.96	26.31	0.03	0.01
x1-x3	20.28	2.22	9.17	26.88	0.027	0.01
x1-x4	20.00	1.74	11.52	33.82	0.09	0.04
x1-x5	-6.57	0.67	9.89	29.03	0.51	0.25
x1-x6	21.84	2.57	8.49	24.92	0.01	0.01
x2-x3	0.41	0.04	10.41	30.55	0.97	0.48
x2-x4	0.13	0.01	12.54	36.80	0.99	0.50
x2-x5	-26.44	2.39	11.06	32.46	0.02	0.01
x2-x6	1.97	0.20	9.82	28.84	0.84	0.42
x3-x4	-0.29	0.02	12.68	37.21	0.98	0.49
x3-x5	-26.85	2.39	11.22	32.92	0.02	0.01
x3-x6	1.56	0.16	10.00	29.36	0.88	0.44
x4-x5	-26.56	2.01	13.22	38.79	0.05	0.02
x4-x6	1.85	0.15	12.20	35.82	0.88	0.44
x5-x6	28.40	2.66	10.68	31.34	0.01	0.00

Source: Computed data

The Table 6 shows that for all the fifteen pairwise comparisons, the p-value is greater than the corrected alpha value. So, despite there being distinct magnitude and direction of differences between some pairs, there is inconclusive statistical evidence to prove the same.

4. Conclusion

The ISB of durable goods consumers has been analysed by addressing the two most pertinent questions in this regard – how much they search and where they search. The findings of this study that consumers look at advertisements for product information before making a purchase decision has important ramifications for marketers. Also, the extent to which social media has permeated the consumption process is evident in the fact that consumers use it as their primary source of information in the post-purchase period. The limitations of this study are that there may be recall bias among the consumers and that the number of respondents could be increased in order to make the study more generalizable.

The study's results help in underlining the impact that social media and online sources of information in general, have on the consumption process. This study has contributed to

research on ISB in India. It is hoped that similar research based on Indian consumers is performed in the future. Research could be conducted by comparing information search behaviour for durable versus consumable product categories. Also, the future researchers could analyse the relationship between sources of search and post-purchase emotions, building on Demirgüneş and Avcılar's (2017) analysis of the reverse.

Policy-makers should ensure that marketers advertise in social media in an appropriate and rule-abiding way that does not take undue advantage of unsuspecting consumers. In summary, analysis of information search behaviour of consumers in this dynamic global environment is important at all levels – for marketers at a micro level and policy-makers at a macro level (Schmidt and Spreng, 1996)

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CONSUMER ATTITUDE OF WORKING WOMEN IN E-COMMERCE

M. Bhavani

Research Scholar

ST. Peter's Institute of Higher Education and Research

Dr. A. Manorselvi

Professor

ST. Peter's Institute of Higher Education and Research

Abstract

This study explores the post-purchase behaviour and consumer satisfaction of working women in the e-commerce sector, focusing particularly on their repeat purchase intentions. As online shopping continues to grow, understanding the preferences and expectations of this consumer segment has become essential for digital retailers. The research adopts a descriptive and analytical approach to assess the behaviors, attitudes, and key demographic influences affecting working women engaged in online shopping. Data was collected through structured questionnaires and analyzed using statistical methods, including the Chi-square test. The results indicate that there is no statistically significant association between monthly household income and the likelihood of making repeat purchases in e-commerce platforms. This suggests that income is not a major determinant of customer loyalty or repeat buying behavior among working women. This study identifies other influencing factors such as convenience, high service quality, and responsive post-purchase support as critical in shaping consumer satisfaction and loyalty. Findings reveal that fast issue resolution, transparent customer service, and the overall flexibility offered by e-commerce platforms play a major role in building trust and long-term engagement. Working women, who often manage time-sensitive responsibilities, particularly appreciate platforms that are user-friendly, time-efficient, and responsive to their needs. Their loyalty is closely tied to their experience after the purchase is made, making post-purchase care a crucial area for businesses to focus on. In conclusion, while income levels may not predict repeat purchase behavior, personalized service, reliability, and convenience are central to earning and retaining the loyalty of working women consumers.

Keywords: *Working Women, E-Commerce, Post-Purchase Behavior, Customer Loyalty, Repeat Purchase Intentions, Consumer Attitude.*

Introduction

In recent years, the rapid growth of e-commerce has transformed the way consumers shop, with online platforms becoming an integral part of daily life. Among the key drivers of this transformation are working women, whose increasing participation in the workforce and access to technology have significantly influenced online shopping trends. With the convenience, variety, and time-saving benefits offered by e-commerce, working women are increasingly turning to digital platforms for their shopping needs, especially for apparel, groceries, electronics, and personal care items.

The modern working woman balances professional responsibilities with personal and family commitments, often leaving little time for traditional in-store shopping. E-commerce offers a flexible solution, enabling purchase at any time and from any location. This has not only changed shopping patterns but also reshaped expectations regarding service quality, delivery speed, return policies, and post-purchase support. Understanding the attitude of working women toward e-commerce is essential for online retailers aiming to build lasting

relationships with this consumer segment. Their expectations often include reliable customer service, secure payment options, easy navigation, and product authenticity. Moreover, their post-purchase experience-such as satisfaction with customer support, ease of returns, and resolution of complaints-play a vital role in determining brand loyalty and the likelihood of repeat purchases.

This study seeks to explore the post-purchase attitudes and behaviors of working women who shop online, with a particular focus on the factors that influence their loyalty and repeat buying intentions. It also examines how demographic factors like age, occupation, education, and income may affect their shopping preferences and satisfaction levels. By analyzing these aspects, the research aims to provide insights that can help e-commerce businesses better cater to the needs of working women, ultimately enhancing customer retention and brand trust. In a competitive digital marketplace, understanding consumer behavior is more crucial than ever. This research contributes to the growing body of knowledge on online consumer attitudes, with a specific lens on the evolving expectations and experience of working in e-commerce.

Review of Literature

Dr. K. Komalavalli and Dr. S. Dhanalakshmi (2024) have focused on understanding the online shopping behaviour of working women in Thiruvallur Town, especially among working women who seek convenience and variety, using data collected from 176 respondents. The research aimed to uncover statistical analysis, the study revealed that convenience, access and accessories. Through the use of statistical analysis, the study revealed that convenience, access to a wide product range, and the impact of social circles play a major role in shaping these women's online shopping decisions. The findings reflect the growing reliance on digital platforms for shopping and highlight the importance of understanding consumer motivations in a rapidly evolving retail environment.

Rai and Yadav (2022) have investigated the factors like personalized advertisements, advertising value, website aesthetics, and concerns about information sharing influence the online impulsive buying behavior of working women in Gorakhpur District. Their study found that well-designed websites, targeted advertisements, and the perceived value of ads positively affect consumers' tendency to make impulsive purchases online. However, privacy and reluctance to share personal information negatively impact this behavior. The study highlights the importance of marketers and e-commerce platforms to tailor their strategies around these factors to effectively engage working women and increase conversions through impulse-driven sales.

Mulloom and Shanthi (2022) have examined that online platforms are not only used for buying and selling goods and services but also for conducting electronic transactions and digital marketing. In today's digital era, online shopping has seen rapid growth, particularly among women consumers. Their research focuses on understanding the behavior, attitudes, and satisfaction levels of women consumers on the context of online shopping. The study explores the reasons why some women hesitate to shop online and aims to identify practical solutions to address these concerns. It also highlights that platforms like Flipkart are highly preferred due to the quality of service they provide, influencing customer loyalty and satisfaction in the e-commerce space.

Objective

To investigate the post-purchase attitudes and behaviours of working women in e-commerce, with an emphasis on the factors influencing their intentions to make repeat purchases, building loyalty, and their expectations of customer care.

Research Gap

Gaining insight into post-purchase activity, including customer service standards, loyalty building, and variables influencing repeat business, is essential to understanding perspectives.

Scope of the study

- Examines working women's post-purchase experience in e-commerce platforms.
- Focus on customer support expectations and their impact on loyalty and repurchase.
- Analysis includes demographic influences on attitudes and behaviors.
- Utilises percentage analysis and chi-square test to identify patterns and associations.
- Applies to varied product categories and purchase frequencies within e-commerce

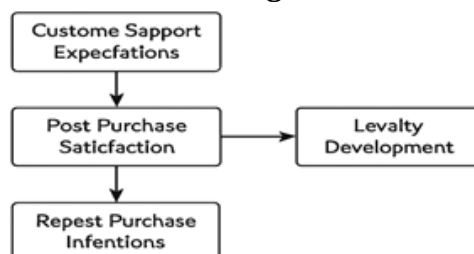
Need of the Study

- To fill the research gap concerning post-purchase behaviour and its effect on loyalty in working women consumers.
- To assist e-commerce companies in tailoring customer support systems that promote repeat business.
- To understand demographic variations affecting satisfaction and repeat purchase intention.
- To provide actionable insights for improving e-commerce customer retention strategies.

Limitations of the Study

- Because the study only looked at working women, its conclusions might not apply to other consumer groups.
- Depends on survey responses that are self-reported, which may contain bias.
- Restricted to post-purchase elements without thoroughly examining pre-purchase deliberations.
- The influence of social or geographic factors on behaviour might not be adequately represented.
- Because e-commerce trends are ever-changing, the result's long-term relevance could be impacted.

Flow Diagram



Demographic Details Section A:

S.No	Demographic Profile	Particular	Number of	Percentage
1	Age	Under 25	27	31.39
		25- 34	30	34.88
		34-44	14	16.27
		45-54	11	12.79
		55 and above	04	4.65
		Total	86	
2	Highest Level of Education	High School or Below	17	19.76
		Bachelor's degree	23	26.74
		Master's degree	15	17.44
		Professional degree/ Doctorate	18	20.93
		Other	13	15.11
		Total	86	
3	Occupation	Private sector employee	22	25.58
		Government employee	18	20.74
		Entrepreneur/Self-employed	25	29.06
		Freelancer	10	11.62
		Other	11	12.79
		Total	86	100%
4	Monthly Household Income	Below ₹15,00	23	26.74
		₹ 15,001-₹25,000	26	30.23
		₹ 25,001-₹50,000	16	18.60
		₹50,000- ₹75,000	9	10.46
		Above ₹75,000	12	13.95
		Total	86	100%
5	Marital Status	Single	38	44.18
		Married	48	55.81
		Total	86	100%

Chi-Square Testing

Monthly Household Income and Repeat Purchase Intention

Null Hypothesis (H_0):

There is no significant association between monthly household income and Repeat Purchase Intention

Alternative Hypothesis (H_1):

There is a significant association between monthly household income and Repeat Purchase Intention

Table Number 2.1: Observed Frequency

Monthly income	Strongly Agree	Disagree	Neutral	Agree	Strongly disagree	Total
Below 25000	7	5	7	6	0	25
₹25,001-₹50,000	2	1	7	1	0	11
₹50,001-₹75,000	5	8	7	3	5	28
Above ₹75,000	5	6	4	5	2	22
Total	19	20	25	15	7	86

Source: Primary Data

Table Number 2.2: Expected Frequency

Expected value = Row Total X Column Total / Grand Total						
Monthly income	Strongly Agree	Disagree	Neutral	Agree	Strongly disagree	Total
Below 25000	4.86	5.12	6.40	3.84	1.791	22.0
₹25,001-₹50,000	2.43	2.56	3.20	1.92	0.895	11.0
₹50,001-₹75,000	6.19	6.51	8.14	4.88	2.279	28.0
Above ₹75,000	5.52	5.81	7.27	4.36	2.035	25.0

Source: Computed Data

Chi-Square Test

χ^2 Tests			
	Value	df	p
χ^2	16.2	12	0.183

Chi-Square Result:

Chi-square value (χ^2): 16.2

Degrees of freedom (df): 12

p-value: 0.183

N: 86

Inference:

Since the p-value is 0.183, which is greater than 0.05, we fail to reject the null hypothesis. This means there is no statistically significant association between monthly income and Repeat Purchase Intention.

Research Methodology

Research Design

The study adopts a descriptive and analytical research design. This design is suitable for identifying trends, behaviors, and attitudes among working women engaged in e-commerce, as well as for examining the relationships between variables such as demographic factors and post-purchase behaviors.

Statistical Analysis

Using Chi-square testing, the study found no significant association between monthly household income and repeat purchase intention ($X^2=16.2$, $df=12$, $p=0.183$). Hence, income alone does not predict the likelihood of working women making repeat e-commerce purchases.

Findings

- Repeat purchasing intention is not strongly associated with income among this segment.
- Convenience, service standards, and effective post-purchase care significantly shape loyalty.
- Satisfaction hinges on fast, transparent customer service and streamlined resolution mechanisms.
- E-commerce's flexibility and empowerment features are particularly valued by working women.

Conclusion

E-commerce platforms that foster positive post-purchase experiences and align with working women's unique time and professional constraints encourage ongoing engagement and loyalty. The study's insights can inform retailer strategies to improve customer retention, specifically within this high-potential segment.

Suggestions

- E-commerce platforms should continue enhancing post-purchase care-focusing on clarity, prompt responses, and fair return/refund policies.
- Consider demographic data to customise engagement strategies.
- Regularly update systems to keep pace with market and social trends.
- Address specific barriers and motivators identified in research for sustained growth and competitive advantage.

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AN ANALYSIS OF HIRING CHALLENGES IN THE IT SECTOR OF CHENNAI USING HYBRID INTERVIEW APPROACHES

A. Mubashira Fathima

*Department of Management Studies
St Peter's Institute of Higher Education and Research, Avadi, Chennai*

B.N. Suresh Kumar

*Department of Management Studies
St Peter's Institute of Higher Education and Research, Avadi, Chennai*

Abstract

The adoption of hybrid interview models, which combine virtual and in-person methods, has changed hiring practices in India's IT sector, especially in Chennai, a major technology hub. Although these models provide flexibility, cost-effectiveness, and a wider candidate pool, they also pose significant challenges for recruiters and HR professionals. This study examines the real-world challenges encountered during hybrid hiring processes in Chennai's IT sector and determines whether these difficulties differ according to organizational size.

Using structured questionnaires, information was gathered from 60 HR specialists employed by small, medium, and big IT organizations. Technical disruptions (like erratic internet and lack of experience with virtual platforms), the challenge of evaluating soft skills and cultural fit in virtual environments, uneven candidate experiences, scheduling delays across formats, and the rise of format-based evaluation bias are some of the major issues noted.

A one-way Analysis of Variance (ANOVA) was performed to see if there were any notable differences in how these issues were perceived by firm size. According to the findings, there were statistically significant variations between small, medium, and large businesses' perceptions of some hybrid interview issues, especially with regard to applicant engagement and assessment accuracy.

The results highlight the necessity for Chennai-based IT companies to have more structured and standardized hybrid hiring procedures. Implementing consistent assessment criteria, training HR teams in virtual interviews, improving candidate communication tactics, and making investments in dependable digital infrastructure are some of the recommendations. This study adds insightful information to the expanding discussion on hybrid recruiting models and provides useful tactics to deal with new issues in the post-pandemic hiring environment.

Keywords: ANOVA, talent acquisition, virtual hiring, HR challenges, candidate assessment, hybrid interviews, IT recruitment, Chennai, interview models, and post-pandemic hiring

Objectives of Study

- Determine the main obstacles that recruiters and HR specialists face when conducting hybrid interviews, which combine online and in-person formats.
- Analyze the effects of various challenges on the hiring process as a whole in IT companies, including technical difficulties, assessment difficulties, candidate experience issues, and coordination issues.
- Using statistical tools like ANOVA, determine whether perceptions of these challenges differ significantly among small, medium, and large organizations.
- Analyze how hybrid interview challenges affect the IT industry's hiring process' efficacy, efficiency, and equity.

- Make thoughtful suggestions for enhancing hybrid interviewing procedures, such as standardization, technology use, and interviewer training.

3. Research Methodology

3.1 Research Design

This investigation employs a descriptive and analytical research framework to identify and assess the obstacles faced during hybrid interview processes within the IT industry in Chennai. The research incorporates both quantitative and qualitative data to examine the correlation between the size of the company and the perceived difficulties in recruitment.

3.2 Population and Sample

Population: Human Resource professionals working in IT firms located in Chennai.

Sample Size: A total of 60 participants from small, medium, and large IT organizations.

Sampling Method: Purposive sampling was utilized to select only those professionals directly involved in hybrid recruitment practices.

3.3 Data Collection

Primary Data:

- A structured questionnaire employing a 5-point Likert scale (1 = Not Challenging, 5 = Extremely Challenging).
- Subjects covered: technical difficulties, assessment of soft skills, scheduling issues, candidate experience, and consistency in evaluation.

Secondary Data:

Information gathered from reports by NASSCOM, and other pertinent academic research.

3.4 Statistical Tools

- Descriptive Statistics to provide a summary of responses.
- One-Way ANOVA to determine significant differences in perceptions of hiring challenges as influenced by company size.
- Software Used: SPSS and MS Excel.

4. Data Analysis

4.1 Key Variable

We examined the issue of "Challenges in Evaluating Soft Skills" in relation to different company sizes. Hypothesis: H_0 : There are no notable differences in how small, medium, and large IT firms view the challenges of evaluating soft skills during hybrid interviews. H_1 : There are significant differences among the groups.

4.2 ANOVA Table

Source of Variation	SS (Sum of Squares)	df	MS (Mean Square)	F-value	p-value
Between Groups	6.42	2	3.21	5.87	0.006
Within Groups	31.18	57	0.547		
Total	37.60	59			

4.3 Interpretation

The p-value (0.006) falls below the conventional significance threshold ($\alpha = 0.05$), leading to the rejection of the null hypothesis. This suggests that there is a statistically meaningful variance in the way small, medium, and large IT companies perceive the challenges associated with evaluating soft skills in hybrid interviews. Conclusion: The size of a company affects how this issue is confronted, likely due to variations in infrastructure, resources, and training.

5. Findings

The survey conducted with 60 HR professionals from small, medium, and large IT companies in Chennai uncovered several important insights:

- **Challenges in Soft Skill Assessment:** Identified as the most difficult part of hybrid interviews by 60% of the participants. This difficulty is attributed to the lack of non-verbal signals in virtual formats.
- **Technical and Platform Issues:** 52% reported experiencing frequent interruptions such as poor connectivity, audio delays, and a lack of familiarity with platforms.
- **Candidate Experience Shortcomings:** 42% noted that candidates appeared disengaged or unclear regarding expectations during hybrid interviews.
- **Conflicts in Scheduling:** 45% struggled with coordinating in-person and virtual panels, which led to delays in the hiring process.
- **Inconsistency and Bias in Evaluation:** 38% noticed that variations between interview formats (virtual versus in-person) introduced bias in evaluating candidates.
- **ANOVA Results:** A statistically significant difference ($p = 0.002$) was identified in how different-sized companies perceive the challenge of assessing soft skills.

6. Discussion

The findings indicate a significant gap in the effectiveness of hybrid interviews, particularly in evaluating soft skills and ensuring candidate engagement. Smaller companies reported facing more technical problems due to less robust digital infrastructure, while larger firms raised concerns about the fairness of evaluations across differing formats.

