SPECTRUM

Multidisciplinary Research Journal

Research and Development Cell

St. Xavier's College, Mapusa - Goa

SPECTRUM

Multidisciplinary Research Journal

Volume XVII   **July 2025**

ST. XAVIER'S COLLEGE
MAPUSA GOA

Managed by Diocesan Society of Education (DSE)

Awarded 'College with Potential for Excellence' by UGC in 2004

Reaccredited by NAAC with Grade 'A' 4th Cycle in 2019

Awarded the DBT Star College Scheme in 2021

SPECTRUM

Multidisciplinary Research Journal

Message from the Administrator

I am indeed happy to write these few words for Spectrum, Vol. XVII, which, as always, contains research papers and articles written by the College Faculty. But what adds to our joy is that this issue of Spectrum contains research papers brought out by the students also. I wish to express my sincere congratulations to all those who have contributed to this in-house journal.

St. Xavier's is a reputed for various reasons spanning from academics, sports, and cocurricular activities to participating in the different competitions held by other institutions across the breadth of Goa and leaving its mark. 'Spectrum' focuses on the academic work. The faculty came out with an innovative idea this year, whereby they encouraged the students to convert their projects into research papers. This edition contains close to 40 research papers, a milestone in the history of its publication. This will surely give the staff and students a rich dividend in their academic pursuits, and hopefully make research work more appealing.

Credit needs to be given to the Editorial Board for their hard work and getting a large number of contributors. Yet, there are a few others who might not have been able to send in their articles due to various circumstances. It would benefit everyone if their contributions are also included. Hence, it is our earnest desire that every department, including the self-financed, will work to make "Spectrum" a representative research-scholars magazine embracing the whole campus. I might also remind our faculty and students to get their work published on UGC recommended magazines and other research journals for a wider readership and recognition.

Once again, we congratulate the editorial board, and all the contributors, both faculty and students for this very informative and enriching journal.

God bless you all.

Fr. Tony Salema
Administrator

From the Principal's Desk

The XVII edition of our College Research Journal is set for release, and I'm extremely proud of our faculty members who have contributed research articles on a wide range of topics, in keeping with the true sense of the term "Spectrum". This multidisciplinary publication encapsulates the essence of our Institution in terms of the prevailing scientific temperament, the thirst for knowledge and the drive for innovation.

Many of the articles are based on novel ideas, that have evolved out of serious thinking or out of playful inventiveness from students, who worked diligently under the supervision of their project Guides.   Kudos to each of the authors and co authors!

I wish to express my sincere appreciation to the Editor, Dr. Zen Lobo for efficiently steering his team to ensure timely completion of the tasks entrusted, to the Technical Editors Dr Johnross Albuquerque and Dr Prachi Joshi for the structured and organised layout of the articles and to the entire editorial team for your collaborative efforts, not forgetting the three members of our in-house peer team who gave their valuable time and inputs.

May this publication serve to advance research interest among our scholars and at the same time kindle the flame of curiosity in our budding researchers.

Ursula Barreto
Acting Principal

Unveiling "Spectrum" Vol. XVII: A Beacon of Interdisciplinary Research….✎

It is with immense pride and enthusiasm that I announce the official release of "Spectrum," an interdisciplinary research journal from our institution. As the Convener of the Research and Development Cell, it fills me with great satisfaction to witness the culmination of countless hours of dedication, intellectual curiosity, and collaborative spirit that have brought this journal to fruition.

"Spectrum" represents a significant milestone in our commitment to fostering a vibrant research culture within our academic community. This journal serves as a dynamic platform, showcasing the diverse and innovative research endeavours undertaken by both our talented students and esteemed faculty members. In an increasingly interconnected world, the boundaries between traditional disciplines are blurring, and true innovation often emerges at their intersections. "Spectrum" embodies this philosophy, providing a space for ground-breaking work that transcends conventional academic silos. We believe that by bringing together diverse voices and research approaches, "Spectrum" will not only disseminate valuable insights but also spark new collaborations and inspire further exploration.

A heartfelt gratitude to all the authors—students and faculty alike—for entrusting us with their valuable work. Their contributions are the very essence of this journal, and their commitment to excellence has set a high standard for future editions. Furthermore, I would like to acknowledge the tireless efforts of the editorial board under the guidance of Dr. Jervin Zen Lobo, Department of Mathematics and everyone involved in the meticulous process of bringing "Spectrum" to print. Your expertise, critical eye, and dedication to academic integrity have been instrumental in ensuring the quality and credibility of every published article.

"Spectrum" is more than just a collection of research papers; it is a testament to our collective intellectual vitality and our shared vision for a future driven by informed inquiry and innovative solutions. We encourage everyone—students, faculty, and the wider academic community—to explore the pages of "Spectrum," engage with the thought-provoking research presented, and be inspired by the intellectual prowess showcased within.

We look forward to the continued growth of "Spectrum" as a leading forum for interdisciplinary discourse and a source of inspiration for future generations of researchers.

Prof. Janet Fernandes
Convener, Research and Development Cell
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From the Editor's Desk
Spectrum 2025 – Research, Revelations, and (Just a Bit of) Reluctance

Dear Readers, Researchers, and (Many Reluctant) Writers,

It is with great joy — and just a hint of disbelief — that we present to you the 2025 edition of Spectrum, the annual multidisciplinary research journal of St. Xavier's College, Mapusa, Goa. This year, we've set a new record: nearly **40** research articles! That's right — **forty**. We double-checked. And no, AI didn't write them (we think).

The secret behind this unprecedented scholarly avalanche? A brilliant strategic idea by our **Principal**, Ms. Ursula Barreto, who had the foresight (and courage) to turn the Third Year student projects into potential research papers. It was a masterstroke in academic alchemy — converting raw undergraduate effort into refined faculty output. Who knew students could be such effective catalysts?

Of course, this transformation didn't happen overnight. It took persistent nudging, a flurry of WhatsApp reminders, more emails than we care to admit, and perhaps a few friendly threats (we prefer the term "gentle academic persuasion"). But eventually, inspiration struck — or exhaustion — and manuscripts began to flow in.

Here's how the numbers stack up:

- **9 papers from the Science stream –** proving once again that equations can be poetic.
- **20 from the Arts stream –** because words matter (especially when they reach the word limit).
- **4 from Commerce –** balancing the books and the arguments.
- **1 from UG Self-Financing –** self-financed, self-motivated!
- **3 from PG Self-Financing –** because postgrads have plenty to say (and cite).
- **1 from our ever-curious Librarian –** who reminded us that research starts with knowing where the books are.

What began as an academic challenge has evolved into a celebration of original thinking, creative expression, and cross-disciplinary curiosity. We are delighted to see so many

members of our Xavierite community step into the world of research, some for the first time, others with renewed vigor.

Before we close, a heart filled thanks to our **Administrator,** Rev. Fr. Antonio Salema who has always cheered and motivated all staff at staff meetings, and a hearty round of applause to our **Technical Editors**: Dr. Johnross Albuquerque and Dr. Prachi Joshi. Dr. Prachi gallantly tackled papers in Indian languages written in the majestic Devanagari script, while Dr. Johnross heroically designed a jaw-droppingly beautiful professional template — and spent over an hour on each paper (yes, voluntarily!). He spent so much time with the templates, that he might be eligible for residency in Microsoft Word.

A very special thanks also to the **Editorial Board of Spectrum** for keeping the wheels turning smoothly, and most importantly to **all our contributors** — the real stars of this show. Without your words, insights, and bravery to hit 'send', there would be no Spectrum, no success, and certainly no editorial caffeine-fueled celebrations.

As we turn the pages of this year's Spectrum, may it inspire more minds to explore, question, write — and submit on time (fingers crossed for next year).

With gratitude, laughter, and a touch of editorial pride,

Dr. Jervin Zen Lobo
Managing Editor

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Real-Time American Sign Language Recognition using Deep Learning: A CNN-Based Approach

Caje Pinto

Department of Electronics, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Caje Pinto (caje.p@xavierscollegegoa.ac.in)

ABSTRACT

Sign language is vital for communication among deaf, mute, and hard-of-hearing communities, but many hearing individuals are not fluent, creating a communication gap. To address this, we developed a real-time sign language recognition system using Python, OpenCV, and Keras. The system captures and processes sign images via a camera, applying Gaussian filtering and double thresholding to enhance image quality. Using Convolutional Neural Networks (CNNs) for feature extraction, the model trained on 8,100 images and tested on 2,700 images, achieving 99.72% accuracy within 60 minutes of training. The system effectively translates ASL gestures into text on an OLED screen and speech via speaker in real-time with high accuracy.

1. Introduction

Communication is crucial in our lives, yet deaf and mute individuals face challenges in expressing themselves [1]. Factors like age-related hearing loss, trauma, genetics, and congenital disabilities exacerbate the communication gap. Sign language, such as American Sign Language (ASL), is a prominent method, using hand gestures, facial expressions, and body language to convey thoughts [2]. Developing an application to recognize ASL gestures can enable effective communication between deaf individuals and those unfamiliar with sign language [3]. Technological advancements and research in deep learning and computer vision have contributed to improving accessibility for the deaf and mute community [4-8]. This paper focuses on recognizing ASL gestures in real-time using a webcam, converting them into text and speech. Techniques like image segmentation and gray algorithms enhance image processing by cropping required parts and

compensating illumination. The system aims to bridge the communication gap, enabling seamless interaction between ASL users and non-users through real-time translation.

1.1. *Literature Survey*

Extensive research has been conducted in sign language recognition. Ankit Ojha et al. [9] developed a real-time sign-to-text and speech translation system using a webcam and CNN, achieving 98% accuracy with a database of 1,000 gestures. Sawant Pramada et al. [10] introduced a Binary Sign Language method to detect the number of extended fingers, achieving 90.9% accuracy with up to 1,023 gestures. Mahesh Kumar N B [11] used MATLAB with the LDA algorithm to convert Indian sign language gestures into text and voice format, reducing dimensionality and noise for improved accuracy. Amrita Thakur et al. [12] employed Python-based CNN and Hidden Markov Models to recognize gestures with training accuracy of 99.65% and testing accuracy of 87.88%, using datasets of 32,000 training and 8,000 test images. Rajaganapathy. S et al. [13] utilized Microsoft Kinect for gesture-to-voice conversion, identifying human joints with 90% accuracy in tests of 100 signs. Chhaya Narvekar et al. [14] applied image processing and Naïve Bayes classification for gesture-to-speech conversion, achieving maximum accuracy with minimal noise. Our work normalized and rescaled images to 128 pixels and utilized CNN architecture to classify 26 ASL gestures, achieving over 99% accuracy for improved robustness.

1.2. *Neural Networks*

Deep learning algorithms use neural networks to map inputs to outputs. A neural network comprises an input layer (for numerical data like pixel values), hidden layers (where most computations occur), and an output layer (for predictions). Information flows between layers via specific functions, as illustrated in Figure 1.
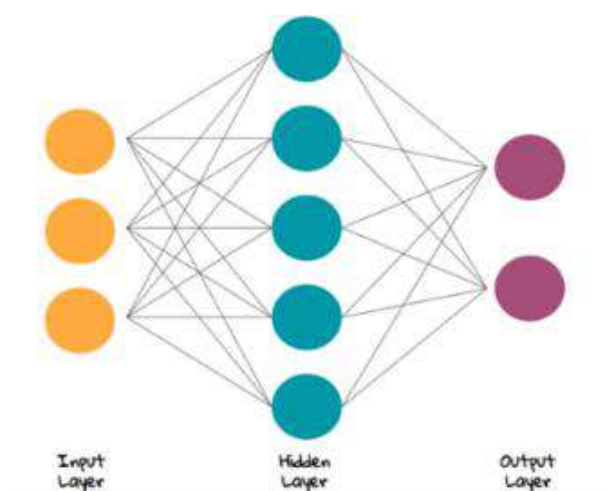
Figure 1. Simplified Neural Network.

The tunable weight (w) and bias (b) parameters, shown in Figure 2, are crucial to deep learning. After processing inputs, the neural network computes a loss function to assess prediction accuracy and adjusts parameters to enhance performance.
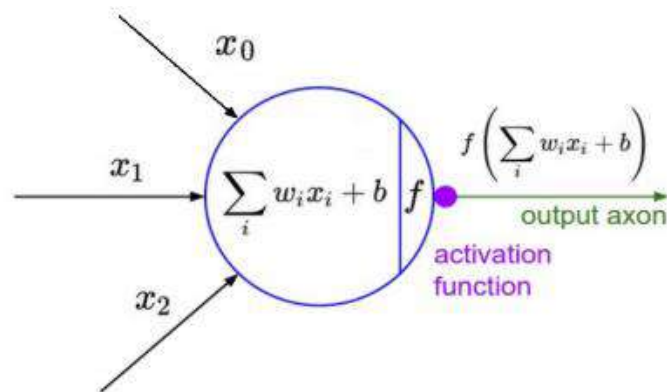
Figure 2. Primary Function in Neural Networks.

The network minimizes loss by adjusting weights and biases through backpropagation using gradient descent, iteratively reducing the loss function to become an accurate function approximator that maps inputs to expected outputs.

1.3. *Convolutional Neural Network*

Convolutional Neural Networks (CNNs) are deep learning algorithms that learn patterns directly from data, such as identifying objects, classifications, or categories in images. CNNs reduce human effort by automating feature detection and can contain tens or hundreds of layers, each specializing in detecting increasingly complex image features.

1. **Convolution Layer**: The initial layer extracts features from input images by applying filters of size. It calculates the dot product between the filter and the input image, resulting in a feature map that highlights edges and corners. This map is passed to subsequent layers to learn more features.

2. **Rectified Linear Unit (ReLU)**: An activation function that improves training by converting negative values to zero while retaining positive values, enabling only activated features to propagate.

3. **Pooling Layer**: Reduces the size of feature maps to lower computational costs and prevent overfitting. Techniques include:
    o   **Max Pooling**: Retains the maximum value in each section.
    o   **Average Pooling**: Computes the average value.
    o   **Total Pooling**: Sums all elements in a section.

4. **Fully Connected (FC) Layer**: Connects neurons between layers using weights and biases. The FC layer flattens the input from previous layers to form a vector, which is further processed before generating predictions.

5. **Dropout**: Prevents overfitting by randomly removing 40% of neurons during training. This simplifies the network, reduces complexity, and enhances generalization on new data.

6. **Activation Functions**: Add nonlinearity, enabling the network to model complex relationships. Common functions include ReLU, Softmax, tanH, and Sigmoid. Softmax is ideal for multi-class classification, while Sigmoid is suitable for binary classification.

2. Materials and Method

Our aim was to design and develop a device for ASL Recognition using image processing for seamless communication between deaf and hearing individuals in education, heath, etc. Our objectives are stated as follows:

1. Develop robust image pre-processing algorithms, incorporating techniques such as grayscale conversion, Gaussian filtering, noise reduction, and edge detection.

2. Design and implement a CNN-based model to train and recognize American Sign Language.

3. Integrate real-time ASL predictions into assistive devices to enable seamless communication between deaf and hearing individuals in daily scenarios.

2.1. *Hardware Design of ASL Recognition System*

The block diagram of the ASL recognition system is depicted in Figure 3. The system incorporates a Raspberry Pi 4, a camera, a speaker, and a OLED display. The camera captures sign language gestures, which are transmitted to the Raspberry Pi 4 for processing. The Raspberry Pi 4 serves as the core processing module, handling tasks such as image segmentation, grayscale conversion, data training,

Figure 3. Block diagram of ASL Recognition System.

and testing. The project utilizes Python's OpenCV, TensorFlow, and Keras modules to train datasets for the recognition of alphabets from A to Z. Live sign language gestures are translated

into both text which is displayed on OLED display and speech via speaker in real time with high accuracy.

2.2. *Software Design of ASL Recognition System*

The flowchart of ASL Training using CNN and Real-time ASL Prediction are shown in figure 4 and figure 5 respectively. The various steps in training the dataset and predicting sign language using CNN model in real-time are also explained further in details.
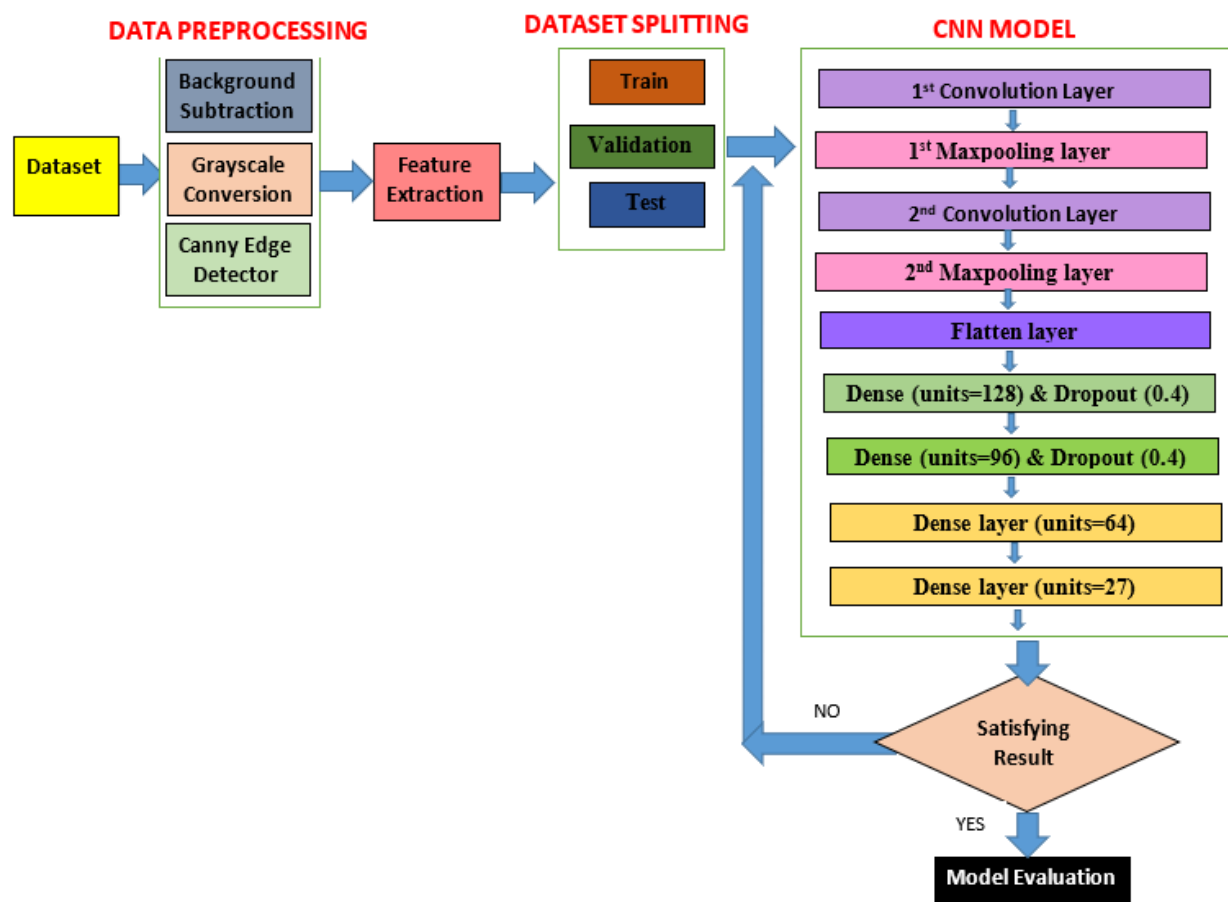
Figure 4. Flowchart of ASL Training using CNN.

The Python script builds and trains a CNN model for ASL image classification. It preprocesses the dataset by converting images to grayscale, resizing, and applying filters to enhance quality. The data is split into training and testing sets, and the CNN is constructed using Keras, comprising convolutional, pooling, and fully connected layers with dropout regularization to prevent overfitting. The model is trained with the Adam optimizer and categorical cross-entropy loss function. Additionally, the script saves the model and generates plots for training and validation metrics.
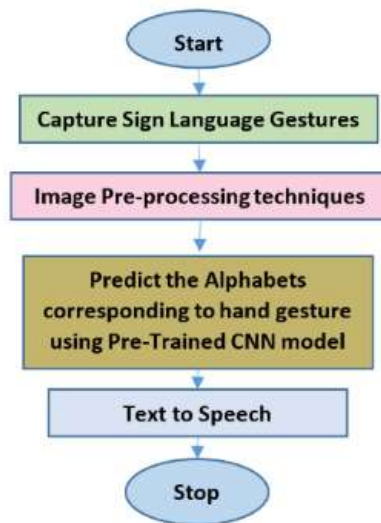
Figure 5. Flowchart of Real-time ASL Prediction.