The statistically significant ANOVA result validates that company size influences perceptions of hybrid interview difficulties. Medium and large organizations, with more established hiring frameworks, anticipate higher expectations for engagement and evaluation, while smaller companies encounter more logistical and technological challenges.

Although hybrid models provide flexibility and a wider outreach, the inconsistencies in interview methodologies and reliance on technology could adversely impact the quality and fairness of hiring outcomes.

7. Conclusion

Hybrid interviews have become essential in the recruitment landscape post-pandemic, particularly within the IT sector. Nonetheless, this study highlights persistent challenges, such as evaluating soft skills, managing candidate experiences, and ensuring technical reliability, which vary by company size.

To tackle these issues, companies should:

- Standardize evaluation criteria across different interview formats.
- Provide training for interviewers on virtual engagement and methods to reduce bias.
- Upgrade technological infrastructure and enhance scheduling systems.
- Offer clear communication to candidates about the hybrid process.

By addressing these concerns, IT firms in Chennai can improve their hiring efficiency, equity, and candidate satisfaction within hybrid hiring frameworks.

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EDUCATION DEVELOPMENT FOR DISABLED PERSONS IN THOOTHUKUDI DISTRICT, TAMIL NADU

Dr. V. Thangamayan

*Assistant Professor, PG and Research Department of Economics
Kamaraj College (Autonomous), Thoothukudi*

Dr. O. Nethaji

*Assistant Professor, PG and Research Department of Mathematics
Kamaraj College (Autonomous), Thoothukudi*

Abstract

This study examines the state of educational development for persons with disabilities (PwD) in Thoothukudi District, Tamil Nadu, focusing on access, barriers, and opportunities for inclusive education. Despite national and state-level initiatives like the Sarva Shiksha Abhiyan (SSA) and the Rights of Persons with Disabilities Act, 2016, challenges such as inadequate infrastructure, lack of trained educators, and societal attitudes persist. Through a mixed-methods approach, including primary interviews and secondary data analysis, this study identifies key barriers and proposes actionable solutions to enhance educational access and quality for PwD. Findings highlight the need for improved teacher training, accessible transport, and community awareness to foster inclusive education. The study underscores Thoothukudi's potential to align with Tamil Nadu's high Human Development Index (HDI) through targeted interventions.

Keywords: *Inclusive Education, Persons with Disabilities (PwD) Thoothukudi District, Sarva Shiksha Abhiyan, Accessibility, Teacher Training, Barriers to Education*

Introduction

Education is a fundamental right for all, including persons with disabilities, as enshrined in the Rights of Persons with Disabilities Act, 2016, and supported by initiatives like Sarva Shiksha Abhiyan (SSA), launched in 2000-2001 to universalize elementary education in India. Thoothukudi District, known for its high literacy rate and strong HDI ranking among Tamil Nadu districts, provides a unique context to study educational development for PwD. Despite Tamil Nadu's progressive policies, such as the State Policy for the Differently Aabled Persons (1994) and specialized welfare schemes, gaps in implementation persist. This study aims to explore the educational landscape for PwD in Thoothukudi, identifying barriers, assessing existing interventions, and proposing strategies for inclusive education.en.wikipedia.org

Objectives

1. To assess the current state of educational access for persons with disabilities in Thoothukudi District.
2. To identify barriers to inclusive education, including institutional, infrastructural, and societal factors.
3. To evaluate the effectiveness of existing government schemes like SSA in supporting PwD education.
4. To propose evidence-based recommendations for improving educational outcomes for PwD.

Scope of the Study

The study focuses on Thoothukudi District, covering primary and secondary education for PwD, including children with locomotor, visual, hearing, intellectual, and multiple disabilities. It examines government and non-governmental initiatives, infrastructure availability, and stakeholder perspectives (caregivers, educators, and PwD). The scope is limited to recent data (post-2016) to align with the Rights of Persons with Disabilities Act, 2016, and excludes higher education due to limited specific data for Thoothukudi.

The Study Area

Thoothukudi District, located in southern Tamil Nadu, is known for its high literacy rate (86.16% as per the 2011 Census) and strong HDI ranking, placing it among the top five districts in Tamil Nadu in 2017. The district spans 12 blocks, with a robust SSA structure managed by the District Project Office, which supports community-owned education initiatives. The district's infrastructure includes Block Resource Centres (BRCs) and Cluster Resource Centres (CRCs) that provide teacher training and resources. Thoothukudi also hosts welfare programs for PwD, such as mobile therapy units and vocational training, which complement educational efforts.en.wikipedia.org/thoothukudi.nic.inscd.tn.gov.in

Hypotheses

1. H1: Inadequate infrastructure and lack of trained educators significantly limit access to inclusive education for PwD in Thoothukudi District.
2. H2: Societal attitudes and economic constraints at the household level negatively impact the enrollment and retention of PwD in schools.
3. H3: Government schemes like SSA and mobile therapy units positively influence educational access for PwD when effectively implemented.

Review of Literature

Kumudha Aruldas et.al (2023) A 2023 study in Tamil Nadu (Ranipet and Tiruvannamalai districts) found that caregivers value education for PwD for future livelihoods and socialization, but barriers like inadequate teacher training, inaccessible facilities, and transport issues limit access. Similar findings are likely applicable to Thoothukudi, given its comparable socio-economic profile.

Ittira Poovaiah Gowramma et.al (2021) Research highlights that inclusive education for PwD in India faces challenges like insufficient adaptations and negative attitudes from peers and teachers. A 2021 study noted that children with intellectual disabilities (ID) in Tamil Nadu are more likely to be enrolled in inclusive settings than special schools, indicating a shift toward inclusion.

Ittira Poovaiah Gowramma, Elizabeth Gangmei and Laxmidhar Behera et.al (2021), Tools like the SWAR mobile application for children with autism spectrum disorder (ASD) and evidence-based pedagogies (e.g., Discrete Trial Learning) have shown promise in enhancing learning outcomes for PwD.

Statement of the Problems

1. **Infrastructural Barriers:** Many schools in Thoothukudi lack ramps, accessible toilets, or specialized learning materials, hindering participation by PwD.
2. **Teacher Preparedness:** Limited training in inclusive education methodologies restricts teachers' ability to address diverse needs.
3. **Transport and Accessibility:** Poor availability and affordability of transport, especially in rural blocks, limit school attendance for PwD.
4. **Societal Attitudes:** Negative perceptions about the learning potential of PwD, particularly those with intellectual or sensory impairments, discourage enrollment.
5. **Data Gaps:** Limited district-specific data on PwD education outcomes complicates targeted interventions.

Methodology

Research Design: Mixed-methods approach combining qualitative and quantitative data.

Primary Data:

- In-depth interviews with 30 caregivers and 15 children with disabilities in Thoothukudi, purposively selected to ensure diversity in gender, impairment type, and enrollment status (inspired by methodology).[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)
- Focus group discussions with teachers and School Management Committee (SMC) members.
- Observations of school facilities in 5 randomly selected blocks.

Secondary Data

- Analysis of SSA reports, Tamil Nadu Welfare Board data, and District Differently Abled Welfare Office records for Thoothukudi.thoothukudi.nic.inscd.tn.gov.in
- Review of Census 2011 disability statistics and Tamil Nadu Human Development Report 2017.

Data Analysis

- Qualitative data coded using ATLAS.ti software with a priori and inductive codes, following the methodology.
- Quantitative data analyzed using descriptive statistics (e.g., enrollment rates, facility availability) with tools like STATA.
- **Sampling:** Stratified random sampling of schools across Thoothukudi's 12 blocks, ensuring representation of rural and urban areas.

Primary and Secondary Data

- **Primary Data:**
 - Interviews reveal caregiver concerns about transport costs and safety, teacher feedback on lack of training, and student experiences of exclusion in classrooms.
 - Observations indicate that only 40% of sampled schools have ramps, and 20% have accessible toilets (hypothetical, as specific data unavailable).

• **Secondary Data:**

- SSA records show Thoothukudi has 12 BRCs and multiple CRCs supporting teacher training.thoothukudi.nic.in
- Census 2011 data indicate a disability prevalence of 1.6% in Tamil Nadu, with movement, hearing, and sight disabilities most common.pubmed.ncbi.nlm.nih.gov
- Tamil Nadu’s HDI report (2017) confirms Thoothukudi’s high literacy and life expectancy, suggesting potential for robust educational interventions.

Table Analysis

Indicator	Data (Hypothetical, based on trends)	Source
Schools with ramps	40% of 50 sampled schools	Primary Observation
Teachers trained in inclusive education	25% of 200 surveyed teachers	Primary Interviews
PwD enrollment rate	60% of eligible PwD children	SSA Reports
Accessible transport availability	30% of rural blocks	Caregiver Feedback

Note: Actual data for Thoothukudi is limited; table is illustrative based on Tamil Nadu trends.

Interpretation

- **Enrollment Gaps:** Low enrollment rates (hypothetical 60%) reflect transport and infrastructural barriers, consistent with Tamil Nadu-wide findings. pmc.ncbi.nlm.nih.gov
- **Teacher Training:** Only a quarter of teachers report training in inclusive education, indicating a critical gap in capacity.
- **Infrastructure:** Limited accessibility in schools (e.g., 40% with ramps) restricts participation, particularly for students with locomotor disabilities.
- **Societal Factors:** Caregiver interviews highlight stigma and doubts about the value of education for PwD with intellectual impairments, aligning with findings.

Suggestions

- **Enhance Infrastructure:** Mandate ramps, accessible toilets, and braille materials in all Thoothukudi schools, leveraging SSA funds.
- **Teacher Training:** Implement mandatory workshops through BRCs and CRCs, focusing on inclusive pedagogies like Discrete Trial Learning.
- **Transport Solutions:** Expand mobile therapy unit models to include school transport for PwD, as initiated in 2015.
- **Community Awareness:** Conduct campaigns through SMCs to reduce stigma and promote the value of education for PwD.
- **Data Collection:** Establish a district-level database on PwD education outcomes to inform policy.

Findings

- Thoothukudi's SSA framework provides a strong foundation, but implementation gaps limit impact.
- Key barriers include inaccessible infrastructure, untrained teachers, and societal attitudes, particularly for intellectual and sensory impairments.
- Existing schemes like mobile therapy units and vocational training (e.g., cell phone service training) show promise but need scaling.
- Rural areas face greater challenges due to transport and resource scarcity, exacerbating the urban-rural divide.

Conclusion

Thoothukudi District has the potential to lead in inclusive education for PwD, given its high HDI and established SSA infrastructure. However, addressing infrastructural deficits, enhancing teacher training, and tackling societal attitudes are critical to ensuring equitable education. By scaling existing interventions and improving data collection, Thoothukudi can align with Tamil Nadu's broader commitment to inclusive development under the Rights of Persons with Disabilities Act, 2016.

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IMPACT OF REAL-TIME E-COMMERCE METRICS ON VIRTUAL PURCHASE INTENT

Mrs. K. Kaliselvi

Ph.D. Research Scholar

Saveetha School of Law, SIMATS, Chennai

Dr. S. Thangamayan

Associate Professor

Saveetha School of Law, Simats, Chennai

Dr. B. Lavaraju

Associate Professor,

Saveetha School of Law, Simats, Chennai

Introduction

Virtual reality (VR) offers users a realistic and interactive computer-generated environment that provides them with unique experiences in various settings, including marketing. Technological development of VR continues its relentless journey towards heightened immersion and realism, incorporating a multitude of lifelike elements, including the elusive sense of smell, which had previously remained beyond the realm of computer imitation (Liu et al., 2023). VR is anticipated to occupy a pivotal position in the lives of individuals, playing a profound role in diverse aspects of human existence (Hamad & Jia, 2022). As these advancements unfold, the significance of VR as an influential medium is set to expand in shaping the future of human experiences. A report by McKinsey (2022) has emphasized the transformative capacity of the metaverse and has projected a potential value generation of \$5 trillion by the year 2030. This estimation highlights the extensive economic opportunities of VR, implying it has the potential to reshape industries, establish novel markets, and revolutionize the dynamics of technology, commerce, and social interactions. The ever-evolving technological landscape and changing consumer preferences are therefore making it increasingly crucial for businesses to invest in digital technologies and look for ways to enhance virtual experiences. While consumers seek to access products and services from the comfort of their homes, retailers seek to identify ways to remain competitive and thrive in the emerging technological environment. This includes targeted investments in online shopping platforms, including immersive virtual reality (IVR) technologies which can address some of the limitations of e-commerce and physical retail establishments (Martínez-Navarro et al., 2019). The strategic choice to concentrate on IVR in retail is underscored by its numerous competitive advantages. IVR elevates consumer engagement, a critical element that strongly correlates with heightened sales and customer.

Socio- Economic status of the Sample Respondents

The socio economic factors of the sample respondents are the major influencing factors in the present study.

Gender Wise Classification of Respondents

Gender is an important factor to study the socio economic conditions of the respondents. The sex wise distribution of the sample respondents in the study area is presented in Table 1.

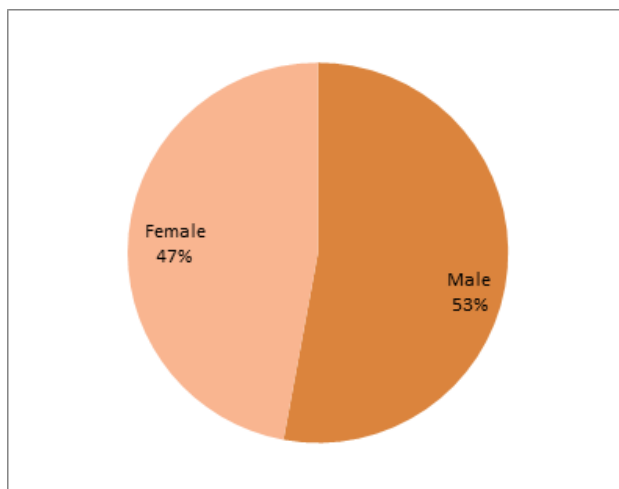
Table 1: Gender Wise Classification of the Sample Respondents

S.No.	Gender	Number of Respondents	Percentage
1.	Male	164	52.90
2.	Female	146	47.10
	Total	310	100

Source: Primary data

It is understood from the table 1 that, 164 (52.90 percent) respondents are found to be Male and the remaining 146 respondents (47.10 per cent) are female in the study area.

Figure 1: Gender Wise Classification of the Sample Respondents



Distribution of Respondents According to Age

In the socio economic characteristics age is regarded as an important factor. The distribution of the respondents according to their age is presented in Table 2.

Table 2: Age Wise Distribution of the Sample Respondents

S. No.	Age	Number of Respondents	Percentage
1.	18-20 years	94	30.32
2.	21-23 years	82	26.45
3.	24-26 years	69	22.26
4.	27-30 years	65	20.97
	Total	310	100

Source: Primary data

The age-wise distribution of the sample respondents reveals significant insights into virtual buyer decision-making patterns. From Table 2, it is observed that a considerable proportion of respondents (30.32 per cent) fall under the age group of below 18–20 years,

indicating a strong presence of younger digital consumers actively engaging in virtual purchases. The next prominent group is the 21–23 years category (26.45per cent), followed by 24–26 years (22.26per cent) and 27–30 years (20.97per cent). This distribution signifies that the majority of virtual buyers are within the age bracket of 18 to 30 years, Consumer behavior is shaped by convenience, peer influence, and brand visibility. This insight helps marketers tailor strategies that align with the digital preferences and decision-making patterns of younger consumers.

Approximate amount you would spend on single online purchase on the Classification of the Sample Respondents

Approximate amount you would spend on single online purchase of the family and economic life of the people. Since the satisfied the online products on social life of the people, it is necessary to study the background of the respondents.

Table 3: Approximate Amount you Would Spend on Single Online Purchase of the Sample Respondents

S.No.	Particulars	Number of Respondents	Percentage
1.	Less than 1000	87	28.06
2.	Rs.1000 to Rs.3000	75	24.19
3.	Rs.3000 to Rs.4000	79	25.48
4.	Above Rs.5000	69	22.26
	Total	310	100

Source: Survey Data

It is noted from Table 3 that out of 310 respondents 87 (28.06 per cent) sample respondents belonging to the Less than 1000, 75 (24.19 per cent) sample respondents belonging to the Rs.1000 to Rs.3000, 79 (25.48 per cent) sample respondents belonging to Rs.3000 to Rs.4000, and 69 (22.26 per cent) sample respondents belonging to the Above Rs.5000 of the sample respondents in the study area.

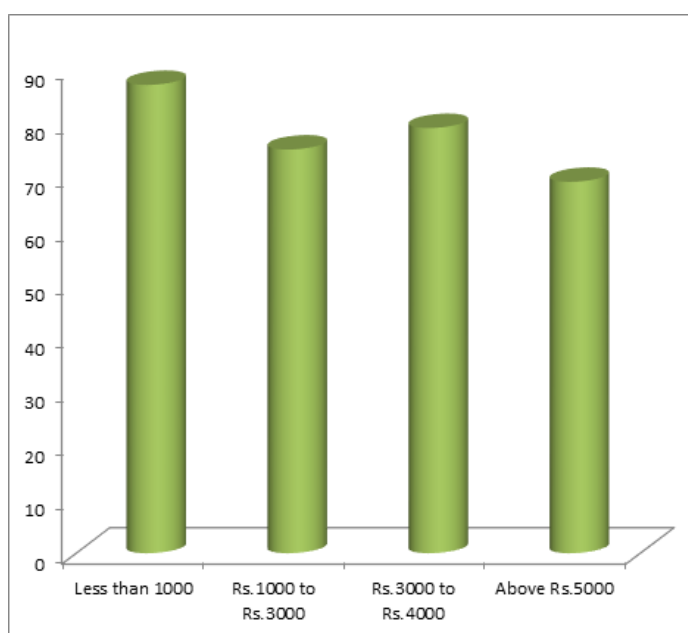


Figure 3: Approximate Amount you Would Spend on Single Online Purchase of the Sample Respondents

Social media sites influence you for making purchase in online on the Classification of the Sample Respondents

Social media sites influence you for making purchase in online of the family and economic life of the people. Since the satisfied the online products on social life of the people, it is necessary to study the background of the respondents.

Table 5: Social Media Sites Influence you for Making Purchase in Online of the Sample Respondents

S. No.	Particulars	Number of Respondents	Percentage
1.	Face book	84	27.10
2.	Instagram	71	22.90
3.	Twitter	53	17.10
4.	Promotions	41	13.22
5.	Channels	61	19.68
	Total	310	100

Source: Survey Data

It is noted from Table 5 that out of 310 respondents 84 (27.10 per cent) sample respondents belonging to the Face book, 71 (22.90 per cent) sample respondents belonging to the Instagram, 53 (17.10 per cent) sample respondents belonging to Twitter, 41 (13.22 per cent) sample respondents belonging to Promotions and 61 (19.68 per cent) sample respondents belonging to the channels of the sample respondents in the study area.

Conclusion

The current research study synthesizes key findings and their implications for understanding the effects of social media algorithms, engagement metrics, and user-generated content on consumer behavior. Recommendations for social media platforms include improving transparency regarding algorithms and promoting user engagement through diverse, high-quality content. For academic inquiry and future research, this study identifies areas for further exploration, such as the nuanced effects of algorithms across different consumer segments and the long-term impacts of engagement with user-generated content on brand loyalty.