The Python script utilizes a pre-trained CNN model for real-time ASL recognition. It processes webcam video input using OpenCV, isolating hand gestures with thresholding and contour detection. The gestures are resized and normalized before being fed into the CNN model, which outputs probabilities for 27 classes (26 letters and a space) to identify the most likely letter. The recognized letter is displayed on the video feed, with a running string of letters updated every 200 frames (approximately every 10 seconds). Additionally, the script generates audio output of the recognized string using the gTTS API and plays it via the playsound library.

3. Results and Discussions

This paper utilizes the American Sign Language (ASL) dataset from beingaryan/Sign-To-Speech-Conversion, consisting of 17,113 images (12,845 for training and 4,368 for testing) with dimensions of 128 x 128 pixels across 27 classes (A to Z and a null character). The model, developed in Python on the IDLE platform, was trained for 20 epochs, achieving 99.91% accuracy with a training time of 135 minutes.

Figure 6. Real-time Prediction of Sign Language.

Reducing the test dataset to 2,700 images lowered accuracy to 99.72%, while training time decreased to 60 minutes, as shown in Table 1. Real-time sign language predictions were obtained in Figure 6. Despite challenges like diverse gestures, sentence structures, and the precision

required for replicating hand movements. Some gestures proved difficult to reproduce consistently during real-time testing.

Table. 1. Training Performance for different sizes of Datasets consisting of images.

Train dataset (images)	Test Dataset (images)	Total Dataset (images)	Validation Accuracy	Training Time (mins)
456 *27= 12845	155*27 = 4368	17113	99.91	135
300*27 = 8100	155*27 = 4368	12468	99.80	70
300*27 = 8100	**100*27 = 2700**	**10800**	**99.72**	**60**
200*27 = 5400	155*27 = 4185	9585	99.70	45
100*27=2700	155*27=4185	6885	99.58	30

4. Conclusion

The American Sign Language (ASL) Recognition system leverages image processing to bridge communication gaps between hearing and deaf individuals. Its development required expertise in computer vision, machine learning, and signal processing. Using deep learning techniques like convolutional neural networks, the model achieved 99.72% accuracy after 60 minutes of training on 8,100 training images and 2,700 test images. With further research, the system has the potential to revolutionize communication and support a wide range of applications, such as expanding to global sign languages for broader accessibility and integrating with mobile devices for enhanced convenience.

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█ RESEARCH ARTICLE

Pharmaceutical Industry and Pharmacies in Goa: A Case Study of Union Pharmacy at Mapusa

Blanche Rosalina Christalina Socorro Fernandes e Mascarenhas

TYBA Project Students 2024-2025 Batch, Department of Electronics, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Blanche Mascarenhas (Blanche.M@xavierscollegegoa.ac.in)

ABSTRACT

Objectives: The paper aims at creating awareness among its readers about the pharmaceutical industry and pharmacies in Goa. It also aims at providing knowledge about Union Pharmacy at Mapusa as an ideal business option.

Methodology: The students have used primary as well as secondary sources of data collection.

I. Introduction
The origin of pharmaceuticals can be traced back to ancient civilization. The late 19th and the earlier 20th centuries saw a dramatic transformation in the pharmaceutical industry. Union pharmacy at Mapusa with its hands-on approach not only filled a crucial gap in healthcare but also strengthened the trust and loyalty of his customers, laying the foundation for his pharmacy's success.

II. History of Medicine in Goa
Herbal formulations, dietary recommendations and therapeutic practices like Panchakarma even though their understanding of modern anatomy and physiology was limited. Tribal community used own medicinal knowledge, using forest plants and roots for healing.

III. Pharmaceutical Production in Goa
Currently, there are over 7000 small-scale industrial units with the presence of more than 150 large and medium-scale industries employing over 25,000 people directly or indirectly.

IV. Pharmacies in Goa
Salcete in South Goa has the highest number of pharmacies followed by Bardez and Tiswadi in North Goa. On the other hand, Dharbandora has the lowest number of pharmacies followed by

Sanguem in South Goa. The total number Pharmacies in North Goa is 591, whereas it is 397 in South Goa. The total number of pharmacies across both districts amounts to 988.

V. Economic Profile of Union Pharmacy at Mapusa
In 1964, the Union Pharmacy was started at Mapusa a bold journey by starting a new pharmacy despite having no prior knowledge about medications relying on the expertise of a few doctors and guidance from medical professionals to ensure the safe dispensing of drugs. Union pharmacy in Mapusa has a strong reputation among its customers and is a viable form of career.

VI. Conclusion
The pharmaceutical companies not only seek profits and financial gains while also giving importance to society. Union Pharmacy has been dynamic and adaptable to changing trends in the market. Hence, it is running successfully for several years since its inception.

Introduction

The origins of pharmaceuticals can be traced back to ancient civilizations. Early societies including the Egyptians, Greeks, and Romans had a sophisticated understanding of medicinal herbs and therapeutic concoctions. These early practitioners, considered the forerunners of modern pharmacists. A turning point in pharmaceutical development occurred in the 18th century. The late 19th and early 20th centuries saw a dramatic transformation in the pharmaceutical industry, characterized by the synthesis of new drugs, such as aspirin, and the emergence of pharmaceutical companies dedicated to research and development. The 20th century revolutionized healthcare, significantly improving human health and life expectancy. Today, the pharmaceutical industry is defined by extensive R&D investments, strict regulatory oversight, patent-driven innovation, and globalization.

While Pharmacy is both an art and a science, focusing on the preparation and distribution of medicines from natural, synthetic, and other sources for the prevention and treatment of diseases. It involves identification, selection, pharmacological action, and formulation of drugs to ensure their safe and effective use.

History of Medicine in Goa

Before the arrival of the Portuguese, Goa followed ayurvedic traditions which were influenced by ancient Indian medical texts like the Charaka Samhita and Sushruta Samhita. Vaidyas in Goa were respected local healers who treated common diseases with herbal remedies and ointments relying on ancestral recipes. They used herbal formulations, dietary recommendations and therapeutic practices like Panchakarma even though their understanding of modern anatomy and physiology was limited. Tribal community used own medicinal knowledge, using forest plants and roots for healing.

A significant milestone occurred in 1563 when Jewish physician based in Goa, published Coloquios dos Simples e Drogas e Cousas Medicinais da India, a work that synthesized European and Indian medical knowledge, gaining widespread acclaim in Europe. They introduced European

medicinal practices, including the use of exotic herbs and alcohol-based tinctures. They also brought elements of Unani and Arabic medicine, which were prominent in their trade networks. The Jesuits and other missionaries established hospitals and dispensaries, blending Western medicine with local Ayurvedic and herbal traditions. This fusion led to the development of unique home remedies in Goan households, combining Indian and European medicinal knowledge.

Traditional Goan households used herbal infusions, coconut oil-based treatments, and spices like turmeric, ginger, and black pepper for common ailments. The Kaadhas (herbal decoctions) were commonly prepared to treat colds, fevers, and digestive issues. Coconut, kokum, and medicinal plants like Aloe vera, Ashwagandha, and Brahmi were widely used.

Goa later became home to Asia's first modern allopathic medical institution, the Goa Medical College and Hospital, established in 1842 in Panaji under the original name Escola Medico Cirurgica da Goa.. In parallel with European medicine, traditional Indian healers, or Vaidyas, played a key role in healthcare, utilizing herbal treatments passed down through generations and commanding significant public respect. Unani medicine, though practiced on a smaller scale, also contributed to Goa's medical landscape, with notable practitioners such as Abu Ali Hussein ben Abdullah ben Sina, who had previously served as personal physician to Emperor Akbar.

Pharmaceutical Production in Goa

The small state of Goa, in India, is also a major pharmaceutical producer in the country with an annual production of over Rs. 2000 crore. Goa supplies around 11% of the nation's total pharmaceutical production, or one-tenth of all pharmaceuticals made there. This surely explains the strict regulations and standard of quality maintained in Goa which matches the highest global quality standards. Currently, there are over 7000 small-scale industrial units with the presence of more than 150 large and medium-scale industries employing over 25,000 people directly or indirectly. About 81 pharma manufacturing units in Goa are licensed. The pharmaceutical industry in Goa is experiencing a sharp rise in competitiveness, and the local entrepreneurs operate in a turbulent and intricate market environment.

A range of well known Indian pharmaceutical companies like Ranbaxy, Pfizer, Cipla, Cadila, Lupin, Sanofi, Dr Reddy's Laboratories, Glenmark Pharmaceuticals, Unichem Lab, FDC, Indoco Remedies have invested huge funds in setting up their plants in Goa. Further, multinational companies like Wyeth, Merck etc are known world-over for their standards in the world and seem to be attracted to Goa and are expanding their operations on account of better infrastructure and logistics with adequate government support .

Unichem's Goa plant is located at Pilerne, which is about 12 Km from the capital city Panjim. Built in 1997, it caters to Unichem's export market. The Goa plant is consistently meeting the Current Good Manufacturing Practices (cGMP) guidelines, WHO and other statutory requirements including zero water discharge criteria. This plant has been rigorously inspected, inter alia, by

USFDA and MHRA on a regular basis as it caters to the majority of the European and American markets.

Geno Pharmaceuticals Ltd. was founded in December of 1975, in a joint venture with the Goa's Economic Development Corporation and private shareholders.

Glenmark was established in 1977 by its Founder Emeritus Late Mr. Gracias Saldanha. Glenmark entered the dermatology market with the launch of 'Candid cream'. Dermatology is a key focus area for Glenmark even today, for both formulations and novel drug discovery worldwide.

Table **I**. Number of Pharmacies in Goa.

Sr. No.	Taluka	No. of Pharmacies	District
1.	Bardez	227	
2.	Tiswadi	140	
3.	Ponda	116	NORTH GOA
4.	Pernem	46	
5.	Bicholim	43	
6.	Sattari	19	
7.	Salcete	262	
8.	Mormugao	75	
9.	Quepem	33	SOUTH GOA
10.	Canacona	16	
11.	Sanguem	7	
12.	Dharbadora	4	
	Total	**988**	

Source: Unstarred LAQ no. 057, annexure A for North Goa and South Goa.

Pharmacies in Goa

Pharmacy can be classified into three kinds:

1. Community Pharmacy – Also known as retail pharmacy, this is the most familiar type, where pharmacists provide medications and healthcare advice to the public. Community pharmacists play a crucial role in ensuring proper medication adherence and promoting the safe and effective use of medicines.

2. Hospital Pharmacy – Found in hospitals, medical clinics, and nursing homes, hospital pharmacies manage medication regimens for patients in collaboration with healthcare professionals. Hospital pharmacists oversee drug administration, participate in clinical trials, and compound personalized medications when necessary.

3. Industrial Pharmacy – This branch is tied to the pharmaceutical industry and involves research, production, packaging, quality control, marketing, and sales of pharmaceutical

goods. Industrial pharmacists may work as company representatives, advocating for their products and educating healthcare providers about their benefits.

Table I provides data on the number of pharmacies in Goa, categorized by district and taluka. North Goa consists of Bardez, Bicholim, Pernem, Sattari, Tiswadi, and Ponda, while South Goa includes Mormugao, Canacona, Dharbandora, Quepem, Sanguem, and Salcete. Among these, Salcete in South Goa has the highest number of pharmacies followed by Bardez Taluka.

Economic Profile of Union Pharmacy at Mapusa

In 1964, the Union Pharmacy was started at Mapusa a bold journey by starting a new pharmacy despite having no prior knowledge about medications relying on the expertise of a few doctors and guidance from medical professionals to ensure the safe dispensing of drugs. In those early days, it was an innovative approach to meet the needs of his customers. Since ready-made medications were not always readily available, medicines were prepared at home using basic equipment and ingredients sourced from trusted suppliers following precise formulas provided by medical professionals to prepare customized remedies. This hands-on approach not only filled a crucial gap in healthcare but also strengthened the trust and loyalty of customers, laying the foundation for his pharmacy's success.

Overcoming his initial lack of knowledge, he focused on learning the basics of pharmacy operations and building relationships with trusted suppliers. His commitment to quality service and ethical practices gradually earned the trust of customers, turning his humble venture into a reliable healthcare hub for the local community.

As the years passed, his son, with formal education in pharmacy and a vision to modernize operations, introduced new technologies and expanded the range of services offered. He upheld his father's values of integrity and community service while adapting to the evolving demands of the healthcare industry. Under his leadership, the business grew into a trusted name in the region, serving generations of families and becoming a symbol of dedication and progress.

At present, the legacy of the pharmacy is carried forward by the grandson, who holds a diploma in pharmacy. As the third-generation custodian of the family business, he has seamlessly blended tradition with modernity. With his formal education and years of hands-on experience, he has introduced innovative practices such as digital record-keeping amongst other digital features to cater to the needs of a tech-savvy generation. He remains deeply committed to the principles laid down by his grandfather, ensuring that customer trust and ethical practices remain at the core of the business. Under his stewardship, the pharmacy continues to thrive as a trusted healthcare provider, honoring its rich history while embracing the future.

It generates direct employment to 32 persons with women was a majority and with educational qualifications from SSC to Graduation to D Pharm and B Pharm. Some newly recruited while

some have been employed 5 years back while a few over 5 years earning a salary of Rs.10000, 10000 to 15000, and above 15000 respectively.

The pharmacy offers a wide range of products including Herbal healthcare items, Ayurvedic and Homeopathic medicines, Cosmetics and it has a separate section for pet care products including food. Customers have mentioned that prices are reasonable.

Union pharmacy in Mapusa have a strong reputation among its customers mainly on account humble staff, wide range of products and pet care section. Customers have praised its service the staff is very friendly and knowledgeable with good communication skills. The quality of products have also been commended with customers appreciating the variety of items available. The pharmacy earns 10,00,000 while the Income Spent is 7,00,000. Hence, a Profit of 3,00,000 of which 150000 is invested in savings by the owner.

Conclusions

Though the pharmaceutical industry has grown in recent years, its evolution from medicinal herbs and concoctions to tablets and pills can be traced back to ancient European knowledge. This dramatic transformation in the pharmaceutical industry is due to the various improvements in technology which in turn helps in developing new medicines. The pharmaceutical companies not only seek profits and financial gains while also giving importance to society. It has brought about improvements in health conditions and immunity against various diseases thus promoting longevity. The pharmaceutical sector, which experiences intense rise in competitiveness, generates a lot of employment while also encouraging entrepreneurship among locals. Union Pharmacy has been dynamic and adaptable to changing trends in the market . Hence, it is running successfully for several years since its inception.

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RESEARCH ARTICLE

Study of Voltage Variation in Capacitance to Voltage Convertors

D. N. Lobo | Swapnija Arondekar | Tejaswi Dewasthali | Prathamesh Mahale

Department of Physics, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: D. N. Lobo (lobonanc@gmail.com)

ABSTRACT

In this paper we present a practical capacitance to voltage convertor circuit for measuring capacitance over a linear voltage range. We present two methods for measuring capacitance as a function of voltage namely the direct capacitance to voltage convertor and the indirect capacitance to voltage convertor.

PACS numbers: capacitance to voltage convertors

1. Introduction

Capacitance is an important parameter in electronics and used in numerous electronic devices [1–5]. Capaci- tive transducers use the conversion of a capacitance - to - voltage (C/V) conversion in transducers and are used for measurement of blood pressure, acceleration, displace- ment, moisture of material and component concentration in multi component fluids. The inputs to these capaci tance based sensors are physical parameters like pressure, acceleration, displacement etc. The resulting change of the iput parameters result in the change of capacitance and are measured as a function of voltage.[6–9] In the design of the direct or indirect C/V converters, a lot de- pends on the quality of designed C/V converter like:

     Nonlinearity
     Resolution
     Sensitivity
     Accuracy
     Stability
     Reliability
     Generated total output noise
     Cost

Unfortunately, a lot of recent research in this field do not take into consideration all of the above requirements which may lead to erroneous C/V conversion, caused by poor reliability, short - term stability, bad linearity or low accuracy. Our project deals with experimental analysis of C/V converters taking into accounts all of the above requirements as practically possible.

Our work proposes a simple method, which can easily integrate capacitance measurement by using a frequency to voltage converter using the National Semiconductor IC Code LM2917, which creates a linear relationship be- tween small changes in capacitance and the output voltage. We have also analyzed various other capacitance to voltage convertors using Op-amp and IC555.

2. Experimental

2.1. *Conventional Direct C/V*

The conventional impedance bridge, as described by [10], is shown in Figure 0. A square - wave generator E_i, drives the network with a frequency f, and the output voltage V_o, is given by the following equation,

$$V_o = \frac{[E_i f R R_L (R + 2R_L)(C_1 - C_2)]}{R + R_L} \qquad (1)$$
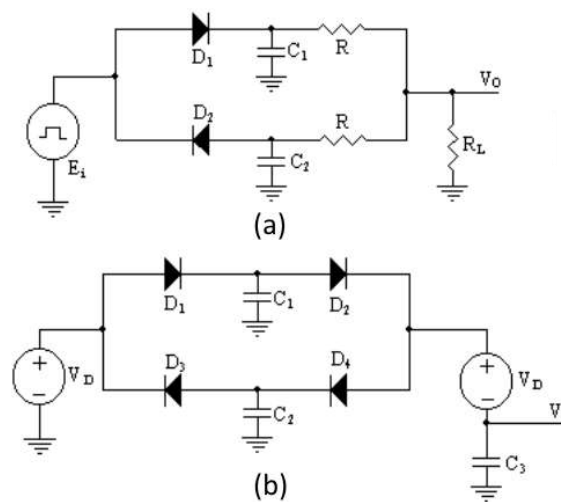
Figure 1. Conventional Direct C/V measurement (a) Twin Bridge circuit using resistors (b) Modified twin Bridge: replacement of resistors with diodes.

To improve the design flexibility and reduce the power consumption, the resistor R and R_1 Fig. 1(a) are usually replaced by two diodes (Fig. 1(b)).

The diode quad circuit is a modification of the conventional C/F converter shown in Fig.1(b). It is based on using commercially available matched diode quads which simplifies the circuit and improves its stability. Although, the diode quad circuit is an improved derivation of the circuit in Fig.1(b), it has the following disadvantages:

i. The full - scale output range is limited due to non-linearity and gain roll-off.
ii. The sensitivity and resolution of this circuit is reduced due to effects of diodes stray capacitances and elements interconnection.
iii. The electronic circuit, which recovers the measured capacitance Cx from the voltage Vo is not simple. This decreases the accuracy of Cx measurements (caused by error propagation) and reliability of the designed system.
iv. It needs two square signal sources which increases the cost of the C/V converter.
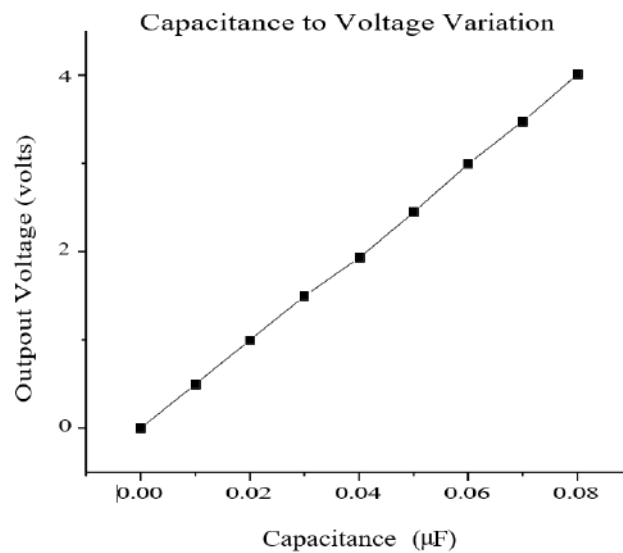
Figure 2. Plot of C (μF) vs o/p V(volts) for circuit in Fig.0.

The plot of variation of C (μF) vs o/p V(volts) for circuit in Fig.0 is almost linearly increasing straight line.

2.2. *Direct C/V Convertor*

The previously discussed two methods were published in literature [5] for directly conversion of capacitance to voltage. These methods have many drawbacks. This is why a decision was taken to design a simple, precise and reliable C/V converter free from previously discussed disadvantages as shown in Fig. 3.

If a sinusoidal signal V_{in} is applied to the input terminals of the capacitive voltage divider as shown in Fig. 2, then the output voltage V_{out} can be given by:

$$V_{out(rms)} = V_{in(rms)} \frac{C_x}{C_1 + C_x} \tag{2}$$

where C_x is the measured capacitance while C1 is a fixed capacitance.
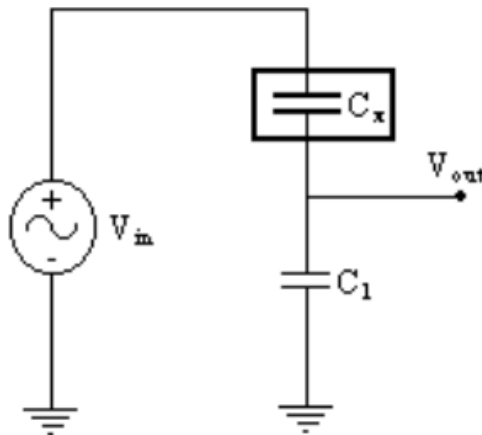
Figure 3. Circuit diagram of the proposed C/V converter (capacitive voltage divider).