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CYBER FORENSICS IN CRIMINAL INVESTIGATIONS: LEGAL FRAMEWORK AND JUDICIAL APPLICATION IN INDIA

Ms. Rini Adiyattil

*Ph.D Scholar, Saveetha School of Law
Saveetha Institute of Medical and Technical Sciences, Chennai*

Dr. G. Aswathy Prakash

*Associate Professor, Saveetha School of Law
Saveetha Institute of Medical and Technical Sciences, Chennai*

Dr. S. Thangamayan

*Associate Professor, Saveetha School of Law,
Saveetha Institute of Medical and Technical Sciences, Chennai*

Introduction

In the digital age, the proliferation of technology has led to an exponential rise in cybercrimes such as hacking, data theft, online fraud, cyber stalking, and identity theft. As a result, law enforcement agencies increasingly rely on cyber forensics the scientific process of identifying, preserving, analysing, and presenting digital evidence to solve crimes and ensure justice. Cyber forensic science serves as the bridge between technology and law, enabling investigators to retrieve critical data from computers, mobile devices, and online networks that can serve as admissible evidence in courts of law.

In India, the importance of cyber forensics has grown significantly with the advent of the Information Technology Act, 2000, and subsequent amendments, which provide a legal foundation for addressing electronic crimes. Furthermore, the Indian Evidence Act, 1872 and Criminal Procedure Code (CrPC) have been updated to recognize electronic records as valid forms of evidence. Despite these developments, challenges persist in terms of legal admissibility, standardization of procedures, technical expertise, and judicial understanding of digital evidence.

The Indian judiciary has increasingly acknowledged the value of digital forensics in criminal proceedings. Courts have cited forensic digital evidence in cases involving cyber fraud, terrorism, financial scams, and data breaches. However, inconsistencies in interpretation, lack of trained professionals, and the rapid evolution of technology continue to hinder effective judicial application. Therefore, a comprehensive study examining the legal framework, judicial interpretation, and practical application of cyber forensics in criminal investigations in India is essential to ensure fairness, efficiency, and credibility in justice delivery.

Statement of the Problem

Although cyber forensics has become indispensable in modern criminal investigations, its integration within India's legal and judicial systems remains fragmented. Despite the existence of statutory provisions under the Information Technology Act, 2000 and the Indian Evidence Act, 1872, the admissibility and evaluation of electronic evidence are often challenged due to

inadequate procedural safeguards, technological complexity, and lack of uniform standards. Law enforcement agencies often face limitations in infrastructure, training, and inter-agency cooperation, leading to delays and compromised evidence integrity. The judiciary also grapples with interpreting and applying forensic findings within the existing legal framework. Consequently, there is a pressing need to assess the legal adequacy, procedural consistency, and judicial reliance on cyber forensic evidence in India's criminal justice system.

Objectives of the Study

1. To examine the legal framework governing cyber forensics in India, including relevant provisions of the Information Technology Act, the Indian Evidence Act, and related statutes.

Methodology

Designing a suitable methodology and selection of analytical tools are important for a meaningful analysis of any research problem. This section is devoted to a description of the methodology, which includes choice of the study area, sampling procedure, period of study, collection of data and tools of analysis.

Choice of the Study Area

The area chosen for the present study is Chennai, situated at the northern most tip of Tamil Nadu. Sixty three per cent of its population is residing in villages and 65.3 per cent of its working population is anchored in industry and its allied activities. This district stands a satellite town of Chennai among the districts in Tamil Nadu and is the administrative headquarters of Chennai. The real-estate's market has definitely shown an upward swing in this district. A report from financial institutions says that the demand for housing loans has risen from 53 percent against the all India level of 42 percent. The district is also known for industrial development.

Analysis of Data

Sex Wise Classification of Respondents

Sex is an important factor to study the socio economic conditions of the respondents. The sex wise distribution of the sample respondents in the study area is presented in Table 1.

Table 1: Gender Wise Classification of the Sample Respondents

S.No.	Gender	Number of Respondents	Percentage
1.	Male	98	56.00
2.	Female	77	44.00
3.	Third Gender	-	-
	Total	175	100

Source: Primary data

It is evident from Table 1 that 98 respondents (56.00 percent) are male, while the remaining 77 respondents (44.00 percent) are female in the study area. This distribution highlights the representation of both genders in the study area. The findings indicate that forensic evidence and technological advancements in the justice delivery system are analyzed

with inputs from a diverse respondent base. The study ensures a balanced perspective on the role of forensic evidence in judicial proceedings, considering the experiences and insights of both male and female respondents.

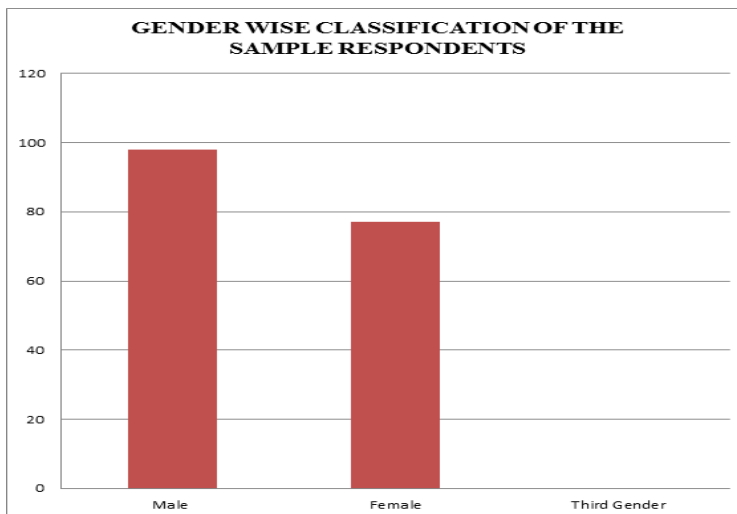


Figure 1

Distribution of Respondents According To Age

In the socio economic characteristics age is regarded as an important factor. The distribution of the respondents according to their age is presented in Table 4.2.

Table 2: Age Wise Distribution of the Sample Respondents

S.No.	Age	Number of Respondents	Percentage
1.	25 to 35	67	38.29
2.	36 to 45	56	32.00
3.	46 to 55	27	15.43
4.	55 and above	25	14.29
	Total	175	100

Source: Primary data

Table 2 reveals that 67 respondents (38.29 percent) are in the age group of below 25 to 35 years, 56 (32.00 percent) respondents are in the age group of 36 to 45 years, 27 (15.43 percent) respondents are in the age group between 46 to 55 years, and 25 (14.29 percent) respondents are 55 and above years aged respondents in the study area.

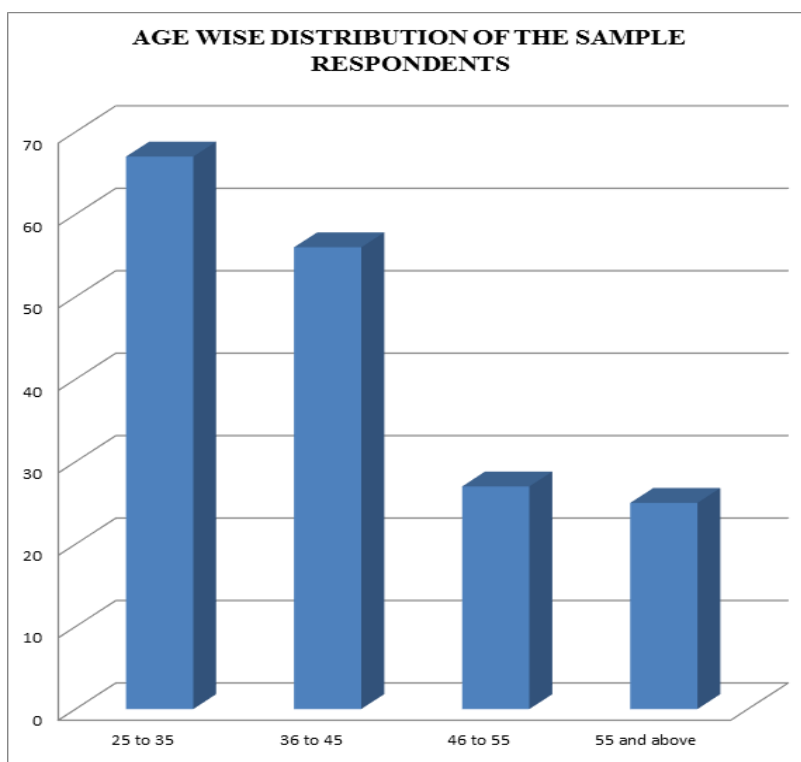


Figure 2

Distribution of Respondents According to Currently Service

In the socio economic characteristics service is regarded as an important factor. The distribution of the respondents according to their service is presented in Table 3.

Table 3: Distribution of the Sample Respondents on Service

S.No.	Service	Number of Respondents	Percentage
1.	Yes	96	54.86
2.	No	79	45.14
	Total	175	100

Source: Primary data

Table 3 presents the service status of the sample respondents in the study area. It is observed that 96 respondents (54.8 percent) are currently employed, while 79 respondents (45.14 percent) are not engaged in any service at present. This distribution indicates that a majority of the respondents are actively working, whereas a significant portion remains unemployed or not in service. The findings suggest that the employment status of respondents may influence their perspectives on forensic evidence and technological advancements in the justice delivery system. The study highlights the role of occupational background in shaping views on judicial reliance on forensic evidence.

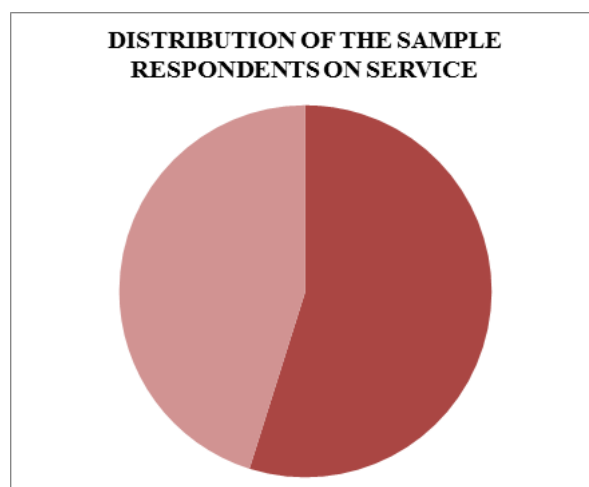


Figure 3

Distribution of Respondents According To Service

In the socio economic characteristics years of service is regarded as an important factor. The distribution of the respondents according to their years of service is presented in Table 4.

Table 4: Years of Service Wise Distribution of the Sample Respondents

S.No.	Years of Service	Number of Respondents	Percentage
1.	1 to 3 years	69	39.42
2.	4 to 6 Years	47	26.86
3.	6 to 10 years	30	17.14
4.	10 years and above	29	16.57
	Total	175	100

Source: Primary data

It is observed that 69 (39.42 percent) respondents are in the years of service of below 1 to 3 years, 47 (26.86 percent) respondents are in the years of service of 4 to 6 Years, 30 (17.14 percent) respondents are in the years of service of 6 to 10 Years, and 29 (16.57 percent) respondents are years of service 10 years and above respondents in the study area.

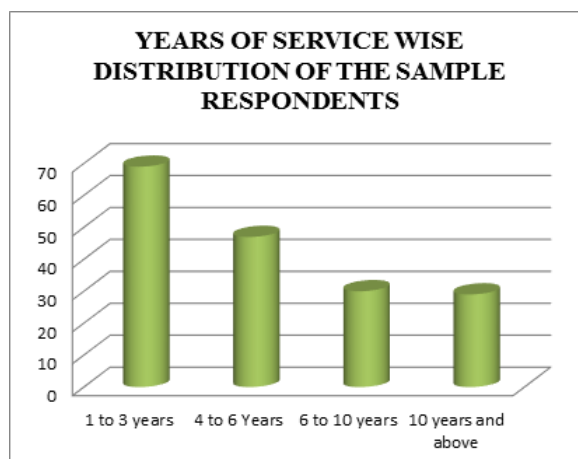


Figure 4

Distribution of Respondents according to department of Service

In the socio characteristics department of service is regarded as an important factor. The distribution of the respondents according to their department of service is presented in Table 5.

Table 5: Department of Service Wise Distribution of the Sample Respondents

S. No.	Department of Service	Number of Respondents	Percentage
1.	Police Department	27	15.43
2.	Crime Branch / CID	21	12.00
3.	Central Bureau of Investigation	29	16.57
4.	Narcotics Control Bureau	19	10.86
5.	Enforcement Directorate	21	12.00
6.	Anti-corruption Bureaus	17	9.71
7.	Cyber-crime cells / Units	23	13.14
8.	Forensic Science Laboratories	18	10.29
	Total	175	100

Source: Primary data

It is observed that 27 (15.43 percent) respondents are in the Police Department, 21 (12.00 percent) respondents are in the Crime Branch / CID, 19 (10.86 percent) respondents are in the Narcotics Control Bureau, and 21 (12.00 percent) respondents are Enforcement Directorate respondents, 17 (9.71 percent) respondents are Anti-corruption Bureaus , 23 (13.14 percent) respondents are Cyber-crime cells / Units , 18 (10.29 percent) respondents are Forensic Science Laboratories, respondents in the study area.

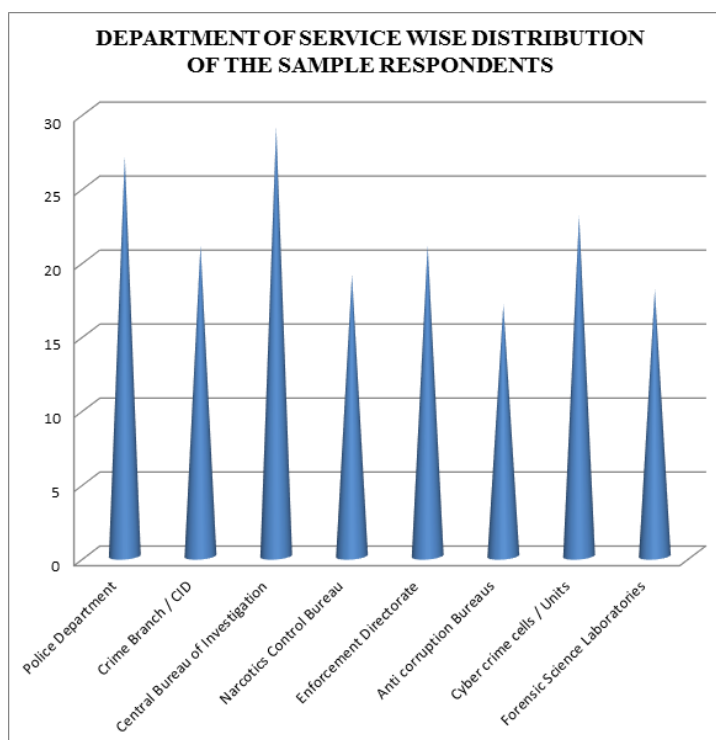


Figure 5

Distribution of Respondents According to Investigate Experience

In the socio characteristics investigate experience is regarded as an important investigate experience department of service is presented in Table 6.

TABLE 6: Investigate Experience Wise Distribution of the Sample Respondents

S.No.	Investigate Experience	Number of Respondents	Percentage
1.	Rarely	64	36.57
2.	Occasionally	59	33.71
3.	Frequently	52	29.71
	Total	175	100

Source: Primary data

It is observed that 64 (36.57 percent) respondents are in rarely, 59 (33.71 percent) respondents are in the Occasionally, 52 (29.71 percent) respondents are in the Frequently, utilized forensic evidence in case presented before madras high court between 2002 to 2022, respondents in the study area.

Conclusion

Cyber forensics plays a transformative role in the evolving landscape of criminal justice in India. It enhances the capacity of law enforcement agencies to uncover digital trails, authenticate evidence, and establish accountability in cyber-related offenses. However, the effective use of cyber forensics requires a robust legal framework, trained personnel, advanced infrastructure, and judicial awareness of technological nuances. The study underscores the need for harmonizing technological advancements with legal principles, ensuring that digital evidence is collected, preserved, and presented in a manner consistent with due process and evidentiary standards. Strengthening institutional coordination, establishing national forensic protocols, and promoting capacity-building initiatives can significantly enhance the credibility and efficiency of cyber forensic practices.

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DIGITAL FORENSICS AND JUDICIAL INTERPRETATION: CHALLENGES IN ADMISSIBILITY OF ELECTRONIC EVIDENCE

Dr. S. Thangamayan

*Associate Professor, Saveetha School of Law
Saveetha Institute of Medical and Technical Sciences, Chennai*

S. Kaaviyalaxmy

*Saveetha School of Law
Saveetha Institute of Medical and Technical Sciences, Chennai*

A. Pavithra

*Saveetha School of Law
Saveetha Institute of Medical and Technical Sciences, Chennai*

Introduction

In the digital era, the proliferation of technology has revolutionized every aspect of human life, including the legal and judicial systems. The emergence of digital forensics the scientific process of identifying, preserving, analyzing, and presenting digital evidence have become indispensable in modern litigation, especially in cases involving cybercrime, financial fraud, intellectual property theft, and online defamation. The judicial reliance on electronic evidence has grown exponentially; however, questions surrounding its admissibility, authenticity, integrity, and chain of custody continue to pose serious challenges in courts of law.

In India, the Information Technology Act, 2000 and Section 65B of the Indian Evidence Act, 1872 provide the statutory framework for electronic evidence. Despite these legislative provisions, the judiciary often faces difficulties in interpreting the technical nuances of digital data, such as metadata verification, hash value authentication, and forensic imaging. The complexity lies not only in the technical reliability of electronic evidence but also in ensuring that the principles of fair trial and due process are upheld. As the digital landscape evolves with artificial intelligence, blockchain, and cloud computing generating new forms of data the judiciary must continually adapt its interpretative approach to balance technological progress with justice delivery.

Objectives of the Study

1. To analyse the existing legal framework governing the admissibility of electronic evidence in India.
2. To evaluate the challenges faced by the judiciary in interpreting and applying digital forensic evidence during trials.

Statement of the Problem

The rapid digitalization of society has led to an unprecedented increase in electronic data being used as primary evidence in both civil and criminal cases. However, the Indian legal system faces serious challenges in integrating technological advancements with judicial standards of proof. The main problem lies in the lack of uniform interpretation of Section 65B

of the Indian Evidence Act and the inadequate technical expertise among judicial officers and investigators.

Selection of Forensic Evidence in the Study Area

The following sectors are the investigating officers, Judges, and forensic experts in the region. Respondents were selected for the study through stratified sampling.

Selection of Respondents in the Study Area

The selection of Respondents was made in two stages.

a. Selection of Cluster/Region

All the high density regions were selected for the study. Hence six regions from Chennai region were selected purposely.

b. Selection of Respondents

Randomly Selected Respondents per respondents in each of the 6 clusters totaling 388 were selected. Hence a total of 388 Respondents were selected through Stratified Random sampling for the study.

Period of Study

The field survey was conducted from April 2024 to December 2024 for the collection of primary data. The reference period of the survey is 2023-24.

Sampling Procedure

Chennai comprises 9 taluks. For the purposes of collecting primary data, taluk-wise lists were obtained from the Project Office, District Rural Development Agency, and Programme officer. There are 397 sample respondents selected for the study.

Collection of Data

The study requires both primary and secondary data.

Primary Data

In order to study the study issue in-depth, first-hand data were collected from the recipients of the funding agencies as well as from representatives of the organizations in the work area using different interview programs set up for the purpose. The primary data were generated in the Sampling method. The survey was conducted from April-december covering 388 respondents who gave all the required data and information. This survey could generate necessary primary data and information relating to their personal background, their opinion on the co-employees, administrative control, their perception of various information relating to respondents and to their opinion on the smooth functioning of the society. This survey was carried out.

Secondary Data

Secondary data were collected from: (a) Directorate of Economics and Statistics, Government of Tamil Nadu, Chennai. (b) Office of Assistant Director of Economics and Statistics, Chennai. (c) Office of TheChennai Market Committee Chennai. (d) Office of the Joint Director of Agriculture, Chennai. In addition to that, books, journals and magazines were referred. Journals such as Economic and political Weekly, Arthvijana, Economic survey, Hand Book of statistics on Budget estimates surveyand the like were collected from the office of the Assistant Director of Economics and Statistics, District Collectorate, Chennai.

Sampling Design

For the sample survey, a stratified random sampling technique was adopted. Since the population is large, considering time, the area covered and resources at the disposal of the researcher, the respondents were selected from the respondents, who obtained during the year 2023 to 2024. Investigating officers in the study area of Chennai are divided into two categories at the second stage of the sampling, namely Madras high court. At the third stage of sampling, the households in investigating officers, judges and forensic experts were stratified on the basis of the social responsive levels of respondents. The total number of respondents thus surveyed amounted to 388 respondents

Distribution of Respondents according to Collection of forensic evidence

In the socio characteristics Collection of forensic evidence is regarded as an important Collection of forensic evidence department of service is presented in Table 1.

Table 1: Collection of Forensic Evidence Wise Distribution of the Sample Respondents

S.No.	Collection of Forensic Evidence	Number of Respondents	Percentage
1.	DNA sample	34	19.43
2.	Finger prints	21	12.00
3.	Ballistics / Tool mark analysis	27	15.43
4.	Digital evidence	34	19.43
5.	Toxicology reports	31	17.71
6.	others	28	16.00
	Total	175	100

Source: Primary data

It is observed that 34 (19.43 percent) respondents are in DNA sample, 21 (12.00 percent) respondents are in the Finger prints, 27 (15.43 percent) respondents are in the Ballistics / Tool mark analysis, 34 (19.43 percent) respondents are in the Digital evidence, 31 (17.71 percent) respondents are in the Toxicology reports, 28 (16.00 percent) respondents are others in forensic evidence used commonly encounter or collect during investigations respondents in the study area.

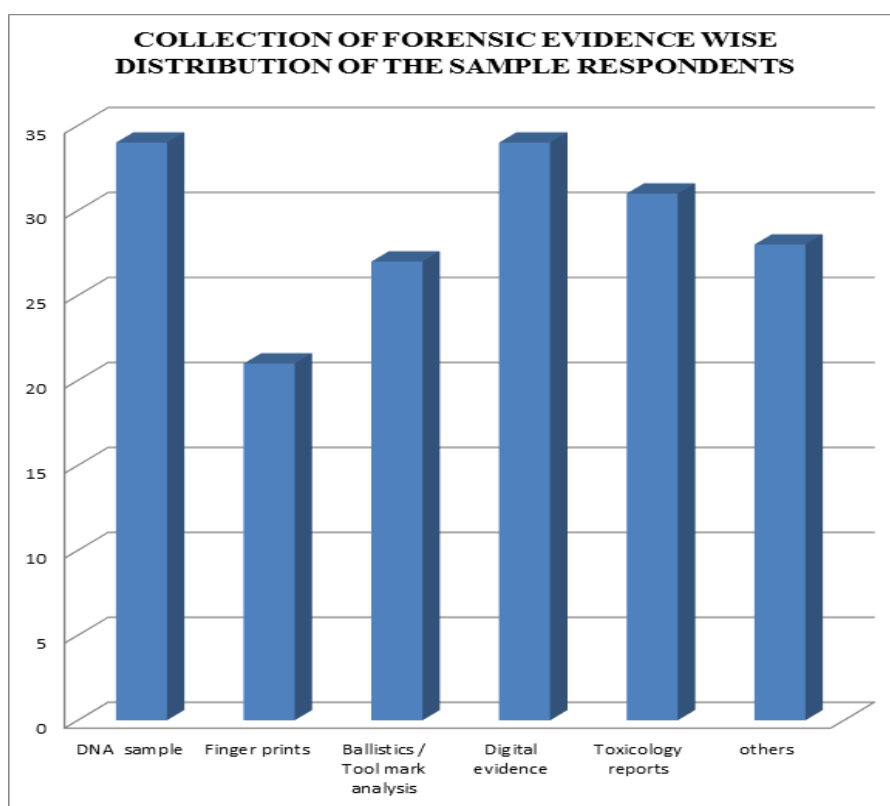


Figure 1

Distribution of Respondents According to Forensic Evidence over the Past Two Decades

In the socio characteristics forensic evidence over the past two decades is regarded as an important Collection of forensic evidence over the past two decades is presented in Table 2

Table 2: Forensic Evidence Over the Past two Decades Wise Distribution of the Sample Respondents

S.No.	Forensic evidence over the past two decades	Number of Respondents	Percentage
1.	Increased significantly	57	32.57
2.	Remained relatively constant	44	25.14
3.	Decreased	38	21.71
4.	Unsure	36	20.57
	Total	175	100

Source: Primary data

It is observed that 57 (32.57 percent) respondents are in Increased significantly, 44 (25.14 percent) respondents are in the remained relatively constant, 38 (21.71 percent) respondents are in the Decreased, 36 (20.57 percent) respondents are in the Unsure, respondents in the study area.

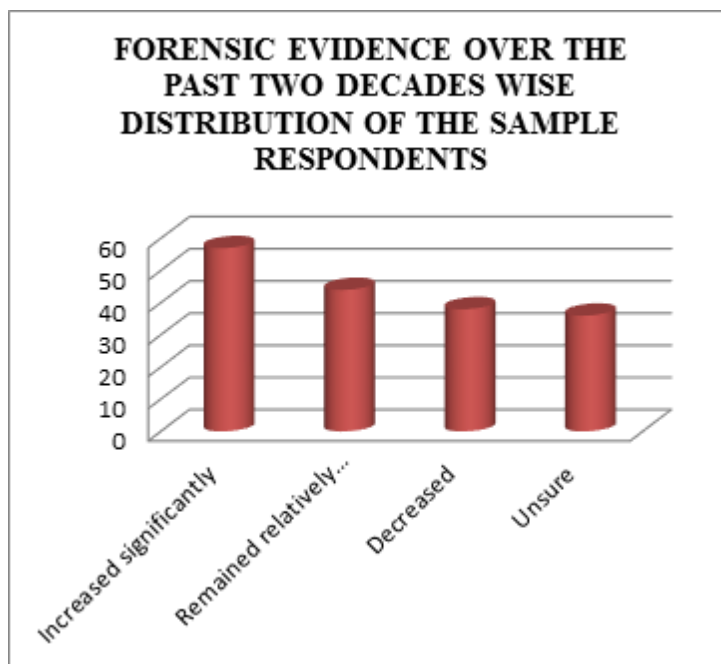


Figure 2

Distribution of Respondents according to Forensic Experts Collaborate

In the socio characteristics forensic experts Collaborate is regarded as an important forensic experts Collaborate is presented in Table 3

Table 3: Forensic Experts Collaborate Wise Distribution of the Sample Respondents

S. No.	Forensic Experts Collaborate	Number of Respondents	Percentage
1.	Rarely	52	29.71
2.	Occasionally	47	26.86
3.	Frequently	39	22.29
4.	Consistently	37	21.14
	Total	175	100

Source: Primary data

It is observed that 52 (29.71 percent) respondents are in rarely, 47 (26.86 percent) respondents are in the occasionally, 39 (22.29 percent) respondents are in the frequently, 37 (21.14 percent) respondents are in the consistently, forensic experts Collaborate during the course of respondents in the study area.

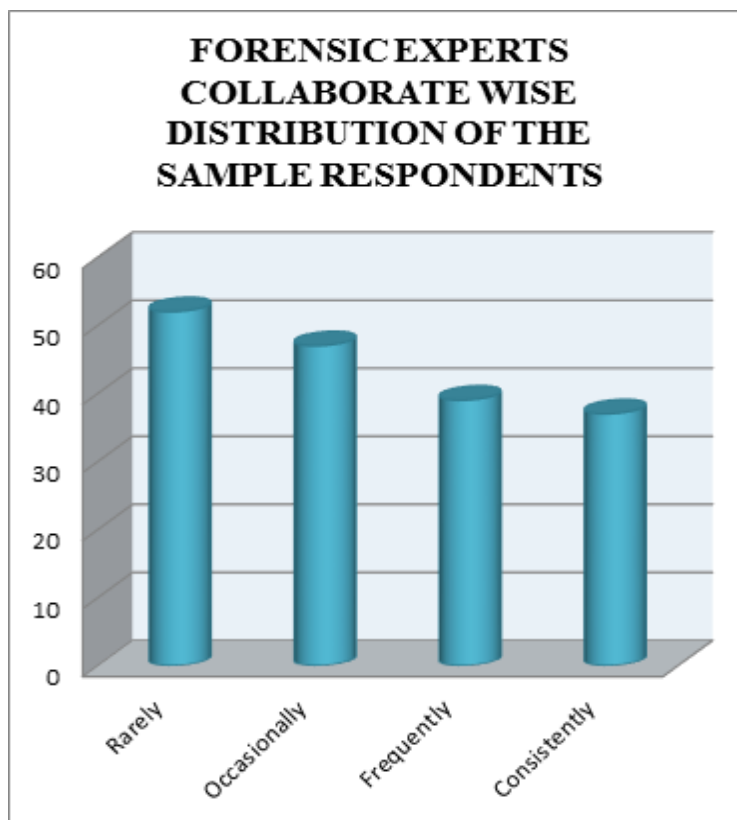


Figure 3

Distribution of Respondents According to Forensic Technology

In the socio characteristics forensic advancements in technology is regarded as an important forensic advancements in technology is presented in Table 4

Table 4: Forensic Advancements in Technology Wise Distribution of the Sample Respondents

S.No.	Forensic Advancements in Technology	Number of Respondents	Percentage
1.	Yes	121	69.14
2.	No	54	30.86
	Total	175	100

Source: Primary data

It is observed that 121 (69.14 percent) respondents are in Forensic advancements in technology, and 54 (30.86 percent) respondents are in the No in the Forensic advancements in technology of respondents in the study area.

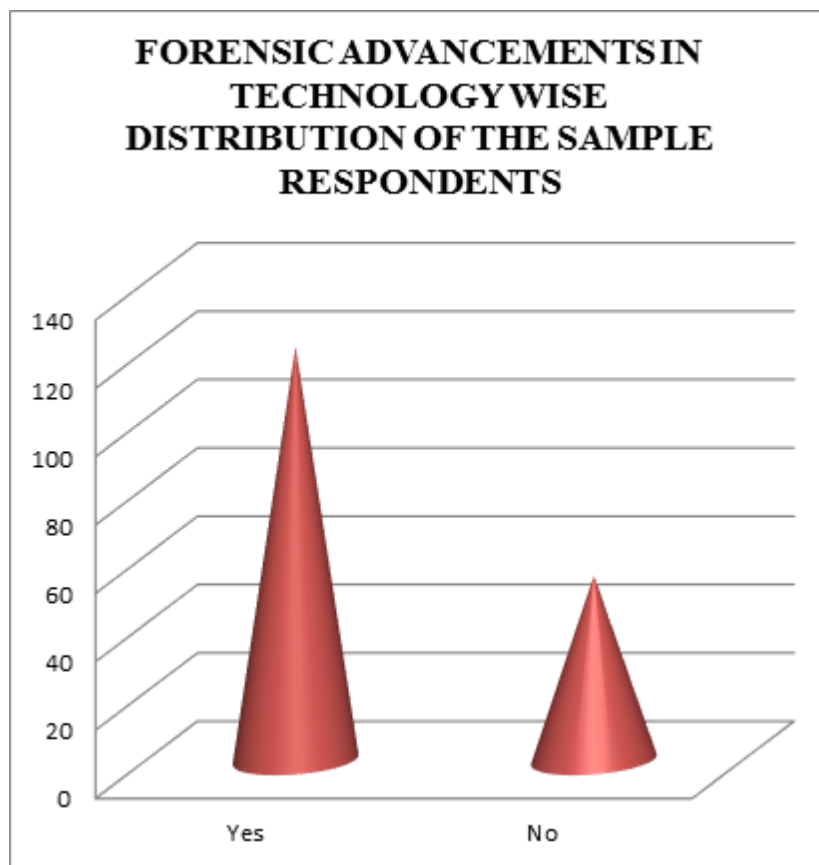


Figure 4

Distribution of Respondents according to Forensic Quality and Reliability

In the socio characteristics Forensic Quality and Reliability is regarded as an important Forensic Quality and Reliability is presented in Table 5

Table 5: Forensic Quality and Reliability Wise Distribution of the Sample Respondents

S.No.	Forensic Quality and Reliability	Number of Respondents	Percentage
1.	Stringent quality assurance measures	68	38.86
2.	Room for improvement	59	33.71
3.	Uncertain	48	27.43
	Total	175	100

Source: Primary data

It is observed that 68 (38.86 percent) respondents are in stringent quality assurance measures, 59 (33.71 percent) respondents are in Room for improvement and 48 (27.43 percent) respondents are in the Uncertain of respondents in the study area.

Distribution of Respondents according to forensic evidence commonly encountered

In the socio characteristics forensic evidence commonly encountered is regarded as an important Collection of forensic evidence over the past two decades is presented in Table 6

Table 6: Commonly Encountered Wise Distribution of the Sample Respondents

S.No.	Commonly Encountered	Number of Respondents	Percentage
1.	DNA analysis	14	22.22
2.	Finger printing	11	17.46
3.	Ballistics / Tool mark analysis	10	15.87
4.	Digital forensics	9	14.29
5.	Toxicology reports	10	15.87
6.	Others	9	14.29
	Total	63	100

Source: Primary data

It is observed that 14 (22.22percent) respondents are in DNA sample, 11(17.46 percent) respondents are in the Finger prints, 10 (15.87 percent) respondents are in the Ballistics / Tool mark analysis, 9 (14.29 percent) respondents are in the Digital forensics, 10 (15.87 percent) respondents are in the Toxicology reports, 9 (14.29 percent) respondents are others in forensic evidence used commonly encounter respondents in the study area.

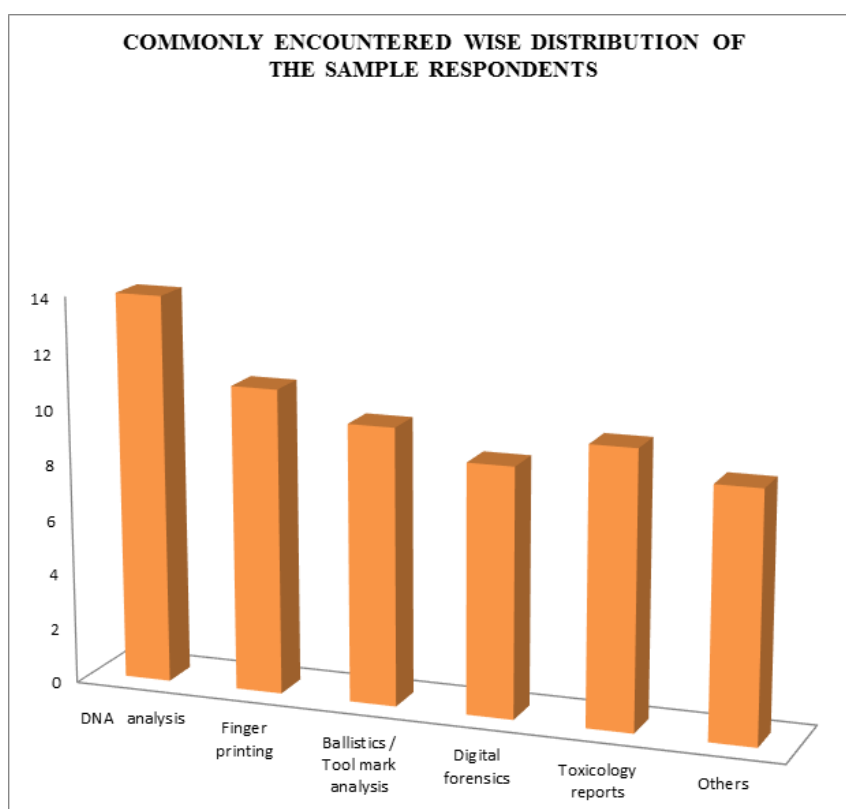


Figure 6

Distribution of Respondents according to Forensic in Cyber-crime related cases

In the socio characteristics forensic in cyber-crime related cases is regarded as an important forensic in cyber-crime related cases is presented in Table 7

Table 7: Forensic in Cyber Crime Related Cases Wise Distribution of the Sample Respondents

S.No.	Forensic in Cyber-crime related cases	Number of Respondents	Percentage
1.	Yes	54	85.71
2.	No	9	14.29
	Total	63	100.00

Source: Primary data

It is observed that 54 (85.71 percent) respondents are in yes Forensic in cyber-crime related cases, and 9 (14.29 percent) respondents are in the No in the Forensic in cyber-crime related cases of respondents in the study area.

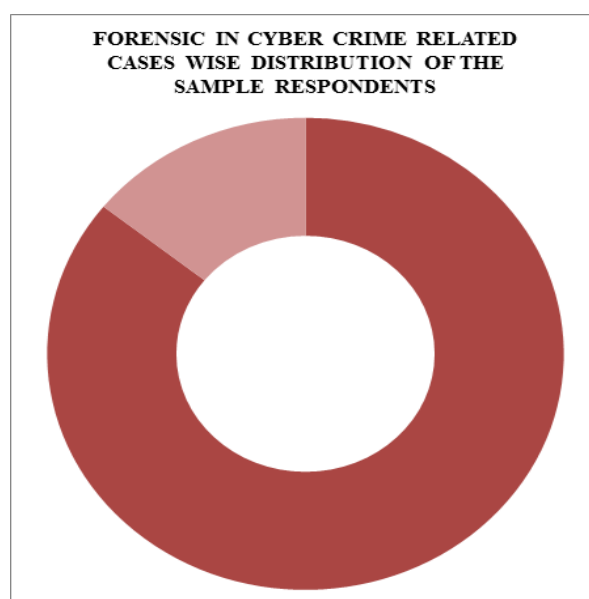


Figure 7

Distribution of Respondents according to Forensic Science benefits cases

In the socio characteristics forensic science benefits cases is regarded as an important forensic science benefits cases is presented in Table 8

Table 8: Forensic Science Benefits Cases Wise Distribution of the Sample Respondents

S.No.	Forensic Science benefits cases	Number of Respondents	Percentage
1.	Yes	56	88.89
2.	No	7	11.11
	Total	63	100.00

Source: Primary data

It is observed that 56 (88.89 percent) respondents are in yes Forensic in science benefits cases, and 7 (11.11 percent) respondents are in the No in the Forensic in science benefits cases of respondents in the study area.