Of course, the linearity of this circuit is depending directly upon the ratio $C_x/(C_1 + C_x)$. Thus, in order to achieve good linearity, the fixed capacitance C_1 must be at least ten times bigger than the measured C_x. If this condition is achieved then equation 2 is reduced to:

$$V_{out(rms)} = V_{in(rms)} * \frac{C_x}{C_1} \tag{3}$$

Therefore, the measured capacitance Cx, can be expressed as:

$$C_x = V_{out(rms)} * \frac{C_1}{V_{in(rms)}} \tag{4}$$

If,C_1 and V_{in} are known and have fixed values. Thus, if we assume that $C_1/V_{in(rms)} = a$, then

$$C_x = a * V_{out(rms)} \tag{5}$$

Equation 5 implies that the proposed C/V converter has a linear characteristic between the measured capacitance Cx and its output voltage (Vout). Moreover, in comparison with the previously discussed conventional C/V converter, this circuit is cheaper, more reliable and has better stability.

The output signal ($V_{(out)}$ of the capacitive voltage divider is sinusoidal signal. The measured capacitance is proportional to the root mean square (rms) value of the output voltage (Eq.5). Thus, to simplify the electronic recovering of the capacitance using Eq. 5, this AC voltage must be converted into DC voltage that will represent the $V_{out(rms)}$. Of course, the designed AC/DC converter must be precise and accurate. Thus, the classical bridge rectifier circuit cannot be used because a voltage drop of 1.4V occurs across the diodes. Moreover, the output voltage of any rectifier circuit is directly proportional to the average value but not to the rms value of its input voltage. So, these problems must be taken into consideration during the design of AC/DC

converter, otherwise an erroneous results may occur. To overcome these problems, a new AC/DC converter is proposed (Fig. 3). In this circuit, the capacitor C is a rectifier filter while the identical diodes D1 and D2 form a half-wave rectifier and these diodes are arranged in a way in which no drop in the output voltage of the capacitive voltage divider across these diodes will occur. Furthermore, the value of R1 and R2 were selected to ensure that the proposed AC/DC converter gives a DC output equals to the Vout(rms) of the capacitive voltage divider. Thus, the proposed converter is a precise one because there is no loss of the output signal of the capacitive voltage divider during its conversion into DC.

The complete circuit diagram of the designed C/V converter is shown in Fig. 4. The input stage of the circuit in Fig. 4 is a sine wave oscillator with an oscillation frequency f=1.5 kHz and 5V amplitude. This circuit can be easily integrated to obtain a miniature IC C/V converter.
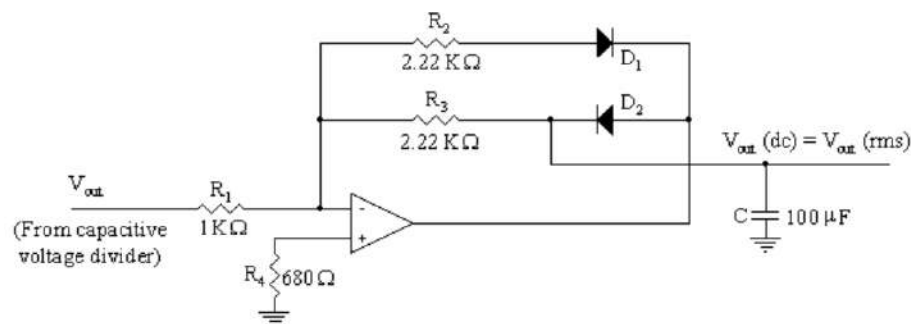
Figure 4. Circuit diagram of designed AC to DC convertor.
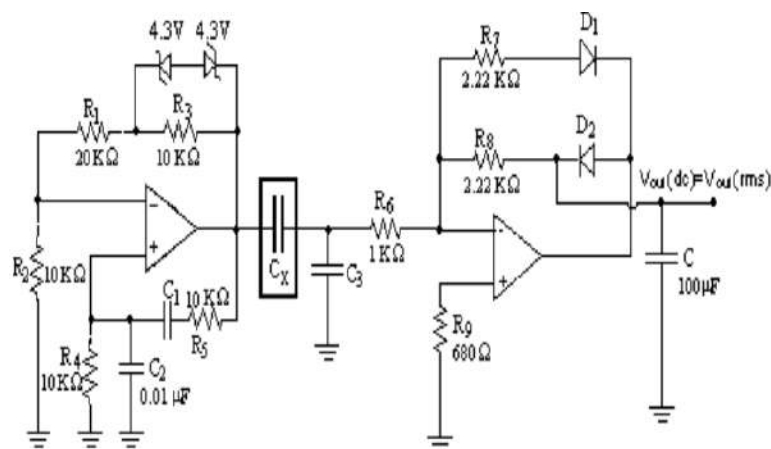
Figure 5. Circuit diagram of the complete proposed C/V converter.

The circuit in Fig. 4 has been experimentally tested for different ranges of C_x. The results are show in Fig. 5. It is easy to see that the output voltage is linear.
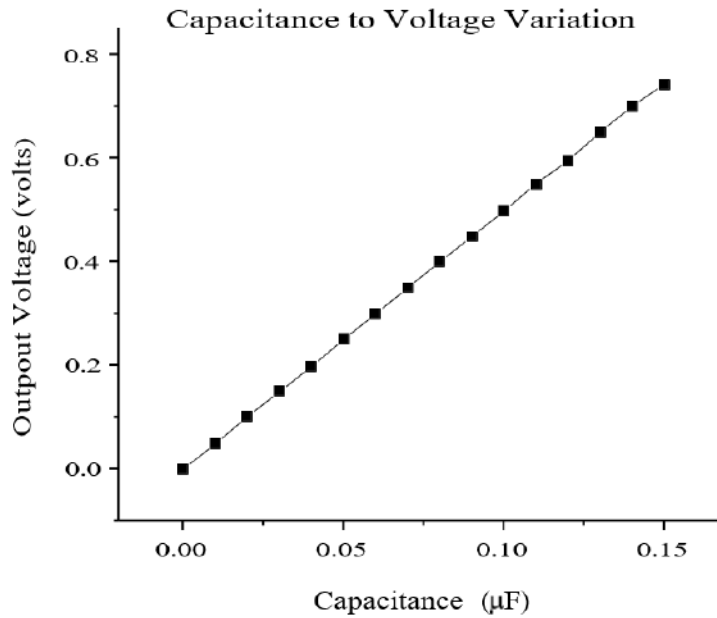
Figure 6. Plot of C (μF) vs o/p V(volts) for circuit in Fig.2.

We decided to test the linearly of the output voltage for a range of input frequencies for the circuit in Fig. 4 Clearly, from Fig. 6 the desirable frequency range to be used is 1000 to 2000 Hz.
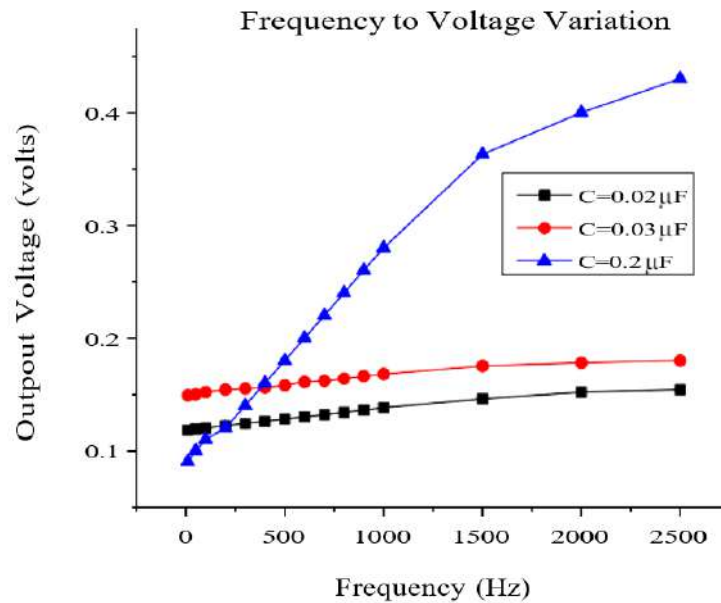
Figure 7. Plot of Frequency (Hz) vs o/p V(volts).

2.3. *Indirect C/V Convertor*

The indirect conversion of capacitance-to-voltage is based on conversion of capacitance changes into frequency or time periods. However these indirect C/V converters have many troubles. First, the output frequency, which is proportional to the measured capacitance, cannot be easily converted into voltage if it is necessary. Second, the control of switches requires a relatively

complex electronic system. This is why attempt has been made to study the problem of indirect C - to - V conversion. This study was lead to design a linear, accurate, simple, reliable and cheap C/V converter. The simplest way to convert the capacitance to frequency can be done by using the 555 timer in the a stable mode (Fig. 6), [18]. The output frequency of 555 timer in case of operation in the a stable mode is given by equation 6.

$$f = \frac{1.44}{C_{ext} * R_1 + 2R_2} \tag{6}$$

Therefore, if R_1 and R_2 are fixed resistors then the frequency f will be function of measured capacitance C_{ext} only. Thus the change in the capacitance C_{ext} will cause a change in the output frequency f of 555 timer. This frequency can be converted into voltage using the linear frequency-to-voltage (F/V) LM2917 converter [19]. Unfortunately, the capacitance-frequency (C-F) characteristic curve of 555 timers is nonlinear (Fig.7). So, it does not easy to recover the measured capacitance by simple analog electronic system which increases the complexity and decreases the reliability of the designed C/V converter.
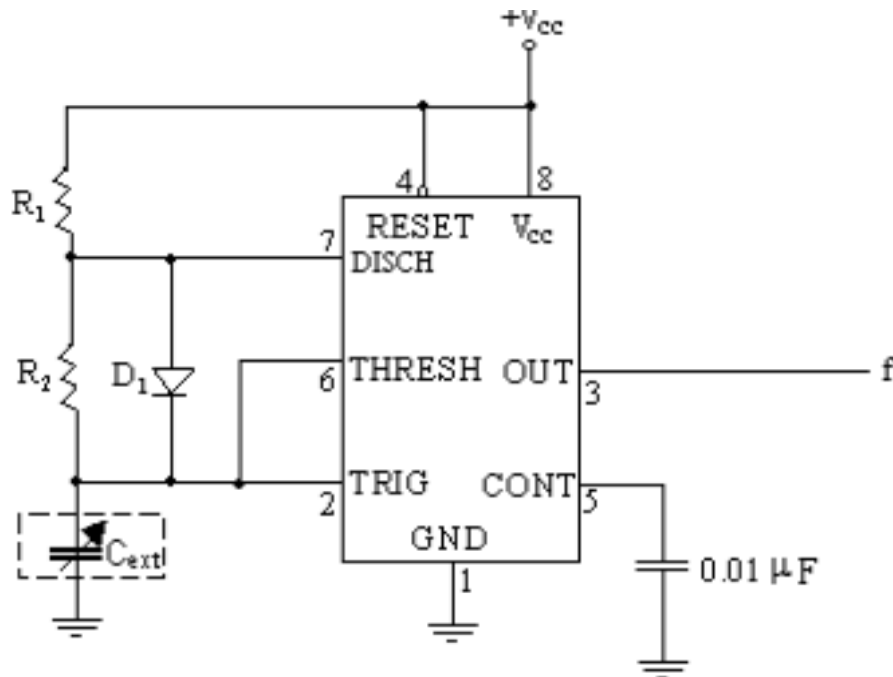
Figure 8. Circuit diagram of 555 timer configured as C/F converter

To eliminate these disadvantages, a simple and linear C/V converter is built using the LM2917 as C/V converter instead of its usual use as F/V converter. This is made possible by building an external square-wave generator using the 555 timer with f=1136 Hz that drives the LM2917 and connecting RC elements with LM2917 that ensure its operation as C/V converter (Fig. 8.). Then, the obtained circuit is experimentally tested and the obtained C-V characteristic curve is shown in Fig. 8.
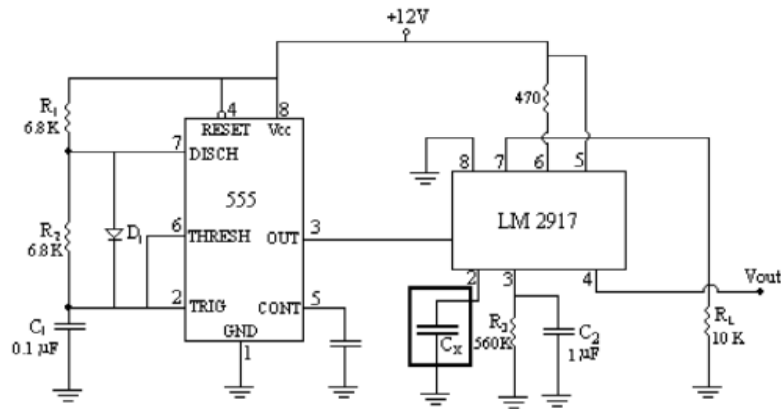
Figure 9. The indirect Capacitance-to-Voltage Converter using LM2917.
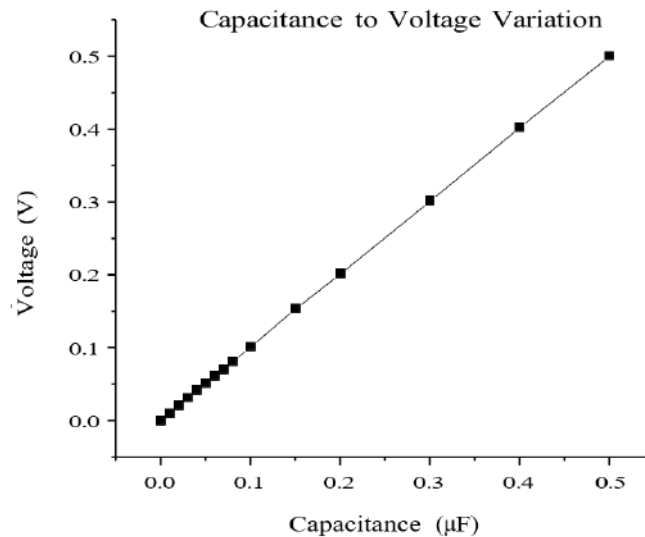
Figure 10. Variation of Capacitance-to-Voltage using IC LM2917.

3. Results and Discussion

The C/V convertors shown in Fig 1, 5 and 9 were experimentally verified by plotting the variation of output voltage with capacitance. The output voltage of circuit in Fig 1 and 3 were linear for a limited input capacitance range. Moreover, for circuit if Fig 5, the frequency of the astable multivibrator should be between 1000 to 2000hz range for stable characteristics as seen from plot in Fig 7.

The reliability of the measurments could not be measured experimentally. However, the probability of fault occurrence in the proposed direct C/V converters is less than the conventional C/V converters. The stability of the proposed and conventional C/V converters was also experimentally evaluated. This was done by making use of a digital millivoltmeter connected at

the C/V converter output to measure the drift of converter output voltage during a certain period of time.

4. Conclusion

From the experimental investigations discussed previously, it can be concluded that the designed C/V converters have many advantages over the conventional C/V converters such as long-term stability, simplicity, good sensitivity, high linearity and reliability and low cost.

Our C/V convertors can be used to convert the capacitance change of a capacitive transducer into voltage or a capacitance of discrete capacitors into voltage with better accuracy and linearity than the conventional C/V converters. Moreover, the designed direct or indirect C/V converters do not require other circuits to convert capacitance to voltage. But, the published C/V converters such as impedance bridge or diode quad circuit require additional electronic circuits such as square-wave oscillators and a complex system for recovering the capacitance from the output voltage of these C/V converters which increases the cost and decreases the reliability of these C/V converters in comparison with the proposed converters. Furthermore, the suggested converters can be easily adapted for different applications because the selection of components that appear in these converters is simpler than the conventional converters. It may be noted that our C/V convertors also exhibit good stability in measurement cycles.

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RESEARCH ARTICLE

Comparing Leadership Styles and Development Strategies in Coastal and Hinterland Villages of North Goa

Richa Eknath Kajoli

Department of Political Science, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Richa Kajoli (kajoliricha@gmail.com)

ABSTRACT

Grassroots leadership is fundamental to rural development in India, where panchayats serve as the cornerstone of local self-governance. This study investigates and compares the leadership styles and development strategies in six villages of North Goa—three coastal (Anjuna, Candolim, Morjim) and three hinterland (Camurlim, Paliem, Corgao). Using a mixed-method approach that includes structured surveys and in-depth interviews with 57 elected panchayat representatives, the research explores how regional contexts influence leadership behaviour, development priorities, and governance effectiveness. The findings reveal that coastal leaders are more inclined towards participatory and transformational leadership styles, shaped by tourism-induced challenges, while hinterland leaders tend to adopt bureaucratic and traditional methods, responding to agrarian and infrastructural concerns. The study concludes with recommendations for region-specific leadership training, greater financial autonomy for panchayats, and strengthened community engagement to improve rural governance outcomes in Goa.

1. Introduction

Leadership at the village level significantly shapes developmental outcomes, especially within India's decentralized governance framework under the Panchayati Raj system. In Goa, a state marked by stark geographic and economic diversity, coastal areas experience tourism-induced commercialization, while hinterland regions remain predominantly agrarian. This divergence creates unique governance challenges that require context-sensitive leadership approaches.

The coastal belt, particularly villages like Anjuna and Candolim, faces the repercussions of rapid urbanization, environmental degradation, and land-use conflicts arising from unchecked tourism. In contrast, hinterland villages such as Camurlim and Paliem grapple with declining agricultural

productivity, inadequate infrastructure, and youth migration. This study aims to understand how local leadership styles adapt to these region-specific demands and how these adaptations shape developmental strategies and governance effectiveness at the grassroots level.

2. Objectives

This research is guided by the following objectives:

1. To compare leadership styles in selected coastal and hinterland villages of North Goa.
2. To analyze the relationship between leadership style and governance outcomes.
3. To assess region-specific developmental challenges and leadership responses.
4. To offer recommendations to strengthen local leadership capacities and participatory governance.

3. Literature Review

Leadership is widely regarded as a central determinant of governance quality. Bell (2018) posits that political leadership is not merely a function of individual charisma but is deeply influenced by institutional settings and cultural expectations. Kane and Patapan (2015) further argue that leadership in democratic contexts is shaped, empowered, and limited by the imperative of participatory legitimacy and public accountability.

At the local governance level, Theakston (2017) underscores the role of bureaucratic leadership in ensuring procedural consistency and institutional stability. However, this form of leadership can sometimes inhibit innovation, especially in settings that demand adaptive and people-centered approaches. Within the Goan context, Fernandes (2015) highlights the evolution of local governance in tourism-intensive areas like Anjuna, revealing how demographic shifts and economic transitions have influenced panchayat responses to development imperatives.

These theoretical perspectives form the foundation for this study's analysis of leadership diversity across Goa's coastal and hinterland villages.

4. Methodology

4.1. *Area of Study*

The research was conducted in six villages in North Goa, representing both coastal and hinterland areas. The coastal villages include Anjuna, Candolim, and Morjim, while the hinterland villages comprise Camurlim, Paliem, and Corgao. These sites were selected based on geographical diversity and socio-economic contrasts.

4.2 *Sampling and Respondents*

The study engaged 57 respondents in total, comprising 41 current panchayat members, 14 former members, and two panchayat secretaries. The selection was purposive, ensuring representation from both coastal and hinterland contexts, as well as gender and experience diversity.

4.3. *Data Collection*

Primary data were collected through structured questionnaires and semi-structured interviews that explored leadership behaviour, decision-making patterns, and governance challenges. Secondary data sources included government reports, panchayat records, books, and reputable online platforms related to rural governance and local development.

4.4. *Data Analysis*

Quantitative data was utilised to provide statistical analysis, while qualitative data were examined and organized into key themes. This dual approach allowed for a detailed understanding of leadership styles, regional challenges, and development strategies adopted by panchayat representatives.

5. Results and Analysis

5.1. *Leadership Styles Observed*

The study observed that leadership styles in coastal villages largely leaned toward participatory and transformational models. Leaders in Anjuna, Candolim, and Morjim emphasized inclusive decision-making, regular citizen interaction, and proactive environmental management. Their governance reflected an awareness of the socio-ecological pressures arising from mass tourism and a desire to respond adaptively.

On the other hand, leaders from hinterland villages—Camurlim, Paliem, and Corgao—demonstrated a preference for bureaucratic and traditional leadership. Their governance approaches were structured, compliance-driven, and often reliant on administrative hierarchies. This style was shaped by the need to manage declining agriculture, infrastructural gaps, and limited financial resources. In a few cases, leadership tendencies shifted toward authoritarian or laissez-faire models, especially when leaders experienced burnout or administrative overload.

5.2. *Governance and Developmental Priorities*

The developmental focus of coastal panchayats centered around environmental sustainability, regulation of tourism, and infrastructure to manage waste and traffic. Leaders reported frequent engagement with issues related to coastal erosion, land disputes, and local resistance to zoning policies.

In contrast, hinterland panchayats prioritized agricultural revival, water conservation, rural education, and road connectivity. Leaders worked within tight budgets and focused on basic needs, often relying on state schemes and public works programs to support their objectives.

5.3. *Challenges Faced*

Coastal leaders highlighted recurring issues such as land-use conflicts, ecological degradation, and opposition from stakeholders resistant to tourism regulation. These challenges were worsened by competing interests in land and resource allocation.

Hinterland leaders cited poor infrastructure, limited financial autonomy, and declining agricultural engagement as persistent obstacles. The lack of youth interest in village governance and migration to urban areas further strained development efforts.

5.4. *Community Engagement*

Community engagement mechanisms differed significantly across regions. Coastal leaders often supplemented Gram Sabha meetings with digital tools like WhatsApp, social media updates, and virtual consultations to maintain continuous dialogue with constituents. This blended model of engagement enabled broader outreach, particularly among youth and migrant populations.

In the hinterland, leaders relied primarily on traditional forms of interaction such as Gram Sabha meetings and interpersonal communication. While this approach fostered close-knit community ties, it occasionally limited broader participation due to logistical or social constraints. Both groups acknowledged the need to enhance inclusivity, especially concerning women, youth, and marginalized communities.

6. Discussion

The findings reinforce the argument that effective leadership is context-dependent. In coastal villages, leadership emerged as more participatory and adaptive, shaped by the complexities of tourism, commercialization, and environmental risk. Leaders in these settings were more inclined to embrace innovative governance tools and collaborative planning.

Conversely, hinterland leaders, operating within resource-scarce environments, adopted leadership models rooted in hierarchy, routine, and procedural adherence. While this approach ensured administrative order, it often lacked the flexibility required to address evolving developmental challenges. This aligns with Kane and Patapan's (2015) assertion that democratic leadership must negotiate between public responsiveness and institutional constraint. Additionally, Theakston's (2017) analysis of bureaucratic leadership helps explain the slower pace of reform and innovation in hinterland governance.

7. Recommendations

7.1. *Leadership Training*

There is a need for tailored leadership development programs. Coastal panchayat members would benefit from training in sustainable tourism management, environmental governance, and digital civic engagement. Such training would enhance their ability to address tourism-related externalities while maintaining ecological balance.

Hinterland leaders require training in agricultural innovation, infrastructure planning, and the mobilization of local resources. Enhancing their technical and administrative capacities can improve service delivery and grassroots development planning.

7.2. *Financial Autonomy*

To ensure more effective governance, both coastal and hinterland panchayats must be granted greater financial autonomy. In coastal areas, localized revenue streams such as eco-tourism taxes or user fees for tourism services could provide much-needed funding for infrastructure and environmental initiatives. Hinterland panchayats could promote cooperative farming, skill development, and micro-enterprise support to diversify income sources and reduce reliance on state assistance.

7.3. *Community Inclusion*

Encouraging inclusive leadership is essential. Institutional mechanisms should support the political participation of women, youth, and marginalized communities through leadership quotas, mentorship programs, and civic education. Strengthening participatory institutions like Gram Sabhas and piloting digital village assemblies can further deepen democratic engagement.

7.4. *Sustainable Development Planning*

In coastal areas, developmental strategies must include stricter land-use regulations, sustainable zoning, and the implementation of coastal conservation programs. For hinterland regions, planning should focus on improved irrigation, enhanced transportation networks, and employment schemes that discourage outmigration and revitalize local economies.

8. Conclusion

This study underscores the significance of contextual factors in shaping leadership styles and developmental strategies within Goa's diverse rural landscape. Leadership at the grassroots level is not uniform; it is moulded by the social, economic, and ecological environments in which it operates. Coastal panchayats tend to adopt adaptive and participatory leadership styles suited to

their dynamic, tourism-driven contexts. In contrast, hinterland panchayats employ more bureaucratic and conservative approaches reflective of agrarian and infrastructural challenges.

To improve rural governance, it is imperative to invest in region-specific leadership training, institutional capacity building, and participatory mechanisms that empower communities. Future research could expand on this study by examining the long-term impact of leadership interventions or by conducting comparative studies in other Indian states with similar rural-urban divides.

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◼ **RESEARCH ARTICLE**

Cultural Nationalism: Reflections on Gellner's Perspectives and Indian Nationalism

Prasad Naik

Department of Political Science, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Prasad Naik (naikprasad929@gmail.com)

ABSTRACT

Nationalism sustains on a constructed high culture. The homogenisation of culture and standardisation of identities is fundamental to nation-making movements. Indian nationalism exploited Hindu-centric artefacts and cultural material to generate the idea of India, formulate singularity within multiplicity, and uniformity within complex plurality. It was the intellectual exercise to merge sacred and secular, as well as reformism and revivalism.

Introduction

The epistemology of nation and nationalism has remained a matter of scholarly discussion since the 20th century. While primordialism and perennialism consider that nations are ancient entities, modernists assert that the nation and nationalism are products of modernity. Though the ideology of nationalism first emerged in Europe and was later exported to the colonial regions of Latin America, Africa, and Asia, the intelligentsia of these colonial countries, especially India, customised the discourse of nationalism to suit the sociocultural necessities and historical realities of the region. Hence, Indian nationalism is termed as a derivative discourse; it is the amalgamation of Western rationalism and indigenous sentimentalism. This article explores Ernest Gellner's conception of nation and nationalism and attempts to depict Indian nationalism as the homogenisation of culture.

Gellner on Nation and Nationalism

Ernest Gellner, in his acclaimed work *Nations and Nationalism,* argues that nations are not natural entities, nor do they have any historical existence. Rather, nationalism is a product of modern

conditions, and industrialisation played a fundamental role in the construction of nationalities. 'Nationalism is primarily a political principle, which holds that the political and the national unit should be congruent' (Gellner, 1983, p. 1). Nation, in simple terms, is a culturally homogeneous community, and this homogeneity is largely constructed or cultivated by the hegemonic class. All communities, large or small, in their natural condition, are plural in terms of vernacular, culture, customs, and beliefs. But the nationalist discourse articulated by nationalist intellectuals contributes to the homogenisation of the community, either by the unification of closely linked identities to postulate monoculture or by the persecution of heterogeneous social traits often connected with minorities. Hence, nationalism is a socio-political populist movement driven towards the standardisation, homogenisation, and centralisation of culture. The homogenous culture presents the community as a nation and legitimises the territorial statism.

Gellner argues that nationalism is an ideology which asserts that the borders of the culture and state should be congruent with each other. However, the expectations of national and political amalgamation may not be compatible with historical realities. A nation-state might contain all its nationals and yet include some outsiders as well, basically belonging to a different culture or nation. And in another case, it might fail to include all its members, as some of its members may come under the territory of a different state. The congruence factor also holds that the ruler and ruled must belong to the same community (Gellner, 1983, p.1). Hence, nationalism has dual objectives. Firstly, to erase the culture of the non-nationals and impose the majority culture on them through education, banal nationalism, and forced assimilation. Secondly, to resist the government or the king, if found not to belong to the nation or the national community.

Gellner analyses the origin of nationalism within the context of industrialisation. He argues that in the pre-modern era, societies were particularly agrarian, and the masses or peasantry did not share culture with the elite class. The societies were horizontally divided, and the masses and elites lacked cohesion. In the absence of the centralised state and ubiquitous bureaucracy, neither the language nor the culture was standardised and uniformised. The state lacked a connection with the grassroots. Rather, villages were self-sustaining and semi-autonomous communities. With the spread of industrialisation, new towns and urban centres came into existence. Labour from rural areas moved to towns in search of durable employment. Since the labour force came from diverse backgrounds, they began to face communication barriers in the absence of a common vernacular, which in turn started to impact industrial production. The state played a crucial role in overcoming communication barriers. The state-run schools replaced the linguistic diversity with the standardised language.

The education system in industrial societies has been largely generic. The generic and semi-vocational education enables industrial production, helps in record maintenance through bureaucracy, and cultivates fraternity and political solidarity among urban labourers and elites (Gellner, 1983, p. 27). These schools and their standardised education instil high culture among people and develop context-free language, contributing to the growth of nationalistic communal consciousness. Hence, Gellner argues that it is not a nation that gives birth to nationalism, but it is nationalism which gives birth to a nation.

Gellner analyses the shift from agrarian societies to industrial societies within the continuum of wild cultures and garden cultures. The culture of agrarian societies was like a wild species that evolved naturally, thrives without external aid, is strong and sturdy, and contains genetic diversity. Agrarian culture lacks any considerable connection with the state. On the other hand, the culture of industrial societies is like a hybrid species, artificially constructed or cultivated through selective breeding. These cultures are standardised and homogenised, but inherently fragile, and need continuous support of the state for their survival (Gellner 1983, pp. 50-52). Through nationalist songs, flags, emblems, festivals, language, bureaucracy, and education, these cultures are protected and promoted. Hence, nationalism is the movement for the homogenisation of culture and the amalgamation of culture and state.

Indian Nationalism and Homogenisation of Culture

Indian nationalism is a derivative discourse and evolved under modern conditions. India, as a civilisation, is highly heterogeneous in terms of vernaculars, customs, religious beliefs, and philosophies. The idea of India as a nation-state evolved during British colonialism. The English-educated middle-class intellectuals constituted the people who articulated the entire discourse of Indian nationalism. This bilingual class was introduced to Western thought and European nationalist movements through English education. Using the European discourse, they formulated the idea of the Indian nation and adapted nationalist philosophy to Indian conditions. This part attempts to analyse how the Indian nationalists fostered homogenisation in socially heterogeneous India to legitimise the imagination of a nation.

Indian nationalists were influenced by European nationalist, liberal, and democratic thought. The thoughts of Rousseau, Mill, Locke, etc, inspired them, and they were aware of Cavour, Mazzini, Kossuth, and Bismarck (Khare, 1989, pp. 537-538). Under British colonisation, indigenous folks first generated a sense of political or territorial belongingness. The British bureaucracy, railway network, centralised administration, and the state-sponsored education cultivated a sense of integrated community among Indians. Within the framework of pan-India political consciousness, the middle-class intelligentsia exploited cultural artefacts to develop a national culture and fabricate homogeneity. Based on the idea of Mother Germania and Mother Russia, the idea of *Bharat Mata* was formulated. Abanindranath's painting of Bharat Mata personified the nation, and in the coming years, the nation and the divine combined. For a vague and absurd conception of the nation, the idioms and symbols accelerate the mass imagination.

Since the local cultures were vibrant and complex to replace, the national culture was developed by elevating Hinduism as a national religion and national culture. This transition within politics and religion came to be known as neo-Hinduism and political Hinduism (Schlensog, 2007, p. 161). The utilisation of Hinduism to shape nationalist ideology communalised the discourse and alienated the Muslims. Sen (2002) argues that the 'return to culture and traditions' promoted parochialism and denounced multiculturalism. Aryan theory was postulated to cultivate the sentiments of racial unity. Indians were projected as Aryans who migrated from the Northern

hemisphere to India. They were 'passive and meditative, concerned with religion and philosophy' (Thapar, 1996, p. 5). Hindu nationalism started to operate both inside and outside the Congress, which made the Muslims sceptical of the objectives of Congress and thus started to alienate themselves from the activities of the Congress (Gould, 2005, p. 39).

To strengthen the notion of a homogenous community, the demand was put forth for a national language, resulting in the Hindi-Urdu controversy. Raja Shivprasad, the advocate of the Hindi language and Nagari script, argued that to 'read Persian is to become Persianised, all our ideas become corrupt and our nationality is lost…' (Gupta, 2001, p. 4294). The nationalists declared the mother tongue as the essential element of national culture, which needed to be protected from external intrusion. The nationalists made '..it a cultural project to provide its mother tongue with the necessary linguistic equipment to enable it to become an adequate language for modern culture' (Chatterjee, 1999, p. 7). The Brahminic culture was elevated as national culture, and the subaltern's culture was ostracised. 'The performance cultures of hereditary musicians—Dalits and Muslims in particular—were rendered vulgar or dishonourable in the process to assert the cultural hegemony of high castes' (Ajotikar, 2021, p. 109).

The nationalist sentimentalism entered even the forum of art and architecture.

> …Ravi Varma's paintings also fed into the central concerns of Indian nationalism... they selected from these 'classics' a particular set of lyric and romantic themes in keeping with its aesthetics of 'high art'; they located 'culture' and 'tradition' in certain iconic images of Indian womanhood…(Thakurta, 1991, p. WS94).

Aloysius notes that cultural nationalists shaped Hindu identity through a Brahminical lens, portraying the subcontinent as a Hindu civilisation (Aloysius, 2017, pp. 152-153). The Cow became the symbol of the emerging Hindu nation, and vegetarianism was associated with national culture. However, historical records suggest that Hindu vegetarianism grew with Jainism and Buddhism's influence, and as Krishna's worship grew, the cow became sacred, and cow slaughter, a serious sin (Simoons & et al., 1981, pp. 122-123; Pal, 1996, pp. 53-54).

Conclusion

Hindu nationalism was fundamentally an upper caste's attempt to homogenise and hegemonize the Brahminic culture to protect hereditary privileges. The standardisation efforts received a major challenge from Dalit-Bahujan and Muslim leadership. While the former aspired for social revolution to achieve social egalitarianism, the latter aimed to protect Islamic culture. Muslim nationalism lost its fervour with the partition of India. In independent India, the discourse of nationalism and democracy is transforming within the dichotomy of cultural nationalism with the Hindu state and cosmopolitan nationalism with secular democracy.

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RESEARCH ARTICLE

Valorization of Fish Scale Collagen as a Sustainable Biotechnological Resource

Vishal Mardolkar | Ruth B. Aguiar | Seeya S. Mandrekar | Kimberly B. D'Costa | Shriya S. Raikar | Thanishka J. Menezes | Anifa Fernandes

Department of Biotechnology, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Vishal Mardolkar (Vishal.M@xavierscollegegoa.ac.in)

ABSTRACT

The increasing burden of fish processing waste presents both an environmental challenge and a valuable opportunity. This study explores the extraction of collagen from the scales of *Lates calcarifer*, a widely consumed fish in Goa, and investigate its sustainable applications in cosmetics and biotechnology. The extracted collagen underwent characterization through UV-Vis and FTIR spectroscopy. The purified collagen was successfully used to fabricate biodegradable face masks with polyvinyl alcohol (PVA), which were tested for its biodegradability and UV protection ability, demonstrating superior performance over commercial face masks. The results highlight the potential of fish scale collagen as a sustainable alternative to porcine collagen in high-value applications, addressing both ecological and industrial concerns.

1. Introduction

The global seafood industry, while pivotal in nutrition and economy, generates substantial waste, with up to 70% of the biomass discarded during processing (Coppola, et al., 2021). Among these by-products, fish scales are typically disposed of without consideration for their latent value, leading to environmental pollution and resource inefficiency (Qin, et al., 2022). Recent biotechnological advances have highlighted the potential of fish scales due to their rich collagen content. Collagen, a structural protein found in skin, bones, and connective tissues, plays an integral role in cell scaffolding, wound healing, and maintaining skin elasticity (Wu, Liu, Liu, & Wang, 2017). It is predominantly composed of glycine, proline, and hydroxyproline arranged in a triple-helix structure, particularly Type I collagen, the most abundant form in vertebrates (Ignat'eva, et al., 2007).

Fish-derived collagen offers several advantages over its porcine counterpart. It is associated with a lower risk of zoonotic disease transmission, has fewer religious and cultural restrictions and utilizes low-cost waste materials (Rajabimashhadi, Gallo, Salvatore, & Lionetto, 2023). The extraction process from fish scales is not only eco-friendly but also yields collagen with high biocompatibility and bioactivity. This aligns with current trends in regenerative medicine, tissue engineering, and cosmetics where biodegradable, non-toxic, and sustainable materials are preferred (Khan & Khan, 2013).

In particular, *Lates calcarifer* (commonly known as barramundi or chonak), a commercially important fish species in Goa, presents an ideal candidate due to the abundance of scales generated from local fish markets. This study aims to extract and characterize collagen from its scales and apply it in preparing biodegradable cosmetic face masks. These applications not only illustrate the scientific viability of fish collagen in product development but also promote sustainable waste management practices. The work thus contributes to both environmental preservation and the advancement towards green biotechnology (Bhagwat & Dandge, 2016).

2. Materials and Methodology

Materials: Fresh scales of *Lates calcarifer* (Barramundi/ Chonak) were collected from Mapusa fish market, Mapusa, Goa (15.5882°N. 73.8130°E). The chemicals used in this experiment were laboratory grade NaCl, EDTA, Tris–HCl buffer, acetic acid, PVA, vitamin E, glycerine, ethanol.

Methodology

2.1. *Extraction of Collagen*

Fish scales were weighed, washed in distilled water and soaked in 10% NaCl solution for 48 hours to remove unnecessary proteins on the surface and stored at 4°C. For the demineralization process, the scales were transferred in 0.5mol/L EDTA solution at pH 8 and kept undisturbed in the refrigerator for 96 hours followed by soaking of scales in 0.05M Tris–HCl buffer at pH 7.5 for 48 hours. The scales were then washed three times with cold distilled water (Ikoma et al., 2003).

2.2. *Purification via dialysis*

The demineralised scales were treated with 0.5M acetic acid at pH 2.5 for 48 hours (Chuaychan et al., 2015). The insoluble part of the scales was filtered and to this filtrate, 0.9M NaCl was added to induce salting out of collagen (Bhagwat & Dandge, 2016). The precipitate was centrifuged at 9,000 RPM for 30 minutes at 4°C to obtain a pellet. The pellet was dissolved in 0.5M acetic acid and stored in the refrigerator at 4°C. The dissolved pellet was transferred in dialysis membrane (HiMedia Dialysis membrane-50) and dialysed against chilled 0.1M acetic acid for 48 hours, changing the buffer after every two hours (Chuaychan et al., 2015). The purified Collagen was stored in polypropylene centrifuge tubes at -18°C for further use.

2.3. Characterization of purified protein

2.3.1. UV-Visible Spectroscopy: The purified protein was dissolved in 0.5M acetic acid and analysed using UV-Visible Spectrophotometer (OPTIZEN 3220UV) in the range of 200nm to 300nm to detect the presence of collagen, maintaining 0.5M acetic acid solution as blank (Jafari, et al., 2020)

2.3.2. FTIR analysis: The purified collagen was spread on a crystal disc and observed for its functional group peaks using the Thermo Fisher Scientific Model: Nicolet iS5 FTIR unit. The spectra were acquired over the range of 400-4000cm^{-1} (Jafari, et al., 2020)

2.4. Preparation of collagen face mask

For the preparation of face masks, 5g of PVA were dispersed in beaker containing distilled water, 2mL of the purified collagen, vitamin E, glycerine, ethanol and kept over a magnetic stirrer at 60℃ to get 100ml of homogenised mixture. The mixture was uniformly poured over cleaned petri-plates and kept in a dust free environment overnight (Raju, 2022).

2.5. Biodegradability assessment

A 3 x 3 cm piece of commercial collagen face masks and extracted collagen face mask with 5% PVA were used to test its biodegradability. The pieces were weighed and buried in petri plates containing 45g of dry soil. They were observed for the duration of five days by checking its weight each day.

2.6. UV shielding efficiency of face masks

An overnight grown *E. coli* culture suspension was spread plated on five petri plates. Petri plate A was kept as control, petri plate B was kept uncovered, petri plate C was covered with glass plate, petri plate D was covered with commercial face mask and petri plate E was covered with face mask prepared from extracted collagen with 5% PVA. All five petri plates were exposed to UV light for 20 minutes and kept in incubator for 24 hours. The next day, the plates were checked for microbial colonies.

3. Results and Discussion

3.1. Extraction and purification of collagen

The extraction of collagen from *Lates calcarifer* scales using acid treatment followed by purification via dialysis yielded approximately 10 mL gelatinous collagen from 100g fish scales. The visual appearance of a translucent gelatinous mass after dialysis indicated minimal contamination and a successful yield. The sequential treatment steps using NaCl, EDTA, and Tris-HCl ensured inorganic matter was removed without denaturing the collagen protein.