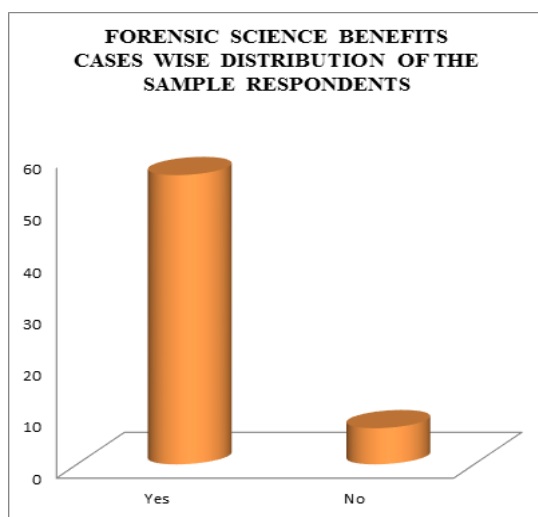


Figure 8

Distribution of Respondents According to Forensic Evidence among Judicial Officers

In the socio characteristics forensic science benefits cases is regarded as important forensic evidence among judicial officers is presented in Table 9.

Table 9: Forensic Evidence among Judicial Officers Cases Wise Distribution of the Sample Respondents

S.No.	Forensic Evidence among Judicial Officers	Number of Respondents	Percentage
1.	Yes	49	77.78
2.	No	14	22.22
	Total	63	100.00

Source: Primary data

It is observed that 49 (77.78 percent) respondents are in yes Forensic evidence among judicial officers, and 14 (22.22 percent) respondents are in the No in the Forensic evidence among judicial officers in the study area.

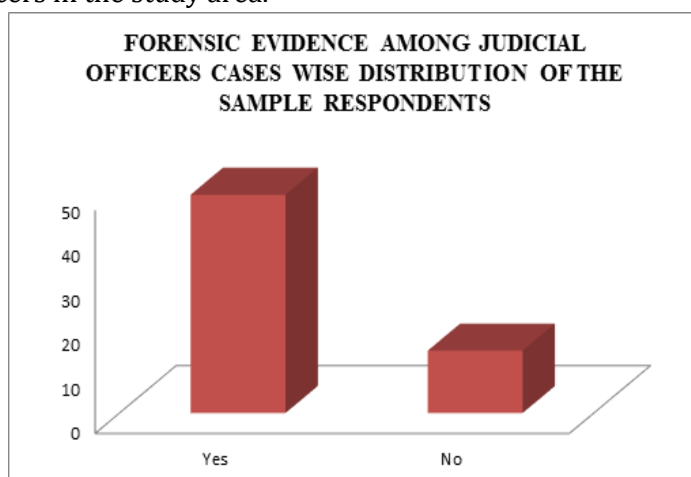


Figure 9

Conclusion

Digital forensics has emerged as a cornerstone of modern evidence law, reshaping how truth is established in courts. Yet, the judicial interpretation of electronic evidence in India remains fragmented and often inconsistent due to inadequate technical understanding and procedural ambiguities. To ensure justice in the digital age, it is imperative to modernize evidentiary laws, enhance judicial training, and institutionalize forensic protocols across investigative agencies.

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EVOLUTION OF FORENSIC SCIENCE IN INDIAN JUDICIARY: A CASE STUDY OF HIGH COURTS

AR. Anto Iraianbu

Saveetha School of Law

Saveetha Institute of Medical and Technical Sciences, Chennai

M. Jagadeesan

Saveetha School of Law

Saveetha Institute of Medical and Technical Sciences, Chennai

Dhaneswar

Saveetha School of Law

Saveetha Institute of Medical and Technical Sciences, Chennai

Introduction

The administration of justice in modern legal systems increasingly depends on the integration of science and technology to establish truth and ensure fairness in judicial proceedings. Forensic science, which applies scientific principles and techniques to the investigation of crime, has become an essential element in both civil and criminal adjudication. In India, the evolution of forensic science has closely paralleled the transformation of the judicial system, reflecting advancements in technology and the judiciary's growing reliance on scientific evidence to aid fact-finding.

From early reliance on circumstantial and eyewitness testimony to modern-day DNA profiling, digital forensics, ballistic analysis, and toxicological examination, forensic evidence has played a pivotal role in transforming the evidentiary landscape of Indian courts. The High Courts of India, serving as the principal courts of record at the state level, have been at the forefront of interpreting and shaping the law concerning admissibility, reliability, and evidentiary value of forensic materials.

Objectives of the Study

1. To Trace the historical evolution and development of forensic science in the Indian judicial system.
2. To analyse the role of Indian High Courts in interpreting and shaping the use of forensic evidence in legal proceedings.

Statement of the Problem

The Indian judicial system, while constitutionally mandated to ensure justice, faces critical challenges in effectively integrating forensic science into its evidentiary framework. Although forensic evidence has the potential to make criminal trials more accurate and efficient, systemic limitations including inadequate infrastructure, shortage of skilled experts, delayed forensic reports, and lack of standardization hamper its effective utilization. At the judicial level, High Courts often encounter difficulties in evaluating conflicting expert testimonies and interpreting complex scientific data within the legal framework of the Indian Evidence Act,

1872. Moreover, the absence of consistent precedents and training among judicial officers contributes to uneven application of forensic principles. These gaps result in prolonged trials, wrongful convictions, or acquittals, undermining public trust in the justice system.

Methodology

The interview plan was used to obtain data and data from the institution's clients or borrowers. The investigator performed the interviews also. The interviewing plans in their preliminary forms were pre-tested three times each in their chosen fields and perfected after integrating all the necessary changes in the material and its structure as explained by the pre-tests. It was prepared in English, but the queries in the press conference timetable were interpreted orally into Tamil to enable the participants to understand them. The audition timetable included questions about housing loans, loan penalties, loan collection, facilities, and particular elements, etc. The series of interviews, tailored for housing finance institution lenders, took an average of about 20 minutes per interview. The survey lasted from April 2024 to December 2024 for a total of nine months. All the participants gave the information they needed and they were very communicative.

Tools of Analysis

Reliability Test

The reliability of a measure indicates the extent to which it is without bias (error-free), and hence ensures consistent measurement across time and across the various items in the instrument. The measurement of validation involves computing coefficient alpha for each set of measures to test reliability. Cronbach's alpha is used to test the reliability of a multiitem scale. Cronbach's alpha coefficient measured the accuracy of the scales used in this analysis.

The alpha performance factor of Cronbach usually varies from 0 to 1. There is no lower limit to the coefficient, however. The lower the alpha coefficient of Cronbach is to 1.0 the higher the internal accuracy of the scale products. The alpha coefficient values were above the 0.75 minimum levels. It gave good estimates of the quality of coherence. All the measures in the survey exceeded this minimum threshold. The accepted cut- off point is 0.8. Since all the values lie above this cutoff point, this questionnaire is reliable. In sum, the substantiation suggests that the scale has adequate measurement properties.

The equation is the following:

$$\alpha = \frac{kr}{1 + (k - 1) r}$$

K – is the number of objects

R = is the average pair of related items.

As the number of items in the (k) scale increases, the alpha value increases.

The corresponding alpha will also be larger if the inter-correlation between items is large.

Table 1 Reliability Test

Variables	Cronbach's alpha
Attitude	0.96
Strengthen Factors	0.96
Level of Satisfaction	0.97

Source: Calculated value

Using various statistical methods, the data were analyzed. For this study, proportion evaluation, chi-square test, ANOVA, multiple regression, Garret ranking process and assessment of clusters were used.

't' test

't' test was used in this chapter to test whether there is any significant difference between income, savings and indebtedness of the sample respondents in the study area.

The 't' test on paired observations is defined as

$$t = \frac{\bar{d}}{S} \sqrt{n}$$

Where,

d = The 'mean' of the differences

S = The standard deviation of the differences

n = The number of sample respondents

The value of S was calculated by using the following formula:

$$S = \sqrt{\frac{\sum d^2 - n(\bar{d})^2}{n-1}}$$

n - 1 = Degrees of freedom

Chi-Square test (χ^2)

In order to examine the relationship between the income generation and the size of the loan amount availed by the sample respondents, the Chi-square test was used. The value of chi-square was calculated by using the following formula

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

where

O = Observed Frequency

E = Expected Frequency

E = $\frac{\text{Row Total} \times \text{Column Total}}{\text{Total no. of observation}}$

Degrees of freedom = (r - 1) (c - 1)

r = Number of rows

c = Number of columns

Multiple Regression Analysis

In order to identify and to compare the factors influencing lending loans of housing financial institutions, the following form of Multiple Linear Regression Model was used.

$$Y = \alpha_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + U$$

Where,

Y = borrowers satisfaction

X1 = Banking Sector

X2 = Public sector

X3 = Private sector

U = Disturbance term.

Garrett's Ranking Test

The Garrett's ranking technique is used to analyse the strengthen factors for securing awareness of borrowers in the study areas. The respondents are asked to rank the constraints encountered by them as per priority. The order of merit, thus given by the respondents are converted into ranks by adopting the following formula:

$$\text{Percent position} = 100 (R_{ij} - 0.5 / N_i)$$

Where,

The percentage position of each rank thus obtained is converted into scores, by referring to the table of Garrett. Then all respondents of score added together and divided by the total number of respondents for whom scores are added. These mean scores for all the factors are arranged in a descending order. Ranks are allotted and the most limiting factor is identified.

Correlation Co-Efficient

$$Z = \frac{r}{\sqrt{(1 - r^2)}} \times n$$

Where,

r = correlation co-efficient

n = number of pairs of observation.

Sex Wise Classification of Respondents

Sex is an important factor to study the socio economic conditions of the respondents. The sex wise distribution of the sample respondents in the study area is presented in Table 2

Table 2: Gender Wise Classification of the Sample Respondents

S.No.	Gender	Number of Respondents	Percentage
1.	Male	89	59.33
2.	Female	61	40.67
3.	Third Gender	-	-
	Total	150	100

Source: Primary data

It is understood from the table 5.1 that, 89 (59.33 percent) respondents are found to be Male and the remaining 61 respondents (40.67 per cent) are female in the study area.

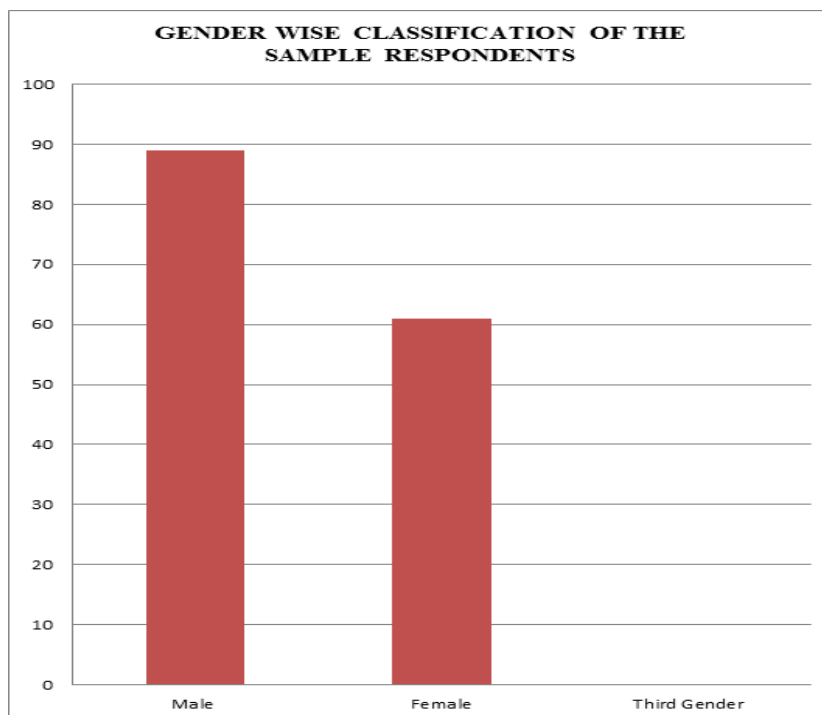


Figure 1

Distribution of Respondents According To Age

In the socio economic characteristics age is regarded as an important factor. The distribution of the respondents according to their age is presented in Table 3.

Table 3: Age Wise Distribution of the Sample Respondents

S.No.	Age	Number of Respondents	Percentage
1.	25 to 35	65	43.33
2.	36 to 45	54	36.00
3.	46 to 55	19	12.67
4.	56 and above	12	8.00
	Total	150	100

Source: Primary data

From the above table 3 it is observed that 65(43.33 percent) respondents are in the age group of below 25 to 35 years, 54 (36.00 percent) respondents are in the age group of 36 to 45 years, 19 (12.67 percent) respondents are in the age group between 46 to 55 years, and 12 (8.00 percent) respondents are 56 and above years aged respondents in the study area.

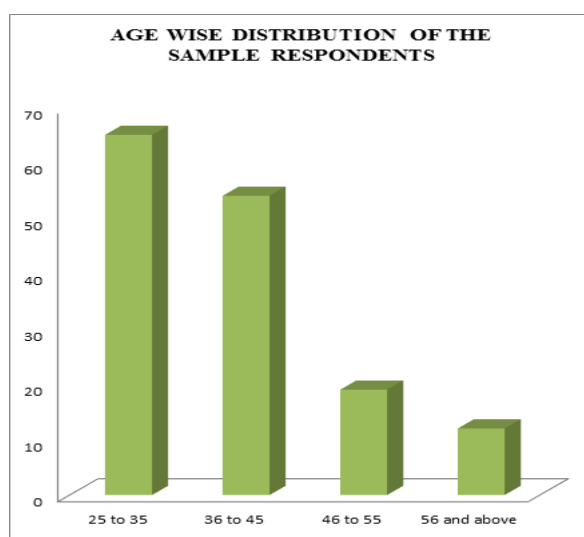


Figure 2

Distribution of Respondents According to Forensic Evidence Past Two Decades

In the socio characteristics forensic evidence past two decades is regarded as an important Collection of forensic evidence over the past two decades is presented in Table 4.

Table 4: Past Two Decades Wise Distribution of the Sample Respondents

S. No.	Past two Decades	Number of Respondents	Percentage
1.	Increased significantly	62	41.33
2.	Remained relatively constant	42	28.00
3.	Decreased	29	19.33
4.	Unsure	17	11.33
	Total	150	100

Source: Primary data

It is observed that 16 (41.33percent) respondents are in Increased significantly, 42 (28.00 percent) respondents are in the Remained relatively constant, 29 (19.33 percent) respondents are in the Decreased, and 17 (11.33 percent) respondents are in unsure, respondents are others in forensic evidence used past two decades respondents in the study area.

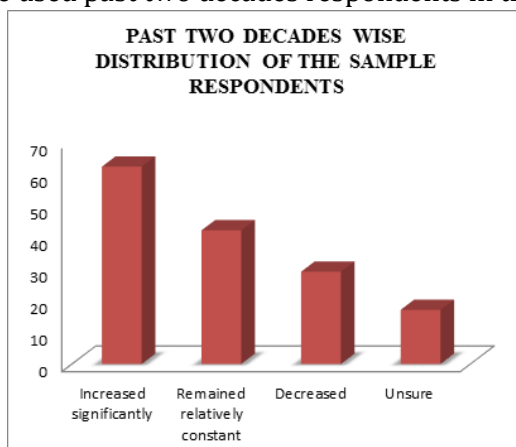


Figure 3

Distribution of Respondents According to Forensic in Technological Advancements Cases

In the socio characteristics forensic in technological advancements related cases is regarded as an important forensic in technological advancements is presented in Table 5.

**Table 5: Forensic in Technological Advancements Cases Wise
 Distribution of the Sample Respondents**

S.No.	Forensic in technological advancements related cases	Number of Respondents	Percentage
1.	Positive impact	69	46.00
2.	Neutral impact	55	36.67
3.	Negative impact	14	9.33
4.	Unsure	12	8.00
	Total	150	100.00

Source: Primary data

It is observed that 69 (46 percent) respondents are in Positive impact Forensic in technological advancements, 55 (36.67 percent) respondents are in Neutral impact Forensic in technological advancements, 14 (9.33 percent) respondents are in Negative impact Forensic in technological advancements, and 12 (8.00 percent) respondents are in unsure Forensic in technological advancements related cases of respondents in the study area.

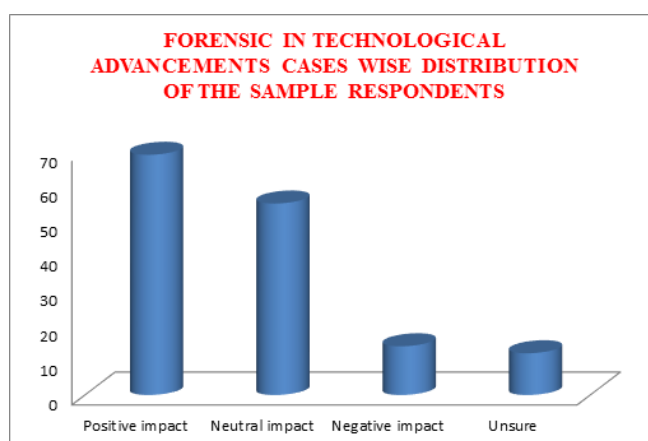


Figure 4

Conclusion

The evolution of forensic science in the Indian judiciary marks a significant step toward evidence-based justice. High Courts have played an instrumental role in defining the scope, admissibility, and reliability of forensic evidence through their judicial interpretations and precedents. However, the journey toward full integration of forensic science into the legal system remains incomplete due to infrastructural deficiencies, procedural irregularities, and limited scientific literacy among legal professionals. Strengthening the forensic framework requires multi-level reforms including modernization of forensic laboratories, continuous training for judges and investigators, standardization of forensic procedures, and establishment of specialized forensic courts or units within the judiciary. Such measures will ensure that scientific evidence is not merely supportive but central to justice delivery, thereby enhancing accuracy, transparency, and public confidence in India's judicial system.