3.2. Characterization of extracted protein sample

3.2.1. *UV-Visible Spectroscopy:* UV-Vis spectroscopic analysis of the purified collagen showed a maximum absorbance peak at 235 nm, characteristic of Type I collagen. The UV-Vis peak at 235 nm is indicative of the presence of the polypeptide bonds and associated chromophores within the collagen structure (Jafari, et al., 2020).
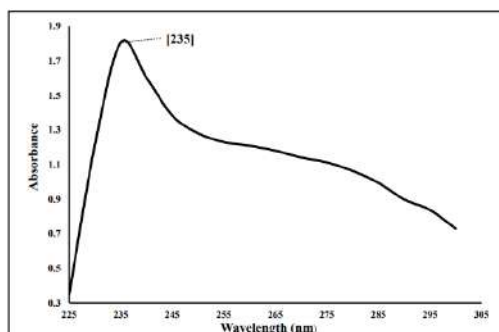
Figure 1. UV-Visible spectrum of extracted Collagen.

3.2.2. *FTIR:* FTIR spectroscopy exhibited key functional peaks: a broad peak around 3425 cm^{-1} corresponding to O-H stretching, and another at 1629.97 cm^{-1} associated with amide I (C=O stretching vibrations), confirming the presence of collagen-specific functional groups. FTIR analysis provided further confirmation by detecting amide bond vibrations specific to the triple-helix configuration of collagen molecules. The amide I peak is particularly important, as it is sensitive to the secondary structure of proteins (Jafari, et al., 2020). The presence of alcohol compound impact the stability and aggregation behaviour of Collagen in solution (Xu et al., 2021). Within the Collagen triple-helix, aromatic residues are relatively rare but they play a specialized role in higher order structure and function, accelerating the aggregation of triple-helical peptides and affecting their biological activity (Bhagwat & Dandge, 2016)
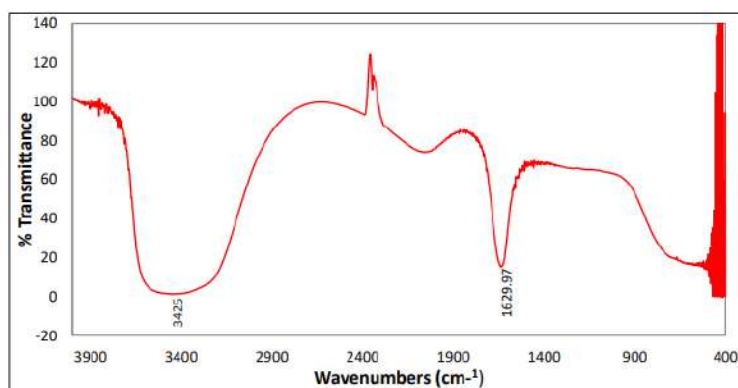
Figure 2. FTIR spectrum of extracted Collagen

Table I. FTIR absorbance frequencies of extracted collagen samples.

Frequency range	Wavenumber (cm^{-1})	Group	Compound class
3900-3400	3550-3200	O-H stretching	Alcohol
1900-1400	2000-1650	C-H bending	Aromatic

3.3. *Preparation of collagen face mask*

The incorporation of collagen with PVA resulted in bio-composite films with promising mechanical properties. The 5% PVA mask was deemed more suitable for cosmetic application due to its lightweight and flexible nature. PVA's hydrophilic property combined with collagen's elasticity produced a biocompatible material ideal for skin-contact applications
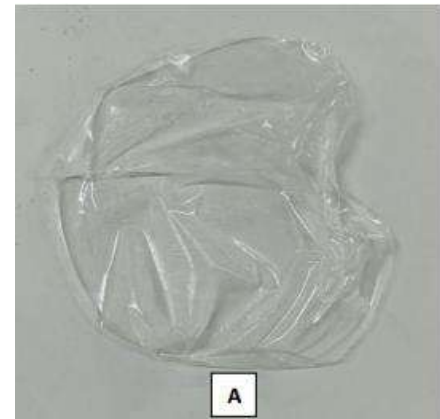
Figure 3. Overnight dried Collagen face mask with 5% PVA.

3.4. *Biodegradability assessment*
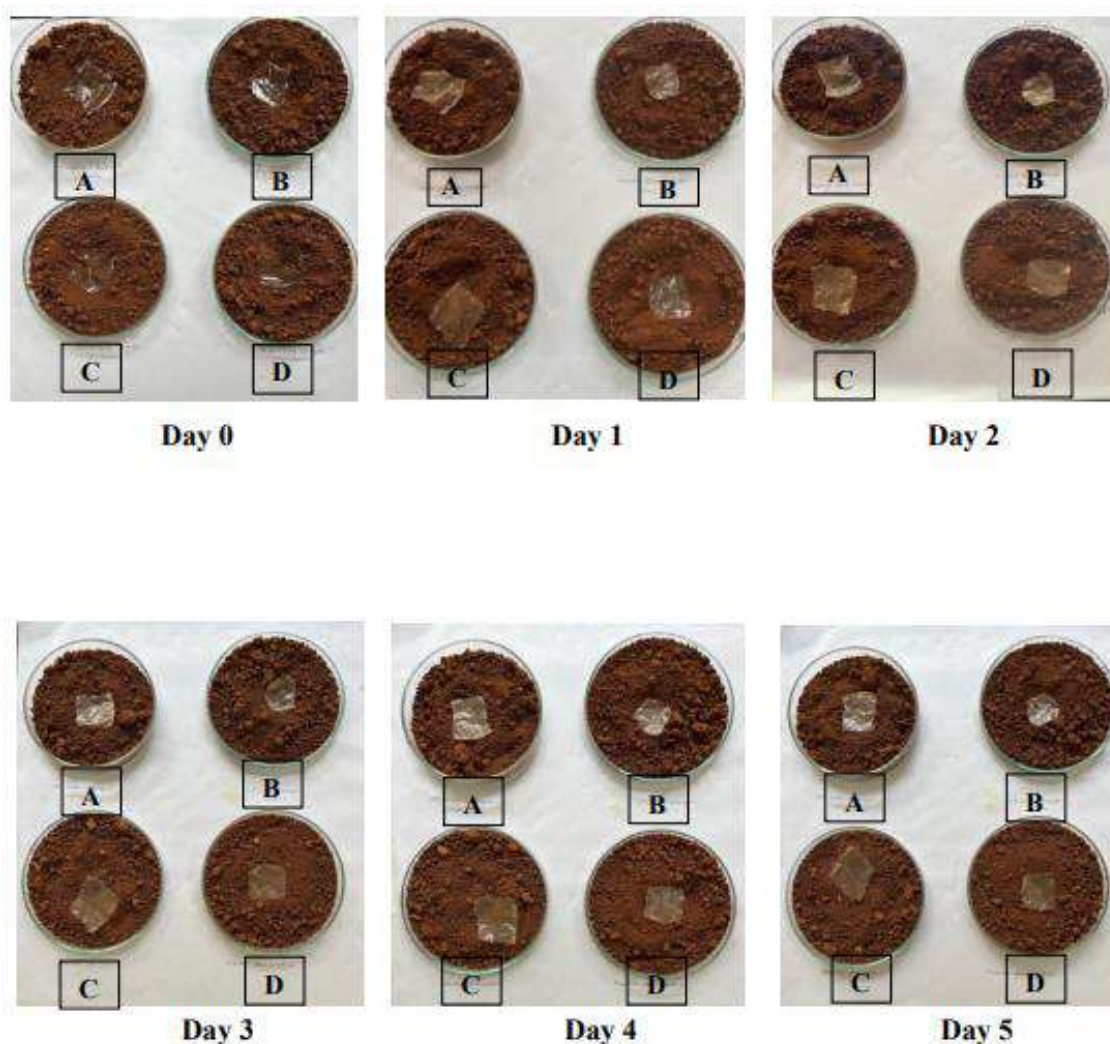
Figure 5. A and B are petri plate with soil sample containing Collagen face mask with 5% PVA. C and D are petri plate with soil sample containing Commercial face mask.

Table II: Weights of Collagen face mask with 5% PVA and Commercial Collagen face mask over a duration of five days.

Sample	Weight (g)					
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
Collagen face mask with 5% PVA (A)	0.047	0.039	0.033	0.03	0.028	0.027
Collagen face mask with 5% PVA (B)	0.028	0.022	0.021	0.021	0.019	0.019
Commercial Collagen face mask (C)	0.04	0.04	0.038	0.038	0.038	0.037
Commercial Collagen face mask (D)	0.022	0.022	0.022	0.022	0.022	0.021

In reference to Table II, a significant weight reduction was observed in the 5% PVA collagen face mask (~43% loss over five days) compared to minimal degradation in commercial alternatives (~7.5%). The significant weight loss of the collagen-PVA composite mask reflects its superior biodegradability, highlighting its environmental advantages over conventional synthetic masks. (Janssens-Böcker et al., 2024).

3.5. *UV shielding efficiency of face masks*

The UV protection ability of the Collagen face mask with 5% PVA was evaluated against commercial face mask by inoculating UV-sensitive *E. coli* on agar plate. After UV exposure, the nutrient agar plate E covered with the Collagen face mask with 5% PVA exhibited approximately 154 bacterial colonies. In contrast, the plate D covered with the commercial face mask showed approximately 64 bacterial colonies, indicating partial penetration of UV light.

UV protection assays using *E. coli* revealed enhanced shielding by the 5% PVA mask over its commercial counterpart, indicated by a higher number of surviving bacterial colonies post UV exposure. This suggests that the collagen's aromatic amino acids may contribute to absorbing harmful UV radiation, thereby offering protective benefits when incorporated into cosmetic products.
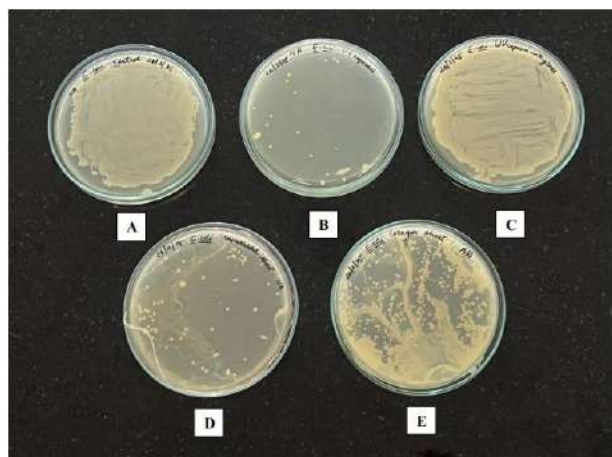
Figure 4: (A) Control, (B) uncovered Petri plate, (C) Petri plate covered with glass, (D) Petri plate covered with commercial Collagen face mask, (E) Petri plate covered with prepared Collagen face mask with 5% PVA after overnight incubation.

4. Conclusion

This study successfully demonstrates the valorization of fish scale waste through the extraction and application of Type I collagen. The collagen obtained from *Lates calcarifer* scales was effectively characterized and utilized in biodegradable face masks preparation with enhanced UV protection and environmental friendliness. These results establish fish collagen as a sustainable, functional resource with immense potential in cosmetics and green bioprocesses. As environmental pressures and demand for biodegradable materials grow, such initiatives will be crucial in promoting circular economy strategies and reducing bio-waste footprints.

5. Acknowledgment

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Spectrum

RESEARCH ARTICLE

Leafing through the Blue Notebook: A Critical Appreciation of Satyajit Ray's 'Feluda' Series

Chetna Thanki | Christie Fernandes | Diksha Tupkar | Joaquim Barneto | Joshua Lobo | Katherine Manuel | Marlon Fernandes | Michelle Macedo | Maria Claudette Gomes

Department of English, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Chetna Thanki (chetnaathanki@gmail.com)

ABSTRACT

This paper presents a critical appreciation of *The Adventures of Feluda* by Satyajit Ray, focusing on the series' unique contribution to children's detective fiction in India. The study explores Ray's successful blending of detective fiction with the conventions of children's literature. Through a detailed examination of character development, particularly of Feluda, Topshe, and Lalmohan Babu, the paper highlights the moral clarity, cultural specificity, and intellectual engagement that define the series. At the same time, the paper addresses notable omissions within the series, including the minimal representation of female characters, subdued depictions of violence, and the absence of romantic or psychological complexity. These elements, while limited in scope, contribute to the series' child-friendly tone and enduring appeal. Ultimately, this study recognises Satyajit Ray's *The Adventures of Feluda* as a significant work of Indian children's literature that encourages critical thinking while fostering cultural pride.

Introduction

Detective fiction and children's literature are two distinct genres, one that is characterised by suspense, logic, and crime-solving, the other by whimsical storytelling and moral lessons. Satyajit Ray's *The Adventures of Feluda* skilfully merges these genres to create compelling detective fiction tailored for younger audiences. This paper critically examines Ray's work, focusing on the narrative structure, character dynamics, stylistic choices, and notable omissions that define the series.

Detective Fiction Meets Children's Literature

Detective fiction traditionally revolves around a central mystery, often a crime, solved through logic and keen observation. Children's literature, on the other hand, thrives on imagination, moral lessons, and relatability. Satyajit Ray's *Feluda* series blends these elements seamlessly, creating stories that are both mentally engaging and age appropriate.

Unlike adult detective fiction, which delves into psychological depth and complex plots, children's detective fiction simplifies narratives, uses straightforward clues, and maintains a tone of adventure rather than darkness. Ray's writing respects the boundaries of children's literature while introducing its readers to the rigors of deduction and reasoning.

While Satyajit Ray is more widely known for his cinematic work, his literary contributions, particularly in Bengali children's fiction, are equally remarkable. He revived *Sandesh*, a Bengali children's magazine, where the Feluda stories first appeared. The series, written in Bengali and later translated by Gopa Majumdar, offers young readers a culturally rich and intellectually stimulating experience devoid of explicit violence or adult content.

The Cast of Characters

Ray's characters play a vital role in shaping the narrative. At the core is Pradosh C. Mitter, better known as Feluda, a 27-year-old detective from Kolkata. Feluda embodies physical fitness, intelligence, and moral integrity. He records observations in a coded blue notebook, showing a methodical approach to crime-solving. In 'The Anubis Mystery', Feluda showcases his exceptional investigative and sharp observational skills, which are evident when he notices the faint scent of sandalwood and the unusual design on the mummy case. Feluda's calm and composed demeanour, even in the face of danger, is noteworthy. His wide reading, calm demeanour, and ethical principles make him an aspirational figure for young readers.

His 14-year-old cousin, Topshe, serves as both his assistant and the narrator. Topshe's perspective grounds the stories in adolescence, providing a relatable lens for the audience. For instance, in 'Tintoretto's Jesus', he is very keen to find out more details of the lost painting. His attention to detail enriches the story. While waiting at Princep Ghat, he observes, "I could not see anyone at all, except boatmen in little boats on the river." His observation reflects a strong sense of awareness, an essential quality for investigations. His character evolves through the series, gaining analytical skills and emotional maturity.

Lalmohan Ganguly, or Lalmohan Babu (pen name Jatayu), adds humor and eccentricity. A crime writer himself, his exaggerated ideas and timid bravery offer comic relief while occasionally aiding in investigations. His humour comes naturally from his personality. He is dramatic and very lovable. His clumsy yet sincere attempts at heroism create some of the series' most memorable moments. Despite his quirks, Lalmohan Babu is loyal and resourceful, rounding out the trio.

Supporting characters like Uncle Sidhu, the encyclopaedic advisor, and a rotating cast of clever antagonists enhance the narrative. Ray's villains, like Maganlal Meghraj and others, are multifaceted, motivated by greed, revenge, or obsession. Their complexity adds depth to the mysteries, challenging Feluda's intellect.

Narrative Style and Structure

Ray employs simple, accessible language that appeals to both children and adults. His stories, originally published serially, follow a consistent structure akin to Freytag's Pyramid: exposition, rising action, climax, falling action, and denouement. The narratives often begin with the characters on vacation or receiving a mysterious invitation, progressing into investigations where clues unfold gradually. Ray uses real settings like Kolkata, Darjeeling, and Gangtok, providing geographical and cultural context. The cultural specificity is enriched through references to local newspapers, festivals, and historical anecdotes.

Dialogue plays a significant role in exposition. Through conversations between Feluda and Topshe, readers are introduced to complex ideas in an understandable way. For example, in 'The Curse of the Goddess', after reading the diaries of Mahesh Chaudhary, Feluda discusses the codes which he finds in them with Topshe and Lalmohan Babu as well. This dynamic is instrumental in maintaining the story's accessibility.

Ray's inclusion of everyday Bengali brands and customs anchors the stories in familiarity, particularly for Bengali readers. Brands that were in daily use and staples, such as Bata footwear, Binaca oral hygiene products, and Charminar cigarettes. The colloquial tone and cultural markers like Durga Puja and Bengali idioms strengthen reader engagement and cultural identity.

Thematic Omissions and Gender Representation

A critical aspect of the *Feluda* series lies in what it omits. Female characters are largely absent or play minor roles. When present, women are passive, reinforcing traditional gender norms. This lack of female representation aligns with the broader trend in Bengali adolescent literature (Kishor Sahitya), which often excludes the perspective of young girls (Kishori Sahitya). When women do appear, they are often relegated to passive or supportive roles. For instance, in 'The Anubis Mystery', female characters like Maya and Mami exist merely as background figures with no active contribution to the central mystery. Similarly, in 'The Disappearance of Amber Sen', Mrs. Sen is depicted as warm and caring, while Runa, Amber Sen's niece, is characterised by her innocence and admiration for Feluda. These characters lack agency, reinforcing traditional gender roles rather than challenging them. Ray defended this choice by citing the need to maintain the "cleanliness" of the stories, avoiding romantic subplots or adult themes. However, this rationale has been critiqued for equating female presence with sexualization, limiting the potential for more inclusive storytelling.

The stories also tone down violence. Crimes are mostly non-graphic cases of theft, deceit, or murder presented with minimal detail. The emphasis is on intellectual problem-solving, not physical confrontation. However, instances of violence do occur, albeit sparingly. In 'Murder in the Mountains', Mr. Majumdar is stabbed in the chest, and Feluda experiences a near-fatal fall into a gorge. Similarly, in 'Peril in Paradise', a large stone is hurled at Feluda, and Mr. Mallick is murdered. Yet, these acts of violence are presented with minimal graphic detail, ensuring the stories remain appropriate for younger audiences.

Moreover, Ray avoids complex psychological themes common in adult detective fiction. His antagonists are driven by tangible motives like wealth or revenge, avoiding exploration of moral ambiguity or existential crises. Similarly, Feluda's character lacks romantic entanglements or emotional backstories, keeping the focus tightly on the plot.

Cultural and Historical Layering

Ray uses setting not merely as a backdrop but as a narrative device. His depiction of places like old Calcutta or Sikkim includes historical trivia and cultural insights, often woven into the mystery itself. This not only enriches the story but also educates readers about Indian heritage. For example, in *The Secret of the Cemetery*, Feluda explains the origin of "Fancy Lane" as derived from "phansi" (hanging), tying the name to colonial history. In *Trouble in Gangtok*, Ray contrasts Indian and Tibetan cultures, offering a glimpse into the socio-political landscape of Sikkim before its integration into India.

Conclusion

Through *The Adventures of Feluda*, Satyajit Ray introduced generations of children to the world of detective fiction. His stories combine the thrill of mystery with cultural familiarity, moral clarity, and educational value. The simplicity of language, strategic narrative structure, and vibrant characters make the series accessible and enjoyable for young readers.

At the same time, Ray's conscious omissions around gender, violence, and psychological complexity, spark important discussions about inclusivity and representation in children's literature. These choices both define the series' distinctive tone and reveal its limitations.

Nevertheless, *The Adventures of Feluda* remains a pioneering work in Indian children's detective fiction. It not only provides an indigenous alternative to Western narratives but also invites readers to appreciate the ingenuity of Indian storytelling. As more readers rediscover Ray's literary legacy, the blue notebook of Feluda continues to inspire curiosity, critical thinking, and a love for stories rooted in both logic and culture.

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Bite of Imagination: Vampires in Modern Fiction and their Impact on Teenage Identity

Chetna Thanki | Maria Claudette Gomes

Department of English, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Chetna Thanki (chetnaathanki@gmail.com)

ABSTRACT

Imagination plays a significant role in adolescent development and shaping how teenagers perceive the world and their place in it. Genres such as fantasy, mystery, and adventure captivate the teen imagination, providing an outlet for self-expression, exploration of complex emotions, and escapism. In today's world, the popularity gained by fanfiction about the supernatural, which often evolves into novels and eventually movies, is quite significant. This paper explores the allure of these genres from a teen perspective through the lens of books such as the Twilight series and The Vampire Diaries, analysing how they allow teens to navigate their internal and external worlds. It also examines how these genres help teens confront fears as they search for an identity of their own. Using vampires and the gothic as the focus, this paper discusses their influence and enduring appeal to teenagers.

Introduction

Transcending time and cultures, vampires have become a staple in folklore and age-old myths. From the eerie tales of Dracula to the portrayal of vampires as misunderstood heroes, their representation has evolved significantly. Naturally, the concept of vampires has not limited itself to the world of folk stories alone. In contemporary fiction (1990–present), there has been a remarkable surge in the popularity of vampires in popular culture, especially among teenage audiences. Works like *The Twilight Saga* (2005) and *The Vampire Diaries* (2009) have given rise to a type of vampire that is both mysterious and relatable, while exploring young adults' desires, struggles, and fears.

The evolution of vampires from terrifying and gruesome creatures to romanticised and even idolised figures, especially among adolescent girls, is truly fascinating. Once symbols of evil,

death, and the supernatural, vampires now represent rebellion, eternal youth, and forbidden love—themes that deeply resonate with a young audience just beginning to explore their own identities. This paper, "Bite of Imagination: Vampires in Modern Fiction and Their Impact on Teenage Identity," explores the evolving role of vampires in modern fiction and how deeply the fangs of their impact run on teenage identity, serving as escapism.

The vampire myth finds its roots in ancient folklore, with the figure appearing in various forms across different cultures. From Eastern European legends of the blood-drinking undead to the Mesopotamian myth of Lilith, vampires were initially feared for their ability to drain life and vitality. The 1897 publication of Bram Stoker's *Dracula*, however, cemented the vampire's place in Western literature. Stoker painted the creature as both seductive and horrifying. Contrary to popular belief, the notion that *Dracula* was the first novel to feature a vampire is a common misconception. In reality, the first vampire was a female character crafted by Sheridan Le Fanu in his novel, *Carmilla* (1872).

Stoker's *Dracula* (1897) represented a dark force that threatened the morality of the Victorian age, bringing forth anxieties about sexuality, foreign invasion, and disease. The façade of charm and sophistication, while feeding on the blood of the innocent, shaped the public image of vampires for decades to come. However, as society modernised, so did the vampire. The feared monster evolved into a more complex, morally grey hero, allowing for a deeper exploration of themes such as identity, desire, and the human condition. It is this very shift in the portrayal of the vampire that captivates the teenage audience today.

Adolescence is a pivotal stage of self-discovery, often marked by emotional turbulence and a quest for identity. Young individuals find themselves grappling with complex emotions and societal expectations. Therefore, it is no secret that during such times, one's imagination plays a vital role in determining how to navigate life around them. It is through this lens that teenagers interpret their experiences and build self-concepts. Supernatural genres and their popularity, particularly those featuring vampires, became a cultural phenomenon. James B. Twitchell notes that Sheridan Le Fanu's Carmilla and Bram Stoker's Dracula… introduced what has become a dominant theme in twentieth-century vampire lore- the vampire as the "love-them-and-destroy-them" adolescent male fantasy (Twitchell).

It is the very allure of dangerous love interests, who promise both desire and destruction, that has made vampires such loved figures in media, both written and visual. The surge of vampire fiction in the 21st century can be largely attributed to *The Twilight Saga* (2005), an immensely popular vampire narrative devoured by millions of primarily female adolescents all over the world (Dresen) written by Stephenie Meyer. This series catapulted and reshaped the vampire genre by introducing a love story that resonated with teenagers. Meyer's *Twilight* transformed the feared monster into a romantic hero struggling with his feelings and desires. The story, set in high school, intertwines themes of immortality, forbidden love, and the yearning for eternal youth. The saga's protagonist, Bella Swan, is a relatable teenage girl drawn to supernatural forces. Edward Cullen, the vampire

and main love interest, is a tortured soul, struggling to suppress his vampire instincts, making him an enigmatic and desirable figure for a teenage audience.

What captivates countless fans in this romantic story are the characteristics of Bella with which they can identify. Apart from the space for female (heterosexual) desire that is created through Edward's continence, an appealing feature of Bella's role appears to be her uniqueness, being chosen for eternity and, within this election, Edward's very serious recognition of her vulnerability and fragility. Critics may deplore this ascription, but I think they must have forgotten how it feels to be a teenager (Dresen). The series gained a large fan following because many young girls desired to be noticed for who they truly were, similar to how Bella was noticed by Edward. Bella's vulnerability and uncertainty in her identity as a young woman resonate with fans who see themselves reflected in her character. And as Grietje Dresen puts it, A godlike lover who notices and respects your vulnerability: What teenager would not want that? (Dresen).

While critics often dismiss *Twilight* as promoting unhealthy relationships, its success lies in its ability to connect with young audiences. Teenage girls identified with Bella's vulnerability and her yearning for a sense of belonging. The series provides a narrative space for young readers to explore intense feelings of desire and vulnerability in a way that is both safe and cathartic.

The Twilight phenomenon was quickly followed by the book series-turned-tv show *The Vampire Diaries* (2009), which only further added to the supernatural fantasy. The series presented a world where vampires struggled with their "humanity" and questioned their purpose, existence and self-worth. The Salvatore brothers, Damon and Stefan, represent two sides of the same coin, i.e. teenage rebellion. The two… characters portray different desires of bloodlust; one brother attempting to suppress his desires and the other learning to cope with them and handle them in moderation. This…shows their human morals and how they manage these desires (Latifi).

The show's plot is not groundbreaking by any means, but it has all the essential elements of a teenage drama: love triangles, friendships, betrayals, and an endless supply of villains. The show's main focus is on the relationships between its characters, and it does a great job of making you care about them, even the villains (Vyas).

The representation of identity and its loss are ideas linked to post-humanism. As the name implies, post-humanism aims to push against or move beyond humanism, a worldview that took hold in the late 18th and early 19th centuries (Allen). Identity and its representation in *The Vampire Diaries* are concepts that much of its audience can relate to (Latifi).

Elena Gilbert, one of the central protagonists and love interests, serves as one of the most relatable aspects of the show. Her journey through grief after losing her parents in a car accident is a very disorienting experience. Her struggle to reconcile her old life with her new reality reflects the turmoil teenagers often feel when facing difficult changes. In Season 2, Episode 1 ("The Return"), Caroline Forbes's transformation into a vampire serves as a powerful metaphor for the loss and reconstruction of her former self, and the challenges of adjusting to her new identity. Her journey, as she grapples with her new self, mirrors the emotional upheavals faced by teenagers as they try

to reconcile who they are becoming. The lines between human and inhumane are blurred in the modern representation of vampires. It correlates to the feeling of losing your identity, with many young adults feeling lost as they are seen as different compared to social norms (Latifi).

The conflict between identity being both empowering and confining, love as both life-saving and dangerous, and immortality as both a blessing and a curse are contradictions that both *Twilight* (2005) and *The Vampire Diaries* (2009) thrive on. Cleanth Brooks's concept of the "language of paradox" provides a valuable framework for understanding the appeal of these texts and others like them. The challenges faced by young adults, as they navigate their lives, are mirrored in popular media, providing the audience with a narrative space to explore their conflicting emotions and desires.

It is no secret that the primary audience for such novels and TV shows was, and continues to be, teenage girls. Both series gained a life of their own, unlike other romance novels published at the time. The reason for this was that these stories were willing to meet teenagers where they were. Teenagers are often taught that any strong feeling is irrational due to their changing bodies, or in the case of sexual feelings, it is labelled demonic and something that must be repressed. Puritanical thinking and abstinence-only education consume the lives of many teenagers, and one can only imagine that this dogma was, and unfortunately still is, much harder for young girls to cope with (meeptop).

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Conclusion

The central conflict of such texts serves as a powerful tool for adolescent development, enabling teenagers to navigate their internal and external worlds through imaginative engagement with themes of identity, desire, and power. Many of the vampire romances that have become so popular in the 21st century so far, especially the ones aimed at a young adult readership, present us with old-school gentleman vampires who are, certainly, sensitive and evolved in some ways, but who also offer security and stability of old-fashioned gentlemen that some readers may now crave without being able to clearly articulate that craving (Mukherjea). The appeal of the vampire myth reflects the complexities of adolescence, providing a lens through which young readers can explore their emotions and relationships. By understanding and analysing these stories, we can better appreciate the role of imagination in the journey of self-discovery during adolescence.

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RESEARCH ARTICLE

The Little Grey Cell Effect: Unravelling the Mystery of Imagination through the Hercule Poirot Series

Katherine Gertrude Manuel | Maria Claudette Gomes

Department of English, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Katherine Manuel (katherinemanuel2020@gmail.com)

ABSTRACT

Every good story, whether fantasy, adventure or mystery, stems from the imaginative faculties of an eloquent writer. Agatha Christie, a stalwart in the genre of mystery and adventure, spins tales and weaves stories that encourage the reader's imagination to run wild. The range of mysteries that Agatha Christie covers in her extensive collection of written work- spanning across almost 60+ novels and 14 short stories starring detectives like Hercule Poirot, Miss Marple, Parker and Pyne and a whole host of standalone amateur sleuths, leads scholars to marvel at her brilliance and creative ingenuity.

Agatha Christie's Hercule Poirot, the compelling, fastidious Belgian detective, steals the hearts of most of Christie's fans- with his cool, laidback crime-solving methods. Till today sales of Christie's novels continue to exceed the two-billion-mark, captivating audiences across ages and generations.

This paper examines the imaginative prowess of this iconic author through the analysis of two of her most popular novels- 'The Murder of Roger Ackroyd' and 'Murder on the Orient Express' and aims to explore her distinctive creation of characters, powerful narratives and gripping resolutions, that fascinates teens and adults alike.

Introduction

Having 66 novels and 14 short story collections to her name, Dame Agatha Mary Clarissa Christie remains one of the world's most renowned crime fiction writers. Blossoming at a time known as the *'Golden Age of Detective Fiction'*, Christie wove stories that had every reader hooked, waiting for a solution to some of the most baffling mysteries, often topped with unexpected plot twists. Of all the characters she conjured throughout her illustrious career, the one that stands out the most to many critics is her fastidious Belgian detective- Hercule Poirot. Poirot, a meticulous and morally

upright private detective, solves every mystery in his calm, collected way, taking his time and using his powers of observation.

Both- 'The Murder of Roger Ackroyd' and 'Murder on the Orient Express'- involve perplexing mysteries that take the reader on an adventure that is unforgettable. This demands an extremely powerful and vivid imagination to create characters and stories like these- portraying Agatha Christie's ingenious creative prowess. She exemplifies what it means to let one's imagination run wild- with unbelievable plot twists and unique characters. Through this paper I aim to highlight nuances of Agatha Christie's writings- especially in 'The Murder of Roger Ackroyd' and 'Murder on the Orient Express'- that brings to light her power of imagination in the mystery and adventure genre.

The imagination is the greatest tool at the disposal of any author. Curiosity is embodied in the form of mystery and imagination is expressed through creativity. According to research, while curiosity and creativity are argued to be distinct concepts, they are likely interconnected. (Jirout et al.) Curiosity is such a basic component of our nature that we are nearly oblivious to its pervasiveness in our lives. (Hayden et al.) This paper intends to explore this pervasiveness into literature by analysing Agatha Christie's most well-known texts through character sketches, plot comparisons and storylines.

Most studies and literature available across sources, provides numerous studies on analysis of Agatha Christie's novels, characters and a host of comparisons between her writing and that of the ever famous Sir Arthur Conan Doyle. Other research papers cover the adaptations of her novels to film and the impact that her detective fiction novels have had on literature.

Results and Discussion

Agatha Christie has earned numerous accolades and awards for her gripping crime fiction novels and her books continue to captivate audiences even today. 'Murder on the Orient Express' follows the murder of an American tycoon, stabbed a dozen times in his train compartment aboard the Orient Express, his door locked from the inside. Winning the 'British Crime Writers' Association prize for best crime novel ever, 'The Murder of Roger Ackroyd' tells the story of a double murder in the otherwise peaceful and quiet English village of King's Abbot. Hercule Poirot must unravel this mystery involving blackmail and death, leading to one of the most startling conclusions of his career.

'Murder on the Orient Express' is quite different from other Golden Age detective novels- with multiple suspects rather than a single criminal (Ines and Fekih). By breaking the barriers set, in terms of detective fiction, Christie created a name for herself that stood the test of time. Knox's *Ten Commandments in Detective Fiction*, a loose structure found in early detective fiction novels that gave a guideline of sorts to most crime and mystery writers, states that- *The criminal must be someone mentioned in the early part of the story, but must not be anyone whose thoughts the reader*

has been allowed to follow. With 'The Murder of Roger Ackroyd', Christie infamously violated the first of Knox's Commandments- that the murderer shouldn't be the narrator. It was through such reading that one finds that Christie revolutionised the way detective fiction was perceived. This became a compelling focus of study and one that would portray how the power of imagination can heavily influence, change and break the standards set in the genres of mystery and adventure.

To understand the iconic *Monsieur Hercule Poirot* and see how Agatha Christie employed her powerful imagination to mould a character this unique, it is necessary to look at the standard template of a detective. W.H Auden, in his article titled '*The Guilty Vicarage: Notes on the Detective Story, By an Addict'* states that- "*since the murderer who caused their disjunction is the aesthetically defiant individual, his opponent- the detective, must be either the official representative of the ethical or the exceptional individual who is himself in a state of grace".* Poirot fits this bill- he is highly moralistic, always looking to uphold his righteous values.

What, then, makes him different? According to W. Marling, *"The detective should be anonymous, eschew publicity, be close-mouthed, and secretive. He or she protects good people from bad people, who do not live by the rules; thus, one may break the rules in dealing with them".* Poirot, on the contrary, is flamboyant and loves attention; he is ambitious and quite vain. He is a true genius, with his knowledge of peoples' psychology, ability to analyse evidence and events and unexpected conclusions. To add to this, his methods vary greatly from that of the *'ideal detective'*, instead of looking for physical clues, Poirot focuses on the psychology of the suspects. He says it himself- *"It is the psychology I seek, not the fingerprints or the cigarette ash"* and employs the use of his '*little grey cells'.* He uses deductive reasoning rather than deciphering clues. He is a performer and entertains the audience while revealing the details of a mystery, rather than being quiet and reserved.

Ever thought about every detective's trusty sidekick? One of the key functions of a sidekick in crime fiction, is to help the protagonist navigate through the complex world of crime by offering technical expertise, emotional support or even physical backup. At times, however, a sidekick can be a fully realised character, with its own developments through the progression of the novel- some are just as complex and intriguing as the detective himself. This is certainly proved through the difference between the sidekicks seen in Hercule Poirot novels in comparison to other sidekicks like Dr Watson in Sherlock Holmes.

In 'The Murder of Roger Ackroyd', the sidekick himself is revealed to be the murderer! How's that for a 'trusty' sidekick? It certainly makes one wonder about the tendencies of human nature. Dr Sheppard's position gives him insights into many secrets and makes both the characters and the readers trust him and assume his innocence. He seems sincere and reliable but turns out to be the most cold, cunning and deceitful sidekick and narrator. It sure does take a lot of imagination to create a character that builds trust throughout the narrative, just for the rug to be pulled from under our feet and this trust shattered in a couple of seconds.

What makes Christie's novels stand out? Let's take a look at 'The Murder of Roger Ackroyd'. Through her vivid imagination, Agatha Christie turned the conventional narrative on its head, enhancing the thrill of mystery and adventure. Detective fiction was often told through a first-person narrative, allowing the reader to experience the mystery unfolding through the eyes of the detective. Through first person narration, the reader is placed in the detective's mind, where he/she will reside for the entirety of the story. In fiction, there is no greater closeness than this. Since the story is being told from the detective's perspective, the narrative is coloured by the detective's unique voice. The reader will learn more about the detective's personality through the way he/she tells the story. (Conelly and Jordan)

In this novel, while the narration is in first person, the sidekick is the narrator and more importantly the narrator/sidekick is the murderer- Dr James Sheppard. This style of writing provides an entirely new perspective in detective fiction, showing a different angle than what was witnessed earlier. What is even more special is that this fact- that the narrator is the murderer- is revealed only at the end of the novel. How does this enhance the reader experience? The reader reads the entire novel imagining clues and examining character conversations, trying to decipher them and figure out the culprit. When the resolution is complete, the reader now has to reimagine the entire narrative and look for clues in the narrator's actions and words. Thus, enhancing the overall novel and giving a two-fold experience. The reader can now read the entire novel again and imagine it from the narrator's perspective while also keeping in mind the fact that he is the murderer. Interesting, isn't it?

If that's not enough, 'Murder on the Orient Express' goes a step further. Rather than having a single murderer, Agatha Christie goes twelve steps further with not one or two, but twelve murderers, all cooped up on a stalled train. A nerve-wracking, scary situation to be in for Hercule Poirot as well as for us readers. Most generic murder mysteries stick to a single killer who possesses a strong motive and commits the crime at an opportune time when in solitude. Here we see a whole gang of murderers-stabbing the victim twelve times consecutively on a train, in the midst of other travellers.

If this doesn't convince you of Agatha Christie's vivid imagination, here's another point to ponder upon. William Stowe defines what conventional detective by fiction is as follows- *"The continuing appeal of the detective novel has been explained by the genre's conservatism. Detective fiction tends to affirm rather than to question, to take social structures, moral codes and ways of knowing as givens, rather than subjecting them to thorough, principled criticism."* (Stowe). In 'Murder on the Orient Express', things are different- Hercule Poirot raises moral questions, rather than affirming answers. He creates two theories about the death of Ratchett and presents both before the group of murderers to decide which he should relate to the Police. By doing this, he takes a step back from upholding the morality and in effect, even protects the gang of murderers. The crime committed is social justice metered to someone who had managed to escape true justice in society.

Ratchett, the victim aboard the Orient Express, also known as Cassetti, kidnaps a young Ms Daisy Armstrong from her wealthy family and demands a high ransom for her return. On paying the sum, the family is devastated to learn that Cassetti has already killed Daisy. The Armstrong household-including family members as well as caretakers of the family home, design this elaborate murder to avenge justice for their little Daisy.

Agatha Christie, through the narrative proposes another out-of-the-box idea- should the twelve murderers be let off the hook because they avenged the death of their ruthlessly murdered little girl? Or should they be reported to the Police for the planning and execution of such a gruesome murder? These questions come up in the mind of the reader, further showing how Christie, rather than sticking to the rules of detective fiction and providing clear resolutions, leaves the reader with more questions than they begin with.

Till today we see the lasting impact of Agatha Christie's Hercule Poirot novels. With a number of film adaptations, the best being Murder on the Orient Express (1974), her writing continues to resonate with young adults as well as hard- boiled fans of detective fiction. Teenagers consistently look for novels that challenge the accepted idea and the fact that Christie does this quite often, appeals to their adrenaline-driven imaginations. This is of essence as we're seeing a steadily increasing need to revive the novel-reading culture at a time when reels and Tik-Tok are the only objects stealing our teenagers' attention.

The imagination is such a powerful creative tool and is an author's biggest asset and a reader's best friend. Through this study, we have seen how Agatha Christie uses this tool to create fantastical tales- going beyond what was accepted and revolutionising the mystery genre. Not only does she conjure suspenseful stories, but she also takes the reader on a journey of adventure, with her imagery and descriptions that the reader often feels like he/she is witnessing the crime first-hand. The power of imagination leaves so much space for creativity and originality. It transforms the most mundane and gives one a chance to escape to a world of mystery, adventure and fantasy.

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■RESEARCH ARTICLE

Sustainable Synthesis Methods for Comparative Study of CoO, NiO and MnO₂ in Supercapacitor Applications and Antimicrobial Studies

Sajal S. Gauthankar | Kalpita K. Talpekar

Post Graduate Department of Chemistry, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Kalpita K. Talpekar (Kalpita.T@xavierscollegegoa.ac.in)

ABSTRACT

The green synthesis of nanoparticles using plant extracts has attracted considerable interest due to its ecofriendly approach and wide-ranging applications. This study focuses on the synthesis of Cobalt oxide (CoO), Manganese Dioxide (MnO_2) and Nickel oxide (NiO) nanoparticles at pH 9, employing the aqueous extract of Ficus benghalensis, a plant known for its rich bioactive content. Electrochemical performance was assessed using cyclic voltammetry (CV), where MnO_2 exhibited the highest specific capacitance, indicating its superior energy storage capability per unit mass. Antimicrobial studies revealed CoO had better antimicrobial activity as compared to MnO_2 and NiO NPs. In conclusion, this study presents a simple and sustainable method for synthesizing CoO, MnO_2 and NiO nanoparticles, highlighting their promising applications in energy storage and antimicrobial activity. These findings contribute to advancing green nanotechnology toward a more sustainable and eco-conscious future.

Introduction

Nanomaterials, with dimensions between 1-100 nanometres, have become a cornerstone in advancing modern science and technology due to their exceptional optical, electrical, and catalytic properties. Their high surface-to-volume ratio enables enhanced reactivity, makig them highly effective in applications such as drug delivery, sensors, catalysis, and energy storage.