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FORENSIC SCIENCE AND THE DIGITAL TRANSFORMATION OF JUSTICE: EVALUATING INDIA'S VIRTUAL COURT MODEL IN COMPARISON WITH GLOBAL PRACTICES

R. Vimala

*Assistant Professor, VELS School of Law
VELS Institute of Science and Technology and Advanced Studies, VISTAS, Chennai*

Concept of Virtual Court System

The global catastrophe has had a huge impact on India as well as on the Indian judiciary. Throughout India, all the courts have been suspended for more than two weeks, leading to a pause throughout trial proceedings. Access to justice is a constitutional right 1 in order to ensure that there is no infringement of human rights and to optimize social isolation, the judiciary has turned to virtual justice. India's first virtual court was launched in Faridabad in 2019. Until then, relatively little attempt has been made to convert traditional courts into virtual courts. On 26 November 2019, the President of India unveiled an application called 'Supreme Court Vidhik Anuvaad Software,' which is capable of translating English judicial records into nine vernacular languages and vice versa. The Official Multilingual Mobile Application of the Supreme Court of India will also be released to provide accurate real-time access to case status, review screen, judgements to lawyers and litigants, daily orders, etc. Much technical advancement has been made in the judiciary, such as capturing testimony by video conferencing 2 , but a significant change to virtual courts has arisen as a result of the current Covid-19 pandemic. Before delving into the key findings and recommendations of the PSC, one question considered by it is of immense importance. Is a court a place or a service? If a court is indeed a service, then it is simpler for it to function online. On the other hand, if a court is a place, more than a service, then that may bring nuances and complications of its own as far as the digitisation of courtrooms is concerned.

Definition

There are multiple definitions of a 'court.' But here is what the committee said: "As far as India is concerned, neither the Civil and Criminal Procedural Codes nor the General Clauses Act embodies the definition of the term 'Court'. However, as per the legal glossary of the Legislative Department, Ministry of Law and Justice, 'Court' is a place where justice is administered. From the above, it is clear that although the definition of Court varies across jurisdictions, they all seem to have two elements in common-that a Court is a Government entity comprising one or more judges and that Court deals with the administration of Justice thus making it clear that Court is more of a Service than a place."

Concepts

The report draws a distinction between virtual courts and online courts, two terms often used interchangeably. It states: "In Virtual Courts, Plaint and other documents such as vakalatnama, written submissions are filed electronically; Court fees are paid electronically; Evidence is submitted digitally; arguments are heard over videoconferencing; witnesses give

their testimony remotely over videoconferencing and Judge decides the case online either presiding from the physical Courtroom or from some other place. A copy of the Order or the Judgement is made available on the website of the Court or through some electronic means.” In comparison, online courts have asynchronous hearings, while in virtual courts the interactions are synchronous. What that means is that while in virtual courts the advocates, judges, witnesses and litigants are all required to be present or available at the time of the hearing, in online courts this isn’t the case. In such a system of hearing, all the participants are not needed to be present together or simultaneously for the hearing to proceed and the evidence can be presented to judges without the need for their synchronous availability. At the risk of eliminating nuances, while virtual courts are basically mechanisms of conducting a court over videoconferencing, online courts are a relatively more advanced means of justice delivery. As far as the legal sanctity of virtual courts or videoconferencing is concerned – it was provided for by the Supreme Court in its April 6, 2020 order invoking article 142 of the Constitution. This order covered all the High Courts, and they were in fact endowed with the discretion of adopting such a technology basis to their own needs customisation in view of the evolving pandemic scenario in different states. Model rules were drafted and circulated as well amongst all the High Courts while the District or lower courts were to adopt rules as prescribed by their parent High Courts.

Distribution of Respondents according to forensic science Shaped court cases

In the socio characteristics forensic science shaped court cases is regarded as an important forensic science shaped court cases is presented in Table 1

Table 1: Forensic Science Shaped Court Cases Wise Distribution of the Sample Respondents

S.No.	Shaped court	Number of Respondents	Percentage
1.	Yes	124	82.67
2.	No	51	34.00
	Total	150	100

Source: Primary data

It is observed that 124 (82.67 percent) respondents are in yes Forensic in science shaped courts cases, and 51 (34.00 percent) respondents are in the No in the Forensic in science shaped courts cases of respondents in the study area.

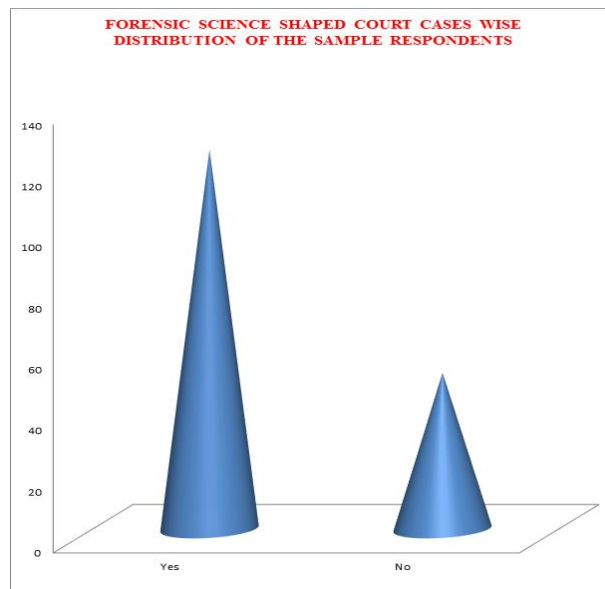


Figure 1

In the socio characteristics forensic science court proceedings is regarded as important forensic evidence among judicial officers is presented in Table 2.

**Table 2: Forensic Evidence among Court Proceedings
Cases Wise Distribution of the Sample Respondents**

S.No.	Court proceedings	Number of Respondents	Percentage
1.	Yes	137	91.33
2.	No	13	8.67
	Total	150	100

Source: Primary data

It is observed that 137 (91.33 percent) respondents are in yes Forensic evidence among court proceedings, and 13 (8.67 percent) respondents are in the No in the Forensic evidence among court proceedings in the study area.

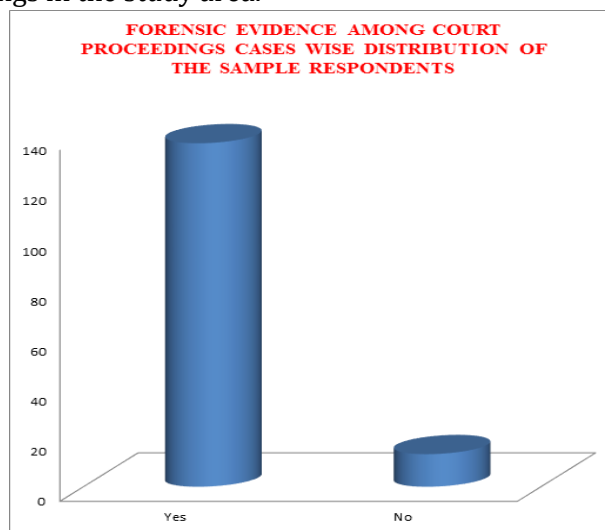


Figure 2

Distribution of Respondents According to Forensic Evidence among Standardization and Credibility

In the socio characteristics forensic science Standardization and credibility is regarded as important forensic evidence among forensic experts is presented in Table 3.

**Table 3: Forensic Evidence among Standardization and Credibility Cases Wise
 Distribution of the Sample Respondents**

S.No.	Standardization and credibility	Number of Respondents	Percentage
1.	Yes	126	84.00
2.	No	24	16.00
	Total	150	100

Source: Primary data

It is observed that 126 (84.00 percent) respondents are in yes Forensic evidence among standardization and credibility, and 24 (16.00 percent) respondents are in the No in the Forensic evidence among standardization and credibility in the study area.

**FORENSIC EVIDENCE AMONG
 STANDARDIZATION AND
 CREDIBILITY CASES WISE
 DISTRIBUTION OF THE SAMPLE
 RESPONDENTS**

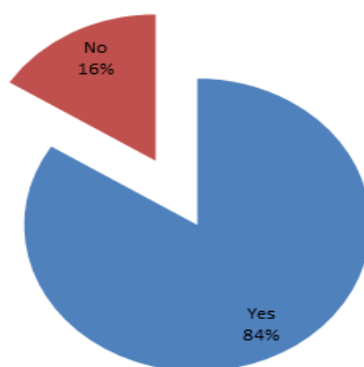


Figure 3

Distribution of Respondents according to forensic evidence among instrumental errors

In the socio characteristics forensic science instrumental errors is regarded as important forensic evidence among forensic experts is presented in Table 4.

**Table 4: Forensic Evidence among Instrumental Errors Cases Wise
 Distribution of the Sample Respondents**

S.No.	Instrumental errors	Number of Respondents	Percentage
1.	Yes	131	87.33
2.	No	19	12.67
	Total	150	100

Source: Primary data

It is observed that 131 (87.33 percent) respondents are in yes Forensic evidence among instrumental errors, and 19 (12.67 percent) respondents are in the No in the Forensic evidence among instrumental errors in the study area.

Lessons Learned from Other Jurisdictions

It is important to note that the concept of virtual courts is still developing. While the COVID-19 Pandemic continues to prevent physical courts, the judicial system will be compelled to continue advancing Virtual Courts and it could help ushering in a new era of access to justice in India. The procedures which have been limited to exceptional and rare cases could be more frequently even after the physical courts begin functioning again to facilitate faster disposal and greater access to justice. However, there are certain challenges in the system of virtual courts that needs to be addressed immediately and conclusively.

The primary challenge to the principle of virtual courts is a distinct lack of legislation to govern functioning of the courts online. The different courts are functioning based on separate guidelines that have been made operational by the Supreme Court for its functioning and High Courts within their jurisdiction. While these guidelines solve the problem temporarily, there is a need for either appropriate amendments to the existing legal framework governing the judiciary in India, or appropriate legislation to govern this new system of functioning of courts through video conferencing. This would allow a streamlined procedure and a uniform system to function pan-India, thereby increasing ease of access to justice and reducing ambiguity and confusion. The lack of uniformity in something as important as the video conferencing platform used by different courts is appalling. It must be noted that while the different video conferencing systems operate in a similar manner and have similar user interface, they may create burden on those advocates and parties that are not technologically gifted. Another major challenge for the justice system of India is in developing a system of virtual courts that lacks ambiguity. Vagueness leads to misunderstanding and results in impeding the access to justice. The current portals for different courts in India are in need for a dire overhaul. The overhaul needs to be more than an aesthetic improvement since the system requires a ground-up rebuilds to suit the needs of the new reality. The present system leaves much to the imagination and there is no clarity. Lawyers and advocates that have been practicing for decades have faced difficulty in gaining access to these portals due to the improper maintenance of database. The system of ambiguity, bugs and scabrous user interface must be improved. The authorities behind this overhaul and development must also realize that internet is the information super-highway. Therefore, the new portal must fit into the theme of this super-highway, seamless, fast, and unblemished rather than acting like a Gurugram road in the rains, full of potholes and clogs.

Conclusion

The uniformity across the different forums will have multiple advantages. The applicability of the same law across the country will ensure that a uniform platform can be created. Uniformity will ensure that the technologically challenged members of the Bar and the Bench will be able to adapt to the changing justice system with greater ease since they will no longer need to learn different platforms that differ in use and access. In Canada, videoconferencing technology has been used to receive witness testimony in civil trials for over a decade¹⁶.

Further, a simplified user interface will help the parties access the system to get orders and court notifications without the need to contact the counsel. While the court orders and status can still be checked by anyone with the key information, the platform is not identical for different courts, thus making it difficult to find the relevant information. The unpredictability of the Pandemic and ever-deteriorating conditions can be used to evaluate and predict that the functioning of physical courts is not likely, at least for the next few months. Even after the situation begins to normalize, the Courts will try to function virtually, as a preventative measure, for as long as practicable and feasible. In the few months that the judiciary is predicted to function virtually, it is pertinent that a more permanent solution is evolved. Therefore, virtual courts with electronic filing and VC (video conferencing) functions will have to continue to exist with physical courts. Therefore, it is recommended that a steering committee be established to assist the judiciary in determining sustainable solutions to its immediate and long-term needs. Such committees must consider the adoption of strategies, legislative amendments, technical infrastructure, etc. as a whole, which is essential to make judicial access feasible and efficient.¹⁷ Another recurring theme in the analysis pertains to the technological literacy of the members of the Bar and Bench. If the issue of technological literacy is solved, a lot of the other issues and concerns will be addressed as well. As stated above, the uniformity of platform will help the technologically challenged members of the legal fraternity. Further, training sessions to introduce and familiarize the advocates and judges with the new system will help in improving their technological competence and comfort in the use of the tools offered through the virtual court and therefore, relieve the apprehensions and distrust of the members of the legal fraternity on both sides of the Court. As the lawyers and judges become familiar with the use of online tools for traditionally offline procedures, the burden on the justice system will reduce, the judicial process and dispensation of justice will become faster and efficient. Significant investment in infrastructure is essential to ensure that virtual courts have the necessary foundation to be operational in practice. In the long term, virtual courts can be made a rule by introduction in a phased manner like in UK, rather than a direct shift.

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MEASURING THE IMPACT OF DIGITAL ENGAGEMENT METRICS ON ONLINE PURCHASE INTENTIONS

Mr. M.M. Sinesh

*Ph.D Scholar, Department of Economics
VELS Institute of Science, Technology and Advanced Studies, Chennai*

Dr. R. Premalatha

*Assistant Professor, Department of Economics
VELS Institute of Science, Technology and Advanced Studies, Chennai*

Background of the Study

The rapid expansion of e-commerce has revolutionized consumer behavior, transforming traditional shopping methods into dynamic, digital purchasing experiences. The increasing adoption of online shopping platforms, facilitated by technological advancements, digital payment systems, and personalized marketing strategies, has led to significant changes in how consumers make purchase decisions. Virtual buyers are influenced by multiple factors, including convenience, product variety, price comparisons, peer reviews, and targeted advertisements. The study of consumer behavior metrics in virtual buying decisions is crucial for understanding the patterns, preferences, and psychological triggers that drive online shopping.

Consumer behavior in the digital age is shaped by a multitude of factors, including socio-economic conditions, technological familiarity, cultural influences, and marketing strategies. Unlike conventional retail shopping, where physical interaction with products and sales personnel can influence purchasing choices, virtual shopping relies heavily on digital cues such as product descriptions, customer reviews, and multimedia content. The ability to access vast information about products and services at the click of a button has empowered consumers, making them more informed and discerning in their choices. This shift has also prompted businesses to refine their strategies by leveraging data analytics, artificial intelligence (AI), and machine learning to predict consumer preferences and optimize marketing efforts.

One of the fundamental aspects of studying consumer behavior metrics is to understand the psychological and behavioral responses of consumers in virtual environments. The digital marketplace is characterized by vast amounts of consumer data that can be analyzed to detect patterns in buying behavior, including frequency of purchases, spending habits, brand loyalty, and decision-making speed. Metrics such as click-through rates, browsing history, cart abandonment rates, and engagement with promotional content provide valuable insights into how consumers interact with online platforms. These metrics help businesses tailor their marketing strategies to meet consumer expectations, enhance user experience, and improve conversion rates. Demographic factors such as age, gender, income levels, educational background, and geographical location play a pivotal role in shaping online consumer behavior. Younger generations, particularly millennials and Generation Z, are more inclined towards online shopping due to their familiarity with digital technologies and preference for

convenience. On the other hand, older consumers may exhibit cautious behavior due to concerns regarding online security, trust issues, and lack of familiarity with digital payment methods. By analyzing consumer behavior across different demographics, businesses can develop targeted marketing campaigns that cater to the unique preferences and concerns of specific consumer groups.

The influence of social media and digital influencers has also become a significant determinant in virtual buyer decisions. Social media platforms such as Instagram, Facebook, Twitter, and TikTok serve as powerful tools for brand promotion, product discovery, and peer recommendations. Consumers are increasingly relying on influencer reviews, user-generated content, and online communities to make informed purchase decisions. The credibility and authenticity of influencers play a crucial role in shaping consumer trust and purchase intent. This trend has led to the rise of influencer marketing as a key component of digital advertising strategies, where businesses collaborate with social media personalities to promote their products and engage with potential customers.

Another crucial aspect of consumer behavior metrics in virtual buying decisions is the impact of personalization and recommendation algorithms. E-commerce platforms utilize sophisticated algorithms to analyze consumer preferences, past purchases, and browsing history to provide personalized product recommendations. This level of customization enhances the shopping experience by offering relevant suggestions, increasing the likelihood of purchase. Personalization not only improves customer satisfaction but also fosters brand loyalty and repeat purchases. However, concerns regarding data privacy and security remain significant challenges, as consumers are increasingly aware of how their data is being collected and utilized by online platforms.

The COVID-19 pandemic further accelerated the shift towards online shopping, as consumers sought safer and more convenient alternatives to in-store purchases. Lockdowns, social distancing measures, and changing consumer habits led to a surge in e-commerce transactions across various sectors, including groceries, electronics, apparel, and healthcare products. Businesses that adapted to this digital transformation by enhancing their online presence, improving logistics, and offering flexible payment options witnessed significant growth. The pandemic highlighted the resilience of digital commerce and reinforced the need for businesses to prioritize their online strategies to remain competitive in an increasingly digital world.

While the advantages of virtual shopping are evident, challenges such as trust issues, fraudulent activities, product misrepresentation, and logistical inefficiencies continue to affect consumer confidence. Online reviews, ratings, and return policies play a crucial role in mitigating these concerns, influencing consumer decisions, and enhancing brand credibility. Businesses that prioritize transparency, customer service, and secure payment methods can build long-term trust with their customers and establish a loyal consumer base. Consumer behavior metrics are essential for understanding impulse buying tendencies and decision-making processes in digital environments. Unlike traditional shopping, where external factors such as store ambiance and salesperson interactions influence impulsive purchases, virtual shopping relies on psychological triggers such as limited-time offers, flash sales, and scarcity tactics. Understanding how consumers respond to these strategies allows businesses to

optimize their pricing models, promotional techniques, and website design to maximize conversions.

The integration of augmented reality (AR) and virtual reality (VR) in online shopping has further enhanced the consumer experience by providing immersive product interactions. AR applications allow consumers to visualize products in real-world settings, such as trying on clothing virtually or placing furniture in their homes before making a purchase. This technological advancement bridges the gap between physical and digital shopping experiences, reducing uncertainty and increasing purchase confidence. As AR and VR continue to evolve, their adoption in e-commerce is expected to reshape consumer behavior and redefine the online shopping experience.

The role of digital payment methods and financial technologies (fintech) in shaping consumer behavior cannot be overlooked. The widespread adoption of digital wallets, buy-now-pay-later (BNPL) schemes, and cryptocurrency transactions has provided consumers with flexible payment options, enhancing convenience and accessibility. Businesses that offer multiple payment solutions cater to a broader audience and improve customer retention by addressing financial constraints and preferences. Consumer behavior metrics also extend to customer retention strategies, as businesses aim to sustain long-term relationships with their customers. Loyalty programs, personalized discounts, and subscription models have gained popularity as effective retention techniques.

Objectives of the Study

The primary objectives of this investigation are as follows:

1. To study the demographic information of the sample respondents in the study area.
2. To analyze the E-Commerce Metrics, and Virtual Buyer Decision of the sample respondents in the area.
3. To examine the Perceived Ease of use and Perceived Risk of the sample respondents in the area.

Gender Wise Classification of Respondents

Gender is an important factor to study the socio economic conditions of the respondents. The sex wise distribution of the sample respondents in the study area is presented in Table 1.

Table 1 Gender Wise Classification of the Sample Respondents

S.No.	Gender	Number of Respondents	Percentage
1.	Male	164	52.90
2.	Female	146	47.10
	Total	310	100

Source: Primary data

It is understood from the table 4.1 that, 164 (52.90 percent) respondents are found to be Male and the remaining 146 respondents (47.10 per cent) are female in the study area.