Among various synthesis approaches, green synthesis has emerged asa sustainable alternative to traditional chemical methods. This eco-friendly process utilizes biological agents like plant extracts to reduce and stabilize nanoparticles, offering benefits such as low toxicity, cost-

effectiveness, and environmental safety. One such plant *Ficus benghalensis* (commonly known as the Banyan tree), is rich in bioactive compounds including tannins, flavonids, and proteins. These phytochemicals not only aid in nanoparticle formation but also enhance their antimicrobial and electrochemical properties.

Metal oxide nanoparticles like nickel oxide (NiO), cobalt oxide (CoO), and manganese dioxide (MnO_2) are widely researched for their multifunctional roles. NiO is a p-type semiconductor with applications in batteries and catalysis. CoO is known for its redox capability, making it suitable for supercapacitors and antimicrobial activity. MnO_2 is valued for its high charge storage capacity and is commonly used in energy devices and environmental remediation. To understand and optimize their functionality these nanoparticles are characterized using techniques such as UV-Visible spectroscopy, Fourier Transform Infrared (FTIR) spectroscopy, and X-Ray Diffraction (XRD). These methods help determine structural, chemical and optical properties.

Figure 1. *Ficus benghalensis.*
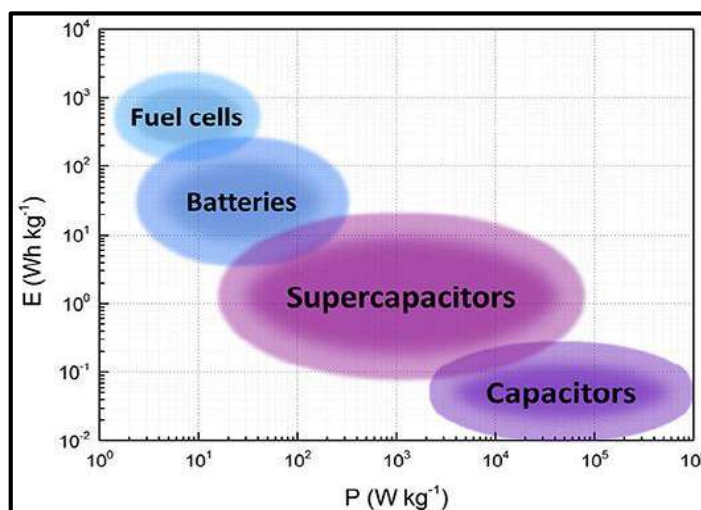
Figure 2. Ragone Plot of various electrochemical energy storage devices.

The electrochemical performance of NiO, CoO and MnO_2 nanoparticles was evaluated using cyclic voltammetry (CV), an essential technique to study redox behavior and charge storage capacity. In CV, the current response is measured as the electrode potential is cycled, providing insights into oxidation-reduction processes and capacitive performance.

These nanoparticles are promising materials for supercapacitor applications due to their high surface area, fast electron transfer, and excellent stability. NiO exhibits high theoretical capacitance and redox activity, CoO supports rapid charge-discharge due to its good conductivity, and MnO_2 shows superior specific capacitance and environmental compatibility.

The Ragone plot is used to compare energy storage devices based on specific energy (Wh/kg) and specific power (W/kg). Supercapacitors, including those using these metal oxides, typically occupy the high-power, moderate-energy region of the plot.

Materials and Methods

Chemicals Required: Cobalt (II) nitrate hexahydrate, Manganous sulphate monohydrate, Nickel acetate tetrahydrate, 2M NaOH.

Preparation of Plant extract and Green Synthesis of Metal Oxide Nanoparticles

Metal oxide nanoparticles (CoO, MnO_2, and NiO) were synthesized using a green synthesis approach with Ficus benghalensis leaf extract serving as a natural reducing and stabilizing agent. Fresh leaves were thoroughly washed with distilled water, boiled in distilled water for 30 minutes, and the mixture was filtered to obtain the extract, which was refrigerated for later use.

For the synthesis of each metal oxide, an aqueous solution of the respective metal salt (cobalt nitrate for CoO, manganous sulfate for MnO_2, and nickel acetate for NiO) was prepared and mixed with a measured volume of the Ficus benghalensis extract under vigorous stirring. The pH of the mixture was adjusted to 9 using 2 M NaOH, and the solution was stirred continuously at 60°C for 4 hours. The resulting precipitates were filtered, washed with deionized water to remove impurities, and dried in an oven at 100°C for 24 hours. The dried powders were then calcined at 800°C for 4 hours in a muffle furnace to obtain the final metal oxide nanoparticles, which were collected for characterization and application studies.

Results and Discussion

The optical properties of the synthesized CoO, MnO_2, and NiO nanoparticles were first analyzed using UV-Visible spectroscopy, as presented in Figure 3. The UV-visible spectrum of CoO nanoparticles (Figure 3A) displayed two distinct absorption peaks at 556.72 nm and 804.48 nm, attributed to $O^{2-} \rightarrow Co^{2+}$ and $O^{2-} \rightarrow Co^{3+}$ charge transfer transitions, indicating the presence of mixed oxidation states. The MnO_2 nanoparticles (Figure 3B) showed a broad absorption band centered around 375.31 nm, corresponding to the photoexcitation of electrons from the valence band to the conduction band, confirming its semiconductor nature. Meanwhile, the NiO nanoparticles (Figure 3C) revealed a sharp and strong absorption peak at 333.00 nm, which arises from the transitions between the oxygen 2p valence band and the nickel 3d conduction band. These distinct spectral signature validate the synthesis of all three metal oxides and suggest their potential in electronic and energy storage applications
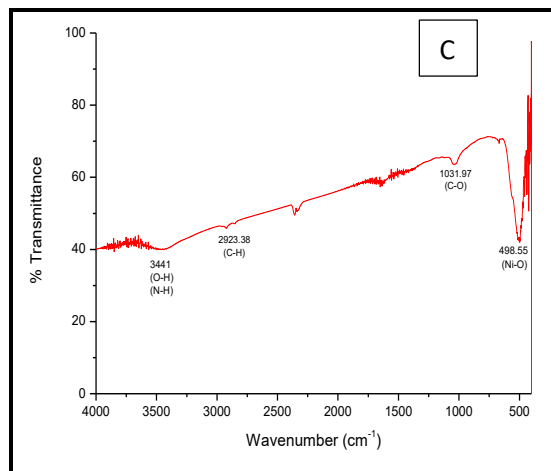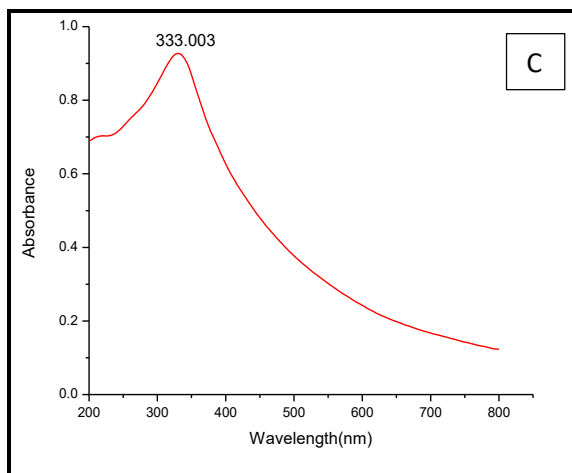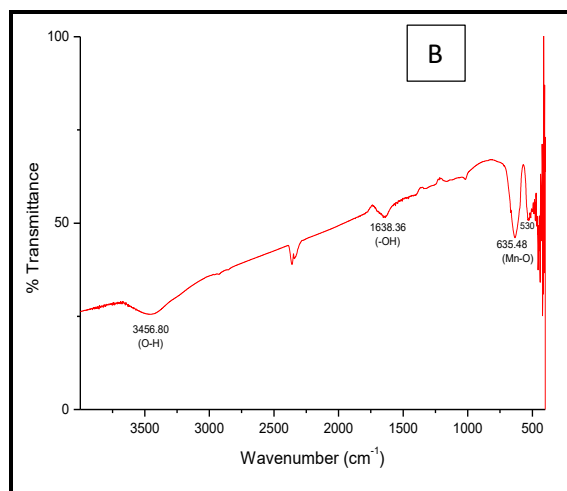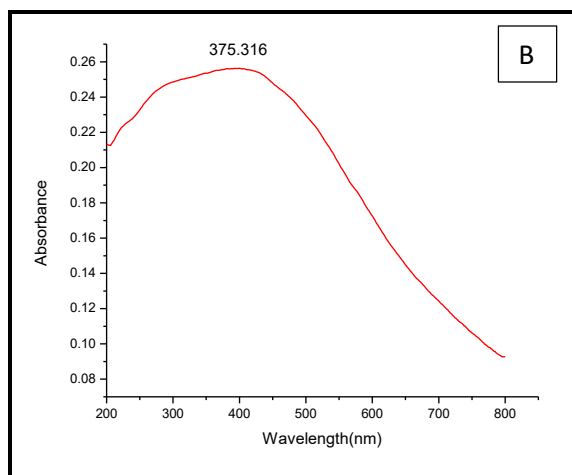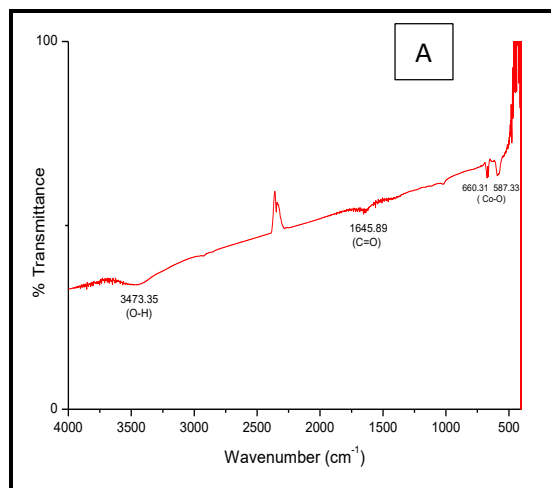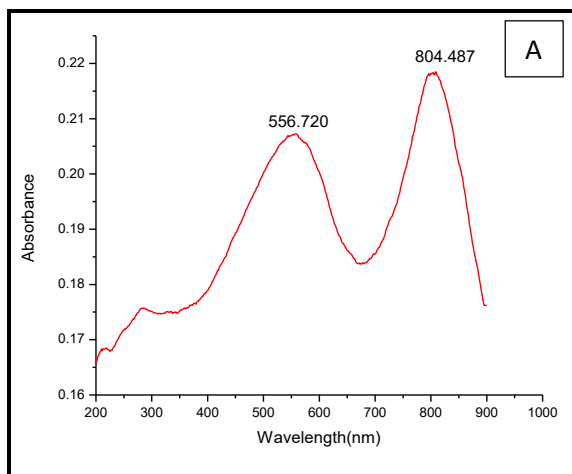
Figure 3. UV-Visible spectra of A) CoO, B) MnO$_2$ and C) NiO.

Figure 4. FTIR spectra of A) CoO, B) MnO$_2$ and C) NiO.
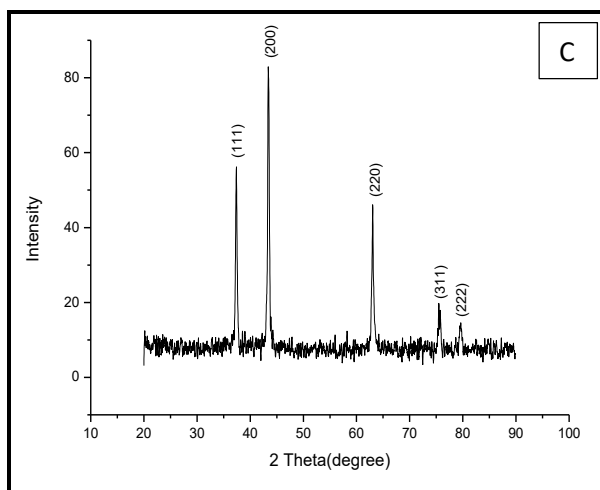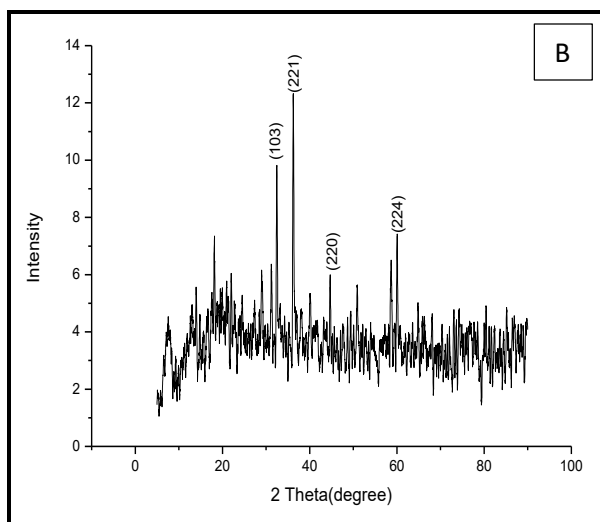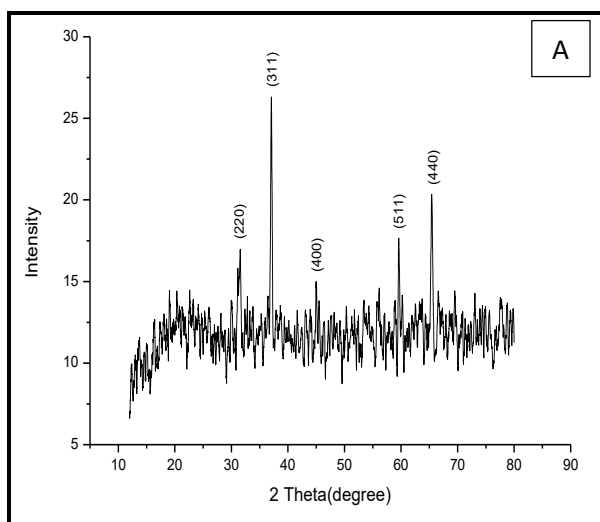
Figure 5. X-ray Diffraction pattern of A) CoO, B) MnO_2 and C) NiO.
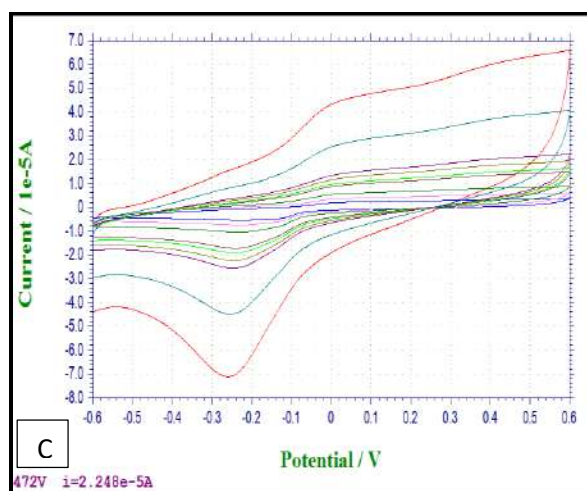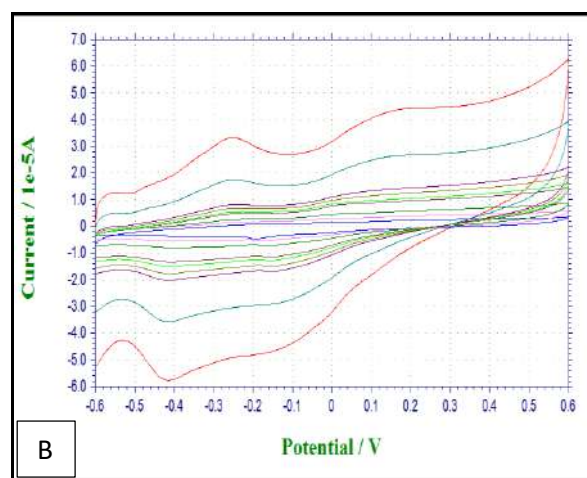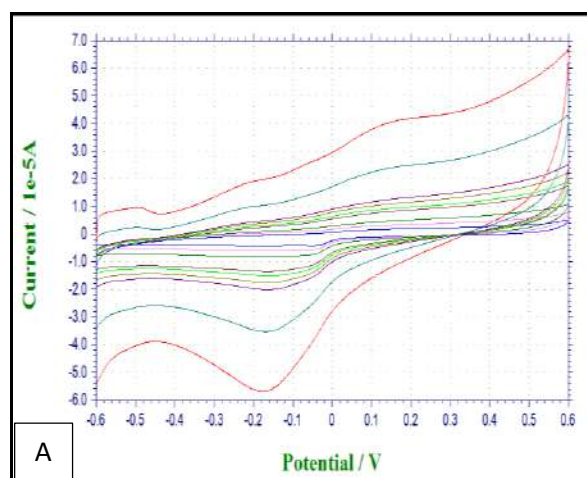
Figure 6. Overly plots of cyclic voltammogram at different mention scan rates of A) CoO, B) MnO_2 and C) NiO.

Fourier-transform infrared (FTIR) spectroscopy was used to investigate the chemical bonding and functional groups present in the nanoparticles, as shown in Figure 4. The FTIR spectrum of CoO (Figure 4A) showed characteristic peaks at 587 cm^{-1} and 660.31 cm^{-1}, which can be assigned to Co–O stretching and O–Co–O bridging vibrations, respectively, confirming the formation of cobalt oxide. For MnO$_2$ (Figure 4B), strong absorption bands were observed at 635.48 cm^{-1} and 530 cm^{-1}, corresponding to Mn–O stretching vibrations, providing evidence for the formation of manganese dioxide. In the case of NiO (Figure 4C), a distinct peak at 498.55 cm^{-1} was observed, representing Ni–O bond vibrations, thereby confirming the formation of nickel oxide. These FTIR results consistently demonstrate that the green synthesis approach effectively produced the desired metal oxide nanoparticles, each showing its characteristic metal-oxygen bonding features.

X-ray diffraction (XRD) analysis was employed to determine the crystalline structure and phase purity of the synthesized materials, as displayed in Figure 5. The XRD pattern for CoO (Figure 5A) revealed sharp and well-defined diffraction peaks, consistent with a cubic crystal structure, and the average crystallite size calculated using the Scherrer equation was approximately 28.31 nm. The diffraction pattern for MnO$_2$ (Figure 5B) showed characteristic reflections corresponding to a tetragonal crystal structure with an average crystallite size of about 32.96 nm. For NiO (Figure 5C), the XRD pattern confirmed a face-centered cubic (FCC) structure, with an estimated crystallite size of 25.28 nm. All diffraction patterns matched well with standard JCPDS reference cards (CoO: 42-1467, MnO$_2$: 44-0141, NiO: 04-0835), verifying the successful synthesis and phase purity of the nanoparticles using the green coprecipitation method.

The electrochemical performance of the synthesized nanoparticles was evaluated using cyclic voltammetry (CV), with the results presented in Figure 6. Measurements were conducted using a platinum wire (counter electrode), an Ag/AgCl (reference electrode), and a platinum (working electrode) in 1 M KOH electrolyte. The working electrode was prepared by drop-casting a slurry of each nanoparticle material. Cyclic Voltammogram of cathode material was recorded within a potential window of -0.6 to +0.6 at 5, 10, 20, 50, 60, 80, 100, 250 and 500 mV/sec scan rates. Further using anodic and cathodic current specific capacitance (F/g) was calculated.

The cyclic voltammograms recorded at various scan rates showed a clear trend: as the scan rate increased, the enclosed area of the voltammogram expanded, indicating enhanced capacitive behavior due to faster surface redox reactions. Specifically, the CoO voltammogram (Figure 6A) showed this increasing area with scan rate, suggesting good capacitive performance, while MnO$_2$ (Figure 6B) exhibited pronounced redox peak currents, reflecting superior charge storage and rapid electron transfer. The NiO voltammogram (Figure 6C) also showed increasing current response with higher scan rates, indicating reversible redox processes and good capacitive behavior.

The Specific Capacitance was calculated using the formula, where i_a and i_c are the anodic and cathodic peak currents respectively, m is the mass of the active material, and the scan rate is in mV/s.

$$C_{sp} = \frac{(ia - ic)}{m \times scan\ rate}$$
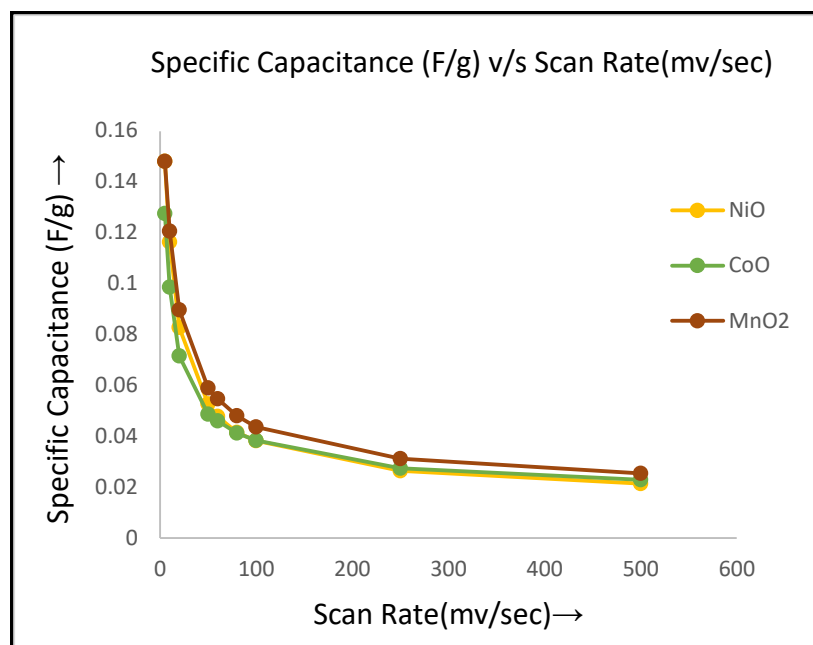
Figure 7. Variation of Specific Capacitance with Scan Rate for A) CoO, B) MnO$_2$ and C) NiO.