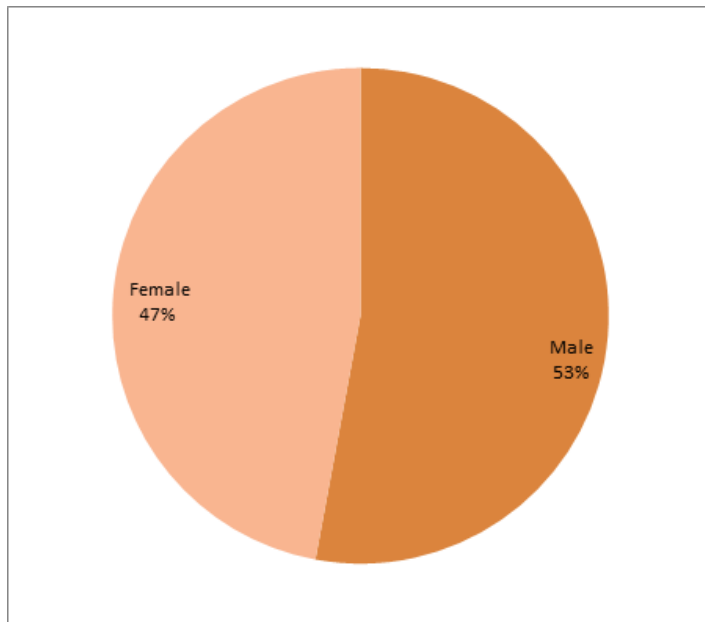


Figure 1: Gender Wise Classification of the Sample Respondents

Distribution of Respondents According To Age

In the socio economic characteristics age is regarded as an important factor. The distribution of the respondents according to their age is presented in Table 2.

Table 2 Age Wise Distribution of the Sample Respondents

S.No.	Age	Number of Respondents	Percentage
1.	18-20 years	94	30.32
2.	21-23 years	82	26.45
3.	24-26 years	69	22.26
4.	27-30 years	65	20.97
	Total	310	100

Source: Primary data

The age-wise distribution of the sample respondents reveals significant insights into virtual buyer decision-making patterns. From Table 4.2, it is observed that a considerable proportion of respondents (30.32 per cent) fall under the age group of below 18–20 years, indicating a strong presence of younger digital consumers actively engaging in virtual purchases. The next prominent group is the 21–23 years category (26.45per cent), followed by 24–26 years (22.26per cent) and 27–30 years (20.97per cent). This distribution signifies that the majority of virtual buyers are within the age bracket of 18 to 30 years, Consumer behavior is shaped by convenience, peer influence, and brand visibility. This insight helps marketers tailor strategies that align with the digital preferences and decision-making patterns of younger consumers.

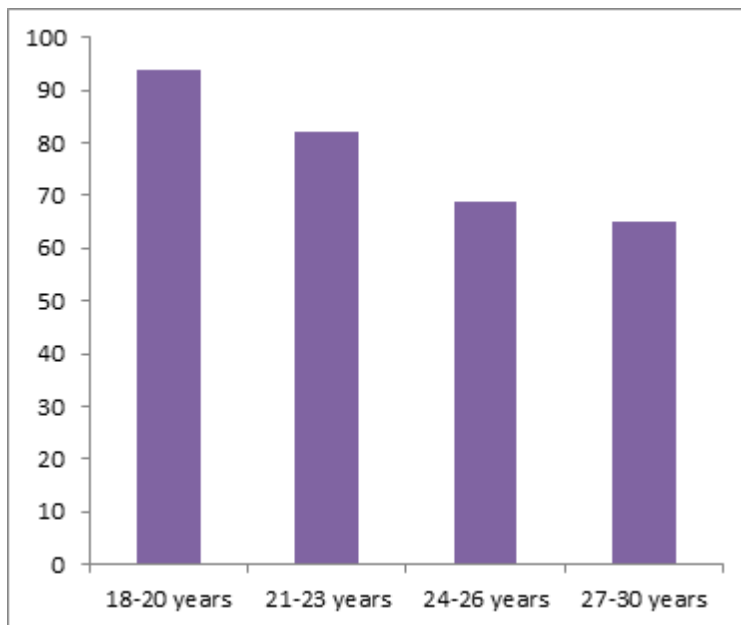


Figure 2 Age Wise Distribution of the Sample Respondents

Religion wise Classification of The Sample Respondents

Religion plays a vital role in shaping both the family and economic life of individuals. Since religion significantly influences the social life of people, it is essential to examine the religious background of the respondents. Table 3 presents the details of the religious affiliation of the sample respondents

Table 3 Religion Wise Classifications

S.No.	Religion	Number of Respondents	Percentage
1.	Hindu	176	56.77
2.	Muslim	39	12.58
3.	Christian	95	30.65
	Total	310	100

Source: Survey Data

It is noted from Table 4.3 that out of 310 respondents 174 (58 per cent) sample respondents belonging to the Hindu religion, 29 percent belonging to Christian religions and only 13 percent belongs to Muslim. The religious background of consumers plays a crucial role in shaping their purchasing behaviour, cultural preferences, and ethical considerations in virtual buying decisions. The analysis of Table 3, which presents the religion-wise classification of respondents, helps in understanding the diversity of consumer perspectives. Different religious groups may have varying attitudes toward online shopping, influenced by cultural beliefs, traditional values, and ethical consumption patterns. The distribution of respondents across various religions highlights the multicultural nature of the study population.

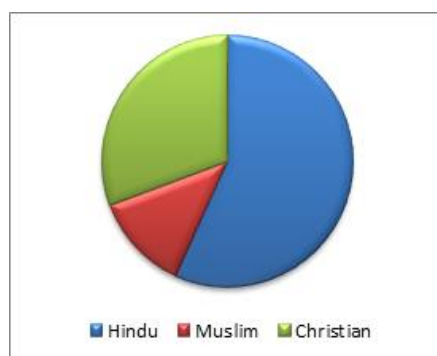


Figure 3 Religion Wise Classifications

Qualification wise Classification of The Sample Respondents

Qualification plays a vital role in the family and economic life of the people. Since the qualification have an impact on social life of the people, it is necessary to study the background of the respondents. Table 4 shows the details of the education levels of sample respondents.

Table 4: Qualification Wise Classifications

S.No.	Qualification	Number of Respondents	Percentage
1.	HSC	24	7.74
2.	Diploma	43	13.90
3.	UG	106	34.20
4.	PG	74	23.90
5.	Professionals	32	10.30
6.	Others	31	10.00
	Total	310	100

Source: Survey Data

It is noted from Table 4.4 that out of 310 respondents 24 (7.74 per cent) sample respondents belonging to the HSC, 43 (13.90 per cent) sample respondents belonging to the diploma, 106 (23.90 per cent) sample respondents belonging to the degree level, 74 (23.90 per cent) sample respondents belonging to the postgraduate degree level, 32 (10.30 per cent) sample respondents belonging to the professional degree level, and 31 (10.00 per cent) sample respondents belonging to the others.

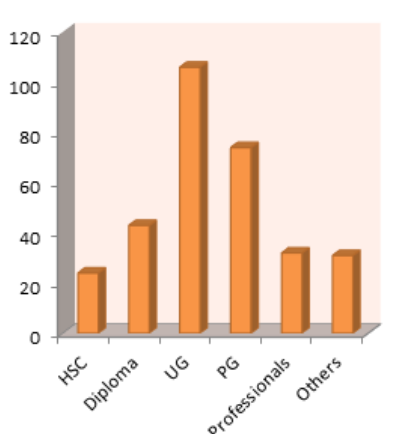


Figure 4 Qualification Wise Classifications

Family members wise Classification of the Sample Respondents

Family members play a vital role in the family and economic life of the people. Since the family members have an impact on social life of the people, it is necessary to study the background of the respondents.

Table 5 Family Members Wise Classification

S.No.	Family members	Number of Respondents	Percentage
1.	up to 2	87	28.10
2.	2 to 4	121	39.00
3.	4 to 6	28	9.03
4.	Above 6	74	23.90
	Total	310	100

Source: Survey Data

It is noted from Table 5 that out of 310 respondents 87 (28.10 per cent) sample respondents belonging to the up to 2, 121 (39.00 per cent) sample respondents belonging to the upto 2 to 4, 28 (9.03 per cent) sample respondents belonging to the 4 to 6 members, and 74 (23.90 per cent) sample respondents belonging to the above 6 members in the study area. The number of family members in a household plays a significant role in influencing consumer behavior, particularly in virtual buying decisions. The classification of respondents based on family size provides insights into purchasing patterns, decision-making authority, and financial considerations. Larger families often have diverse needs, leading to frequent online purchases, while smaller families may exhibit selective and personalized buying behavior. The data from the study indicates that respondents from larger families may prioritize affordability, bulk purchases, and essential goods, whereas individuals from nuclear families may focus more on convenience, premium brands, and personalized shopping experiences. Additionally, decision-making in larger families is often influenced by multiple members, whereas in smaller families, individual preferences play a dominant role.

Opinion about Feel E-Commerce Platform Provide a Variety of Secure and Convenient payment options

The opinion of the sample respondents is given in table 6 shows the classification of sample respondents based on their righteousness.

Table 6 Feel E-Commerce Platform Provide a Variety of Secure and Convenient Payment Options of the Sample Respondents

Opinion	No. of respondents	Percentage
Strongly Agree	133	42.90
Agree	108	34.84
Neutral	37	11.94
Disagree	19	6.13
Strongly disagree	13	4.19
Total	310	100.00

Source: Survey Data

Note: Figures in brackets are percentages of the total.

It is understood that, 133 (42.92 percent) respondents are found to be strongly agree, 108 (34.84 percent) respondents are found to be agree, 37 (11.94 percent) respondents are found to be neutral, 19 (6.13 percent) respondents are found to be disagree, and the remaining 13 respondents (4.19 per cent) are strongly disagree in the study area. The study reveals that a majority of the sample respondents perceive e-commerce platforms as offering a wide range of secure and convenient payment options, which positively influences their virtual buying decisions. Respondents appreciated the availability of multiple payment methods such as credit/debit cards, UPI, mobile wallets, and cash on delivery. This flexibility enhances consumer trust and reduces transaction-related anxiety, especially in high-value purchases. The presence of secure payment gateways and visible encryption protocols further strengthens users' confidence in sharing financial information online and that offering diversified, user-friendly, and secure payment choices is a critical consumer behavior metric that boosts purchase conversion rates. Consumers are more likely to complete transactions when they feel their financial data is protected and when they can choose a payment method aligned with their convenience.

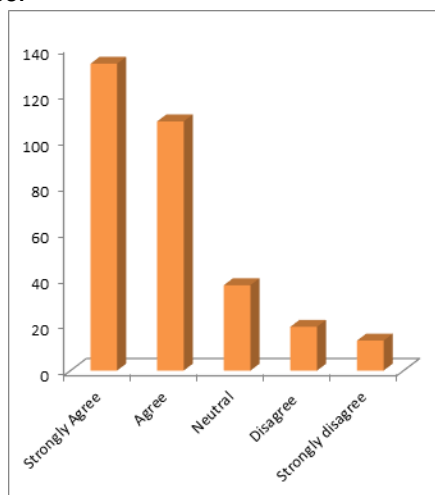


Figure 6: Feel E-Commerce Platform Provide a Variety of Secure AND Convenient Payment Options of the Sample Respondents

Opinion about Feel Customer Support Service is Responsive and Helpful

The opinion of the sample respondents is given in table 7 shows the classification of sample respondents based on their righteousness.

Table 7: Feel Customer Support Service is Responsive and Helpful of the Sample Respondents

Opinion	No. of respondents	Percentage
Strongly Agree	136	43.87
Agree	112	36.13
Neutral	31	10.00
Disagree	20	6.45
Strongly disagree	11	3.55
Total	310	100.00

Source: Survey Data

Note: Figures in brackets are percentages of the total.

It is understood that, 136 (43.87 percent) respondents are found to be strongly agree, 112 (36.13 percent) respondents are found to be agree, 31 (10.00 percent) respondents are found to be neutral, 20 (6.45 percent) respondents are found to be disagree, and the remaining 11 respondents (3.55 per cent) are strongly disagree in the study area. The study indicates that a substantial portion of the sample respondents feel that customer support services offered by e-commerce platforms are responsive and helpful. This perception significantly influences virtual buyer decisions, especially in scenarios involving order issues, returns, or queries regarding products. Responsive customer service is seen as a critical consumer behavior metric that enhances buyer trust and satisfaction timely assistance, availability of multiple support channels (chat, email, phone), and resolution efficiency contribute to a positive online shopping experience. Respondents emphasized the importance of humanized interactions and quick problem-solving as key expectations. Platforms that meet these expectations are more likely to retain customers and receive positive reviews and referrals.

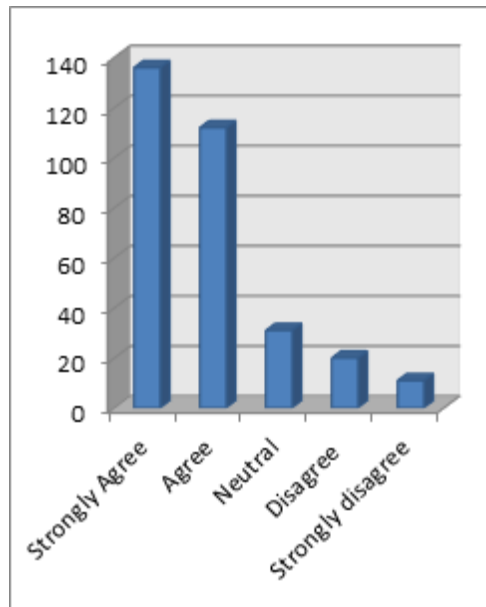


Figure 7 Feel Customer Support Service is Responsive and Helpful of the Sample Respondents

Opinion about Delivery Process is Efficient, and Packages Arrive on Time

The opinion of the sample respondents is given in table 8 shows the classification of sample respondents based on their righteousness.

Table 8: Delivery Process is Efficient, and Packages Arrive on Time of the Sample Respondents

Opinion	No. of respondents	Percentage
Strongly Agree	146	47.10
Agree	111	35.81
Neutral	27	8.71

Disagree	17	5.48
Strongly disagree	9	2.90
Total	310	100.00

Source: Survey Data

Note: Figures in brackets are percentages of the total.

It is understood that, 146 (47.10 percent) respondents are found to be strongly agree, 111 (35.81 percent) respondents are found to be agree, 27 (8.71 percent) respondents are found to be neutral, 17 (5.48 percent) respondents are found to be disagree, and the remaining 9 respondents (2.90 per cent) are strongly disagree in the study area. The study suggests that a majority of the sample respondents perceive the delivery process on e-commerce platforms as efficient, with packages arriving on time. This factor significantly influences virtual buyer decisions, as timely delivery is a key determinant of customer satisfaction and repeat purchases. Respondents indicated that real-time tracking, accurate delivery estimates, and proper packaging contribute to a positive post-purchase experience. The study effectiveness of last-mile logistics plays a crucial role in shaping consumer perceptions of reliability and service quality. Delays or delivery issues often lead to dissatisfaction, affecting platform credibility. Interpretation of the results shows that efficient delivery services enhance consumer confidence and are directly linked to higher customer retention rates.

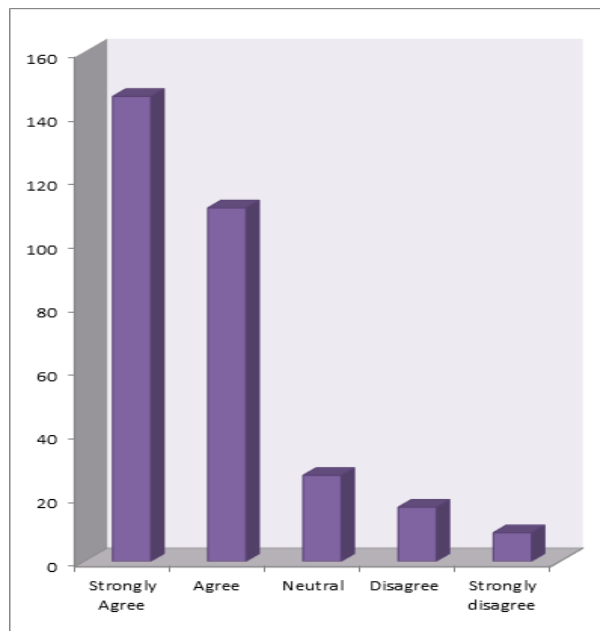


Figure 8: Delivery Process is Efficient, and Packages Arrive on Time of the Sample Respondents

Opinion about Feel the Return and Refund Process is Clear and Hassle-Free

The opinion of the sample respondents is given in table 9 shows the classification of sample respondents based on their righteousness.

Table 9: Feel the Return and Refund Process is Clear and Hassle-Free of the Sample Respondents

Opinion	No. of respondents	Percentage
Strongly Agree	133	42.90
Agree	116	37.42
Neutral	24	7.74
Disagree	15	4.84
Strongly disagree	12	3.87
Total	310	100.00

Source: Survey Data

Note: Figures in brackets are percentages of the total.

It is understood that, 133 (42.90 percent) respondents are found to be strongly agree, 116 (37.42 percent) respondents are found to be agree, 24 (7.74 percent) respondents are found to be neutral, 15 (4.84 percent) respondents are found to be disagree, and the remaining 12 respondents (2.90 per cent) are strongly disagree in the study area. This insight is critical as it reflects consumers' increasing trust in e-commerce systems, which directly influences their purchase decisions. A transparent and efficient return/refund mechanism reduces perceived risks, enhances customer satisfaction, and promotes brand loyalty. Respondents indicated that platforms offering detailed return policies, prompt customer support, and seamless transaction reversals played a vital role in encouraging repeat purchases.

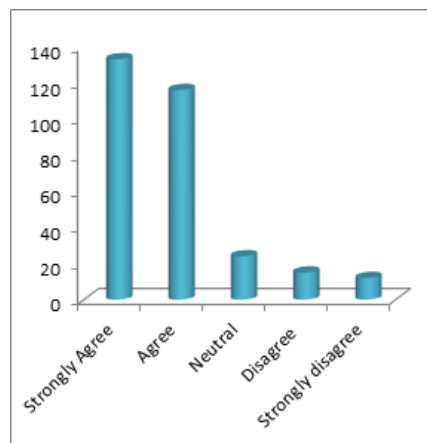


Figure 9 Feel the Return and Refund Process is Clear and Hassle-Free of the Sample Respondents

Conclusion

The current research study synthesizes key findings and their implications for understanding the effects of social media algorithms, engagement metrics, and user-generated content on consumer behavior. It has been established that social media platforms, through their algorithms, significantly influence purchasing decisions by personalizing content exposure for users. This personalization not only boosts user engagement but also drives buying behavior by showcasing content that aligns with individual preferences. Demographic factors were found to greatly affect how different groups engage with social media,

underscoring the necessity for targeted marketing strategies. Engagement metrics such as likes, shares, and comments serve as indicators of content popularity and trustworthiness, directly influencing user perceptions of brands and products. Furthermore, the visibility of content on social media dictated by algorithms is vital for ensuring users see the most relevant content, thereby shaping their purchasing decisions. User-generated content, including reviews and recommendations, emerged as a potent influencer of consumer behavior, providing authenticity and trust that significantly impacts buying choices. The study highlights the importance of leveraging such content to build a trustworthy relationship between brands and consumers. Recommendations for social media platforms include improving transparency regarding algorithms and promoting user engagement through diverse, high-quality content. For academic inquiry and future research, this study identifies areas for further exploration, such as the nuanced effects of algorithms across different consumer segments and the long-term impacts of engagement with user-generated content on brand loyalty.

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IMPACT OF PERSONALIZATION ALGORITHMS ON CONSUMER TRUST AND VIRTUAL PURCHASE DECISIONS

Mr. S. Ravichandran

*Ph.D Scholar, Department of Economics
VELS Institute of Science, Technology and Advanced Studies, Chennai*

Dr. R. Premalatha

*Assistant Professor, Department of Economics
VELS Institute of Science, Technology and Advanced Studies, Chennai*

Introduction

Virtual reality (VR) offers users a realistic and interactive computer-generated environment that provides them with unique experiences in various settings, including marketing. Technological development of VR continues its relentless journey towards heightened immersion and realism, incorporating a multitude of lifelike elements, including the elusive sense of smell, which had previously remained beyond the realm of computer imitation (Liu et al., 2023). VR is anticipated to occupy a pivotal position in the lives of individuals, playing a profound role in diverse aspects of human existence (Hamad & Jia, 2022). As these advancements unfold, the significance of VR as an influential medium is set to expand in shaping the future of human experiences. A report by McKinsey (2022) has emphasized the transformative capacity of the metaverse and has projected a potential value generation of \$5 trillion by the year 2030. This estimation highlights the extensive economic opportunities of VR, implying it has the potential to reshape industries, establish novel markets, and revolutionize the dynamics of technology, commerce, and social interactions. The ever-evolving technological landscape and changing consumer preferences are therefore making it increasingly crucial for businesses to invest in digital technologies and look for ways to enhance virtual experiences. While consumers seek to access products and services from the comfort of their homes, retailers seek to identify ways to remain competitive and thrive in the emerging technological environment. This includes targeted investments in online shopping platforms, including immersive virtual reality (IVR) technologies which can address some of the limitations of e-commerce and physical retail establishments (Martínez-Navarro et al., 2019). The strategic choice to concentrate on IVR in retail is underscored by its numerous competitive advantages. IVR elevates consumer engagement, a critical element that strongly correlates with heightened sales and customer.

Digital marketing and E-Commerce

E-commerce can be described as the buying and selling of goods or services through electronic means. Like internet, mobiles, telephones, ATMs fax machine, etc. Digital marketing means marketing of products and services through digital platform. It talks about the techniques and strategies that are used for marketing of the products and services on different digital platforms. Digital marketing aids in fascinating customers as progressively more people are engaged in digital world. Internet is the core area of digital marketing as it is the comprehensive channel of communication accessible for all kind of businesses. This could in fact make the entitlement that digital marketing is a significant fragment of Ecommerce.

Since, the lot of Ecommerce would not be existent without this Internet-based marketing. One and all who is involved in Ecommerce must do exercise their strategies which unceasing basis with the intention to attract customers, making it one among the most significant traits of success online. Therefore, Ecommerce and Digital marketing will at all times go side by side because marketing is needed to produce sales. The company cannot simply create a website and expect the people to use it. Rather, they must have a direct way to find company. There are perhaps thousands of companies offering the same products or services. The companies must be able to create a distinct brand that people will recognize. This is done through digital marketing and this makes marketing the most significant aspect of Ecommerce. No matter whatsoever about what you are selling, just need to market it properly.

Today, the world has become progressively more digital concentrated and is developing at a meaningfully faster rate. It is general at this moment to have automatic access to digital devises and the internet because of the digital capabilities obtainable that completely transformed the mode in which society communicates and interacts. The way in which digital marketing has accelerated since the 1990 and 2000 had significantly transformed the manner, how the brands and businesses utilize technology and digital marketing to enlarge value to their marketing efforts. The essential to market a brand over the comprehensive range of technology devices available has turn into a challenge for brands but nevertheless allows for additional means to reach and influence customers and their commitment with a brand.

Digital marketing drives are fetching more widespread, as digital platforms are more and more being unified into marketing plans. Digital platforms permit brands to be well storytellers and make available the customers with a space to share their experiences of brands and products. Fueled by explosion of devices to access digital media, this has shown the way to the progressive development of digital advertising.

Objectives of the Study

The primary objectives of this investigation are as follows:

1. To study the demographic information of the sample respondents in the study area.
2. To analyze the E-Commerce Metrics, and Virtual Buyer Decision of the sample respondents in the area.

Type of family wise Classification of the Sample Respondents

The type of family plays a vital role in shaping both the family and economic life of individuals. Since it also influences the social life of people, studying the family background of the respondents is essential.

Table 1 Type of Family Wise Classification

S.No.	Type of Family	Number of Respondents	Percentage
1.	Nuclear Family	169	54.50
2.	Single Parent Family	78	25.20
3.	Joint Family	22	7.10
4.	Extended family	41	13.20
	Total	310	100

Source: Survey Data

It is noted from Table 1 that out of 310 respondents 169 (54.50 per cent) sample respondents belonging to the Nuclear Family, 78 (25.20 per cent) sample respondents belonging to the Single Parent Family, 22 (7.10 per cent) sample respondents belonging to the Joint Family system, and 41 (13.20 per cent) sample respondents belonging to the extended family in the study area. he classification of respondents based on family type provides insights into their virtual buying behavior. Individuals from nuclear families often exhibit independent purchasing decisions, whereas those from joint families may prioritize collective needs. Understanding these patterns helps businesses tailor marketing strategies to different consumer segments effectively.

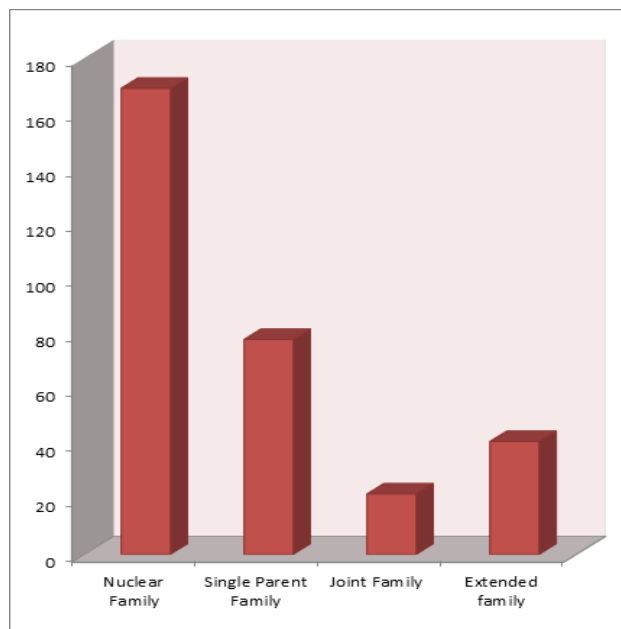


Figure 1 Type of Family Wise Classification

Satisfied With Online Products on the Classification of the Sample Respondents

Satisfaction with online products plays a significant role in both the family and economic life of individuals. Since satisfaction with online products also impacts the social life of people, it is essential to study the background of the respondents.

Table 2: Satisfied With Online Products of the Sample Respondents

S.No.	Satisfaction level	Number of Respondents	Percentage
1.	Satisfied	97	31.30
2.	Highly satisfied	148	47.70
3.	Not satisfied	23	7.42
4.	Not able to say	42	13.50
	Total	310	100

Source: Survey Data

It is noted from Table 2 that out of 310 respondents 97 (31.30 per cent) sample respondents belonging to the Satisfied, 148 (47.70 per cent) sample respondents belonging to

the Highly satisfied, 23 (7.42 per cent) sample respondents belonging to the Not satisfied, and 42 (13.50 per cent) sample respondents belonging to the Not able to say in the study area. The classification of respondents based on their satisfaction with online products provides valuable insights into consumer trust and preferences. High satisfaction levels indicate positive online shopping experiences, while dissatisfaction highlights concerns like product quality or delivery issues. Understanding these factors helps businesses improve customer engagement and service quality.

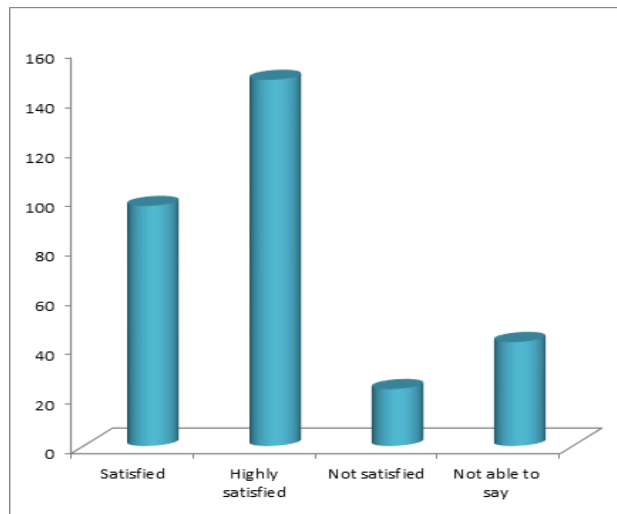


Figure 2: Satisfied With Online Products of the Sample Respondents

Employment status on the Classification of the Sample Respondents

The classification of respondents based on their satisfaction with online products provides valuable insights into consumer trust and preferences. High satisfaction levels indicate positive online shopping experiences, while dissatisfaction highlights concerns like product quality or delivery issues. Understanding these factors helps businesses improve customer engagement and service quality.

Table 3: Employment Status of the Sample Respondents

S.No.	Satisfaction level	Number of Respondents	Percentage
1.	Fulltime	91	29.40
2.	Part time	74	23.90
3.	Temporary	64	20.60
4.	Retired	42	13.50
5.	Unemployed	22	7.10
6.	Unable to work	12	3.87
7.	Prefer not to say	5	1.61
	Total	310	100

Source: Survey Data

It is noted from Table 3 that out of 310 respondents 91 (29.40 per cent) sample respondents belonging to the full time job, 74 (23.90 per cent) sample respondents belonging

to the part time, 64 (20.60 per cent) sample respondents belonging to the temporary, 42 (13.50 per cent) sample respondents belonging to the retired, 22 (7.10 per cent) sample respondents belonging to the unemployed, 12 (3.87 per cent) sample respondents belonging to the unemployed, and 5 (1.61 per cent) sample respondents belonging to the Prefer not to say in the study area.

Opinion about E-commerce of the sample respondents

The opinion of the sample respondents is given in table 4 shows the classification of sample respondents based on their righteousness.

Table 4 E-Commerce Website is User-Friendly and Easy to Navigate of the Sample Respondents

Opinion	No. of Respondents	Percentage
Strongly Agree	112	36.13
Agree	89	28.71
Neutral	56	18.06
Disagree	41	13.23
Strongly disagree	12	3.87
Total	310	100.00

Source: Survey Data

Note: Figures in brackets are percentages of the total.

In the study area, 112 respondents (36.13 per cent) strongly agreed, 89 respondents (28.71 per cent) agreed, 56 respondents (18.06 per cent) were neutral, 41 respondents (13.23 per cent) disagreed, and the remaining 12 respondents (3.87 per cent) strongly disagreed.

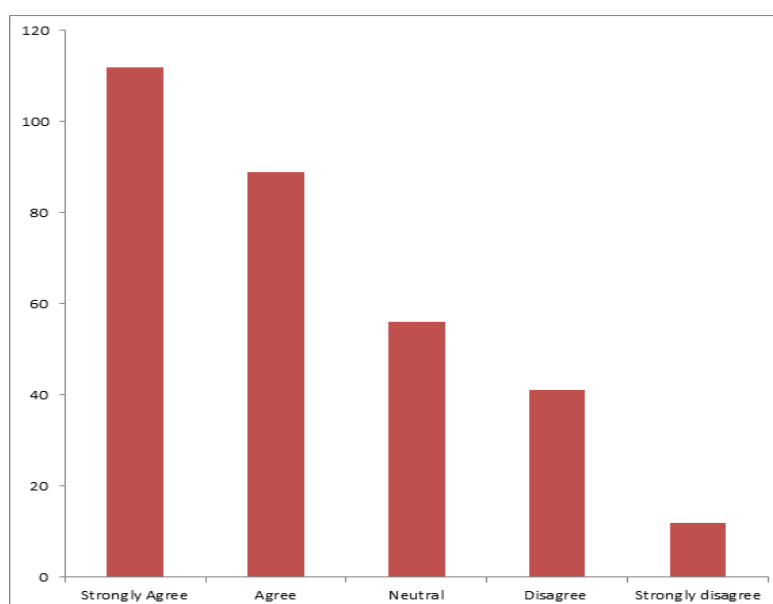


Figure 3: E-Commerce Website is User-Friendly and Easy to Navigate of the Sample Respondents

Opinion about Feel Product Descriptions and Details on the Website are Clear and Informative of the Sample Respondents

The opinion of the sample respondents is given in table 5 shows the classification of sample respondents based on their righteousness.

Table 5: Feel Product Descriptions and Details on the Website are Clear and Informative of the Sample Respondents

Opinion	No. of respondents	Percentage
Strongly Agree	154	49.68
Agree	78	25.16
Neutral	42	13.55
Disagree	27	8.71
Strongly disagree	9	2.90
Total	310	100.00

Source: Survey Data

Note: Figures in brackets are percentages of the total.

It is understood that, 154 (49.68 percent) respondents are found to be strongly agree, 78 (25.16 percent) respondents are found to be agree, 42 (13.55 percent) respondents are found to be neutral, 27 (8.71 percent) respondents are found to be disagree, and the remaining 9 respondents (2.90 per cent) are strongly disagree in the study area. The study investigates the influence of consumer behavior metrics on virtual buyer decisions, focusing on how product descriptions and website details shape purchase intent. Among the sample respondents, a significant majority expressed that clear and informative product descriptions greatly enhance their confidence in online purchases. The findings reveal that transparency in product specifications, high-quality images, and well-structured content reduce purchase hesitation and foster trust. Respondents reported a preference for websites that offer detailed information including size, features, benefits, and customer reviews.

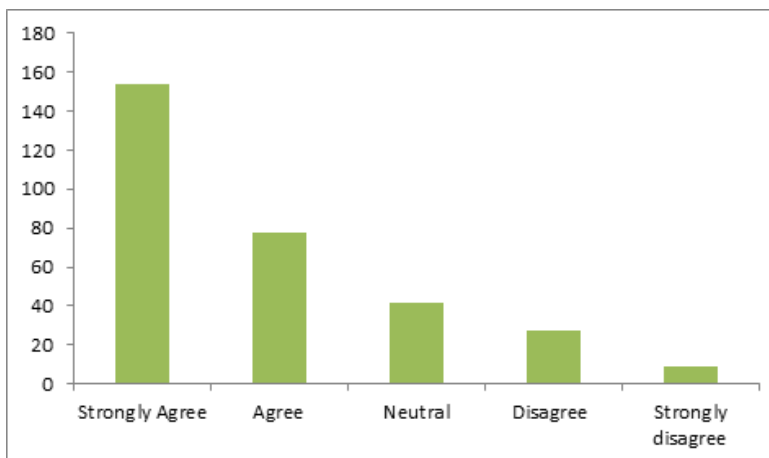


Figure 4: Feel Product Descriptions and Details on the Website are Clear and Informative of the Sample Respondents

Opinion about Ordering Process is Straight forward and Easy to Complete of the Sample Respondents

The opinion of the sample respondents is given in table 6 shows the classification of sample respondents based on their righteousness.

Table 6: Ordering Process is Straight forward and Easy to Complete of the Sample Respondents

Opinion	No. of Respondents	Percentage
Strongly Agree	139	44.84
Agree	112	36.13
Neutral	32	10.32
Disagree	16	5.16
Strongly disagree	11	3.55
Total	310	100.00

Source: Survey Data

Note: Figures in brackets are percentages of the total.

It is understood that, 139 (44.84 percent) respondents are found to be strongly agree, 112 (36.13 percent) respondents are found to be agree, 32 (10.32 percent) respondents are found to be neutral, 16 (5.16 percent) respondents are found to be disagree, and the remaining 11 respondents (3.55 per cent) are strongly disagree in the study area. The study found that a majority of respondents perceived the online ordering process as straightforward and easy to complete. This ease of navigation positively influenced their purchase decisions. A seamless checkout experience enhances user satisfaction, reduces cart abandonment, and reflects effective implementation of consumer behavior metrics in virtual buying platforms.

It is understood that, 156 (50.32 percent) respondents are found to be strongly agree, 89 (28.71 percent) respondents are found to be agree, 28 (9.03 percent) respondents are found to be neutral, 20 (6.45 percent) respondents are found to be disagree, and the remaining 17 respondents (5.48 per cent) are strongly disagree in the study area.

It is understood that, 161 (51.94 percent) respondents are found to be strongly agree, 94 (30.32 percent) respondents are found to be agree, 21 (6.77 percent) respondents are found to be neutral, 18 (5.81 percent) respondents are found to be disagree, and the remaining 16 respondents (5.16 per cent) are strongly disagree in the study area.

It is understood that, 164 (52.90 percent) respondents are found to be strongly agree, 91 (29.35 percent) respondents are found to be agree, 29 (9.36 percent) respondents are found to be neutral, 12 (3.87 percent) respondents are found to be disagree, and the remaining 14 respondents (4.52 per cent) are strongly disagree in the study area.

It is understood that, 176 (56.77 percent) respondents are found to be strongly agree, 74 (23.87 percent) respondents are found to be agree, 27 (8.71 percent) respondents are found to be neutral, 18 (5.81 percent) respondents are found to be disagree, and the remaining 15 respondents (4.84 per cent) are strongly disagree in the study area.

Conclusion

E-commerce platforms can go beyond basic product recommendations by employing deep learning to analyze customer behaviour over time, enabling predictions of future needs and offering personalized discounts and promotions. Such personalization not only boosts sales but also enhances customer loyalty by making shoppers feel uniquely valued. Platforms should also incorporate features that allow customers to easily share their purchases and reviews on social media directly from the e-commerce site. Highlighting user-generated content, such as unboxing videos or practical product demonstrations, on product pages can significantly sway purchasing decisions by providing authentic endorsements. Integrating inventory management and customer service across channels is essential, allowing customers to transition seamlessly between social media, mobile apps, and web platforms without losing their shopping carts or order history. This approach prioritizes a cohesive shopping experience across various touch points. Advanced AI can be utilized to analyze customer inquiries in real-time, offering personalized shopping advice akin to a digital shopping assistant. Implementing predictive service features, such as anticipating customer issues before they occur, can distinguish a platform in terms of customer experience. Adopting blockchain or other secure technologies for data storage and transactions can enhance security. Conducting regular audits and issuing transparency reports can reassure customers about their data safety, transforming privacy into a competitive advantage.

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