Specific capacitance (Csp) was calculated using the anodic and cathodic peak currents, with the results plotted against scan rates in Figure 7. For all three materials, the specific capacitance was observed to decrease as the scan rate increased, which can be attributed to limitations in ion diffusion into the deeper active sites at high sweep speeds. Among the three materials, MnO$_2$ (Figure 7B) demonstrated the highest average specific capacitance (0.0687 F/g), highlighting its excellent redox activity and efficient charge storage behavior. NiO (Figure 7C) followed with a capacitance of 0.0637 F/g, while CoO (Figure 7A) exhibited a capacitance of 0.0579 F/g. These results indicate that MnO$_2$ is the most promising material among the three for supercapacitor applications, while NiO and CoO also show good performance suitable for high-rate charge-discharge systems.

Finally, the antimicrobial properties of the synthesized nanoparticles were assessed using the well diffusion method against Gram-negative (*Escherichia coli*) and Gram-positive (*Staphylococcus aureus*).

Table 1. Zone of inhibition (cm) obtained by Well Diffusion Method.

Name of the compound	Zone of inhibition (cm)	
	E. coli	*S. aureus*
CoO	0.1	0.3
MnO$_2$	-	0.2
NiO	-	0.1

The results, summarized in Figure 8, showed that CoO nanoparticles produced the largest inhibition zones, with 0.3 cm against S. aureus and 0.1 cm against E. coli, indicating broad-spectrum antibacterial activity. MnO_2 showed moderate inhibition against S. aureus (0.2 cm) but no activity against E. coli, while NiO displayed minimal antibacterial effect, with only a 0.1 cm zone against S. aureus.
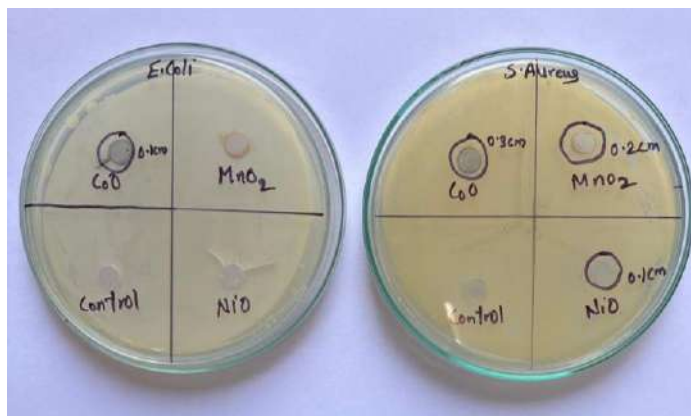
Figure 8. Antibacterial activity of CoO, MnO_2 and NiO NP's against *E. coli* and *S. aureus*.

These findings suggest that CoO nanoparticles, synthesized via the plant-mediated method at alkaline pH, possess strong antimicrobial potential, particularly against Gram-positive bacteria, likely due to the active phytochemical components from Ficus benghalensis involved in the synthesis process

Conclusion

The metal oxides CoO, NiO and MnO_2 were successfully synthesized using Ficus benghalensis plant mediated using coprecipitation method. It was further characterized using FTIR, UV-Vis and XRD. XRD study showed CoO having cubic phase, MnO_2 showed tetragonal phase and NiO showed face centred cubic phase respectively.

These sustainable synthesis methods for CoO, NiO, and MnO_2 have shown promising results for supercapacitor applications and antimicrobial studies. These metal oxides exhibit unique properties that make them suitable for energy storage and biomedical applications.

Compared to all metal oxides MnO_2 showed the highest specific capacitance which makes the material redox in nature which increases the charge storage capacity. Antimicrobial study revealed CoO is effective towards both gram positive and gram-negative bacteria.

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█RESEARCH ARTICLE

From Projects to Publications: Urban-Rural Divide in Bardez: A Comparative Study of Infrastructural Growth

Vijay Talwar

Department of Political Science, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Vijay Talwar (Vijay.T@xavierscollegegoa.ac.in)

ABSTRACT

Goa, despite being India's smallest and relatively progressive state, show significant disparities in infrastructural development between urban and rural areas. Infrastructure plays a crucial role in shaping socio-economic progress by impacting quality of life and regional development. This paper presents a comparative study of infrastructure in Mapusa city and the villages of Anjuna, Siolim, and Camurlim, focusing on sectors such as transportation, healthcare, education, banking Internet, water supply, and sanitation. A mixed-methods approach was adopted, incorporating primary data from surveys involving 200 respondents and secondary data from government reports, census records, policy documents, academic literature, and media sources. RTI applications were filed to obtain non-public information from relevant departments and panchayats. The findings indicate that Mapusa has relatively well-developed infrastructure, while Anjuna and Siolim have seen improvements over time, largely due to tourism-driven development. In contrast, Camurlim continues to face severe infrastructural challenges.

Introduction

The word "Infrastructure" has Latin roots and means "under or below the structure". It was first used by the French in the late 1800s to describe the foundations or sub-structures of a building, road or railway bed (Appelbaum, 2021). Infrastructure is a key determinant in a nation's development, providing the foundation for economic and social progress. Well-developed infrastructure, such as transportation (roads, railways, airports), utilities (electricity, water), and social amenities (education, healthcare, internet), enables efficient movement of goods and people,

supports industries, and improves quality of life. Without strong infrastructure, economic and social activities are hindered, limiting progress and affecting industries and communities.

However, the infrastructural growth has not been same in urban areas and rural areas rather there is a disparity of Infrastructure development in urban and rural areas. Urban areas generally benefit from advanced infrastructure, encompassing well-maintained transportation networks, reliable utilities, and high-quality educational and healthcare facilities. These areas are also hubs for diverse employment opportunities, higher wages, and greater access to public services, which collectively enhance the standard of living. As a result, urban areas tend to attract significant migration from rural regions, as individuals seek better economic opportunities and living conditions (Todaro & Smith, 2020). In contrast, rural areas frequently face substantial infrastructural deficits, including inadequate road networks, unreliable electricity and water supply, and limited access to healthcare and educational services. These deficiencies are exacerbated by the remoteness of rural communities, where essential services are often located far from residential areas, thus limiting accessibility.

Goa, despite being the smallest state in India, show a significant urban-rural divide in terms of infrastructural growth. Cities like Panaji, Margao, and Mapusa has improved infrastructure, owing to concentrated economic activities and urbanization. In contrast, rural areas in the hinterland continue to grapple with infrastructural deficiencies, limiting economic progress. Coastal areas, where tourism has flourished, have witnessed substantial infrastructure development to cater to the growing demands of the tourism sector. However, certain coastal villages lack proper infrastructure due lack of tourism related activities. This uneven distribution of infrastructure underscores the need for targeted policy interventions to address regional disparities and promote balanced development (Directorate of Planning, Statistics & Evaluation, 2020).

This paper presents a comparative study on the availability and quality of essential infrastructure including transportation, healthcare, education, banking facilities, water supply, and sanitation in Mapusa city and the villages of Anjuna, Siolim, and Camurlim. This research paper further examines the challenges faced by the study areas and proposes various measures to address and bridge the urban-rural infrastructure divide.

Material and Research Methods

This research paper adopts a comprehensive mixed-methods approach, combining primary and secondary data to investigate the infrastructure disparities between urban Mapusa and the rural villages of Anjuna, Siolim, and Camurlim. Field surveys were conducted to directly assess physical infrastructure such as roads, transportation systems, healthcare facilities, educational institutions, water supply, sanitation, and electricity access. These observations were further enriched by data gathered through structured and semi-structured questionnaires and interviews with 200 participants, including residents, community leaders, elected representatives, and local

officials. Secondary data sources were systematically reviewed, including government reports, policy documents and census data to trace patterns of infrastructure development and demographic trends. Right to Information (RTI) applications were filed to various departments and panchayats to access non-public data on various parameters. This paper also reviewed various scholarly publications and dissertations. This research paper also analysed articles from national and regional newspapers and magazines to gain insights into the infrastructure challenges faced in both urban and rural areas.

Results and Discussions

A survey was conducted with a sample size of 200 participants, focusing on sectors like transportation, healthcare, education, banking, internet, water supply, and sanitation. The structured questionnaire was administered to respondents in both the urban area of Mapusa and the rural villages of Anjuna, Siolim, and Camurlim.

Transport

Transportation is often regarded as the backbone of economic and social development because it facilitates the efficient movement of people, goods, and services. It enhances connectivity between regions, promotes trade, supports industry, and enables access to essential services such as education and healthcare. In recent years, the significant disparities in rural and urban transportation infrastructure have become increasingly apparent. While cities have benefited from large investment that have led to the improvement and modernization of transportation infrastructure, whereas, villages often face inadequate connectivity and poor public transportation due to lack of investment or negligence from the government from time to time. This continued infrastructure gap has not only hindered the economic development in rural regions but also exacerbates social inequalities, underscoring the urgent need for balanced and inclusive infrastructure planning (*Transportation and Economic Development | The Geography of Transport Systems*, 2017).

The transport infrastructure in Mapusa city and in the villages of Anjuna, Siolim, and Camurlim demonstrates significant variation in terms of both development and accessibility. Mapusa, as a major urban center, is well-connected to both nearby cities and surrounding villages. In contrast, such connectivity is notably lacking in the villages. A survey conducted among 200 respondents across these study areas revealed significant differences not only in the availability of various modes of transport but also in the preferences expressed by residents in accessing them. In Mapusa, personal motorcycles emerged as the most preferred mode of transport, with an overwhelming 96% of respondents favoring them. In contrast, Camurlim recorded the lowest preference for personal motorcycles, with only 54% of respondents indicating their use.

Sr.	Mode of	Mapusa	Anjuna	Siolim	Camurlim
1.	Kadamba	Yes	No	Yes	Yes
2.	Electric Bus	Yes	No	No	No
3.	Private Buses	Yes	Yes	Yes	Yes
4.	Taxi	Yes	Yes	Yes	Yes
5.	Rickshaw	Yes	Yes	Yes	No
6.	Pilot	Yes	Yes	Yes	Yes
7.	Ferries	No	No	No	Yes
8.	Bus stand	Yes	Yes	No	No
9.	Taxi stand	Yes	Yes	No	No
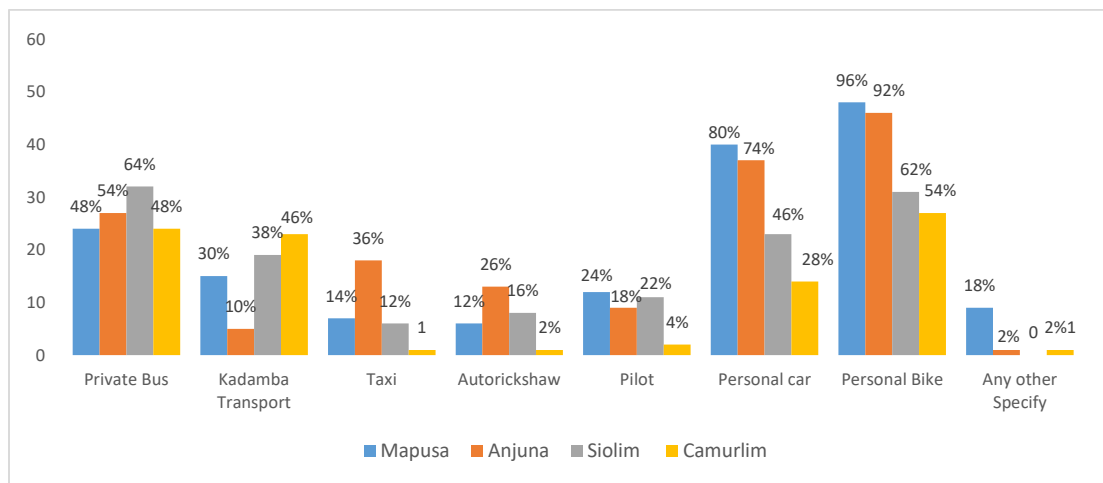
Figure 1. Mode of Transportation.

In rural areas, particularly in Siolim and Camurlim, bus transport is the most favored mode, likely due to economic considerations and the lack of alternative transport options. Survey data reveals that Kadamba Transport and private buses are predominantly used in these villages. In contrast, Anjuna shows the lowest usage of public buses, with personal motorcycles and cars being the preferred modes of transport among local residents. Anjuna is a major tourist hub, there is also a significant usage of motorcycle pilots and auto-rickshaws.

Based on the survey responses, it is evident that residents of Mapusa city and Anjuna village have observed a significant improvement in transport infrastructure over the last 10 years, with 86% and 88% of respondents, respectively. In contrast, the survey findings indicate that, in Camurlim village, there has been either a deterioration or a lack of noticeable improvement in transport infrastructure during the same period.

The survey further reveals that between 8% and 18% of respondents across all study locations reported that roads are both well-paved and well-maintained. However, the majority of respondents in all four areas noted that while the roads are paved but they are poorly maintained.

Healthcare

According to the World Health Organization (WHO), "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (*Constitution of the World Health Organization*, n.d.). This definition, established in 1948, underscores the notion that health extends beyond the mere absence of illness, advocating for a holistic understanding that includes physical, mental, and social dimensions. It acknowledges that well-being encompasses not only the absence of disease but also factors such as emotional stability, social relationships, and overall quality of life. Over the time, there has been a widening gap in health infrastructure between urban and rural areas due to multiple factors that hinder equitable healthcare access. Urban areas often have more advanced health infrastructure compared to rural regions. This disparity is attributed to factors such as increased financial investment, access to advanced medical technology, and a higher concentration of healthcare professionals in cities. In contrast, rural areas lack good healthcare facilities, due to insufficient fundings which contribute to inequities in healthcare infrastructure between urban and rural areas. Inadequate health infrastructure has a significant impact, especially in rural areas, where restricted access to medical facilities, competent healthcare personnel, and necessary services can result in poor health outcomes (Suresh Kumar & Shobana, 2024).

Table 2. Healthcare Facilities and Infrastructure.

Sr. No.	Healthcare Facility	Mapusa	Anjuna	Siolim	Camurlim
1.	District Hospital	Yes	No	No	No
2.	Primary Health Centre	No	Yes	Yes	No
3.	Urban Health Centre	Yes	No	No	No
4.	Community Health Centre	No	No	Yes	No
5.	Private Clinics	Yes	Yes	Yes	No
6.	Private Hospitals	Yes	Yes	No	No

Mapusa city has most developed healthcare infrastructure as compared to the villages of Anjuna, Siolim and Camurlim. As per RTI response, Mapusa has District Hospital also known as 'Asilo Hospital', the foundation stone was laid in April 1923, and the hospital was inaugurated on 27th October 1945 by Governor-General Bernardo Guedes. The hospital was later relocated from Morod, Mapusa, to Peddem in September 2010. Asilo Hospital caters large number of patients across north Goa.

Table 3. Services provided by the Asilo Hospital.

Sr. No.	OPD	IPD
1.	Ent	ENT
2.	General Medicine	General Medicine
3.	Pediatrics	Ped
4.	General Surgery	Pediatrics
5.	Ophthalmology	General Surgery
6.	Dental	Ophthalmology
7.	Obstetric Gynecology	Dental
8.	Psychiatry	Obstetric Gynecology
9.	Orthopedics	Psychiatry
10.	Dermatology & Venereology	SNCU
11.	Anesthesia	Dialysis
12.	Homeopathic	Alcohol Deaddiction treatment
13.	Ayurvedic	
14.	Pulmonary Medicine	
15.	Dietician	
16.	Changing Diabetic Barometer	
17.	Clinic	
18.	Intrauterine Insemination	
19.	Immunization	
20.	Physiotherapy	
21.	Occupational Therapy	
22.	Alcohol Deaddiction Treatment Facility	
23.	Adolescent Friendly Health Clinic	
24.	District Early Intervention Centre	

Source: RTI

According to the RTI response, a Primary Health Centre (PHC) is operational in Siolim village. However, residents of Camurlim and Anjuna villages must rely on PHCs located in Colvale and Vagator, respectively, for healthcare services. Additionally, Anjuna village hosts an Ayushman Arogya Mandir (Sub-Health Centre).

The village of Camurlim faces a significant lack of healthcare facilities, with neither private nor government health centers available within the village. Instead, the village relies on the weekly visit of a government doctor every Monday to provide basic medical services. Due to the absence of permanent healthcare infrastructure, the residents of Camurlim are largely dependent on neighboring areas for access to medical treatment and health-related services.

Figure 2. Health Camps.
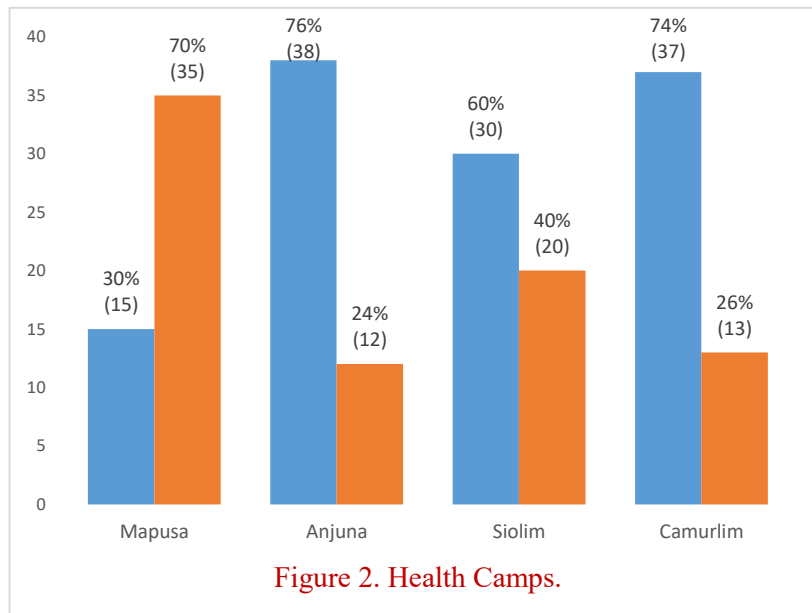
A survey conducted across all four locations reveals that 86% of the population in Camurlim village face difficulties in accessing healthcare facilities. In contrast, residents of Mapusa city, Anjuna village, and Siolim village, where healthcare services are available, reported significantly fewer issues in this regard. However, the findings also raise important questions concerning the maintenance and quality of healthcare services in these better-equipped areas. The survey also reveals that people in Mapusa city, Anjuna village and Siolim village has access to ambulance services with 84%, 78% and 74% respectively. Whereas, 80% of people said that they do not have access to the ambulance services.

Education

Education is the process by which societies deliberately transmit their accumulated information, knowledge, understanding, attitudes, values, skills, competencies, and behaviors across generations. It involves intentional communication designed to bring about learning and development in individuals. This transmission occurs through various means, including formal instruction, informal interactions, and non-formal systems, serving not only to preserve cultural continuity but also to foster critical thinking and innovation necessary for societal progress.

Despite various policy initiatives aimed at fostering inclusive and equitable education. Urban areas generally possess superior infrastructure, a greater concentration of professionally trained educators, enhanced access to digital technologies, and a broader array of academic and extracurricular opportunities. Conversely, rural regions frequently face systemic challenges such as dilapidated school infrastructure, elevated pupil-teacher ratios, limited technological integration, and a scarcity of instructional resources. These structural limitations are further exacerbated by socio-economic constraints, including widespread poverty, gender-based

educational disparities, and low parental literacy levels, all of which collectively hinder student enrollment, retention, and academic performance. As a result, learners in rural contexts are disproportionately affected by educational marginalization, higher dropout rates, and reduced learning outcomes. Addressing these persistent inequities necessitates **strategic policy reform**, increased public investment in rural education, comprehensive teacher training programs, and the adoption of inclusive, technology-enabled pedagogical models to effectively bridge the urban-rural education gap.

Table 4. Education Facilities and Infrastructure.

Sr. No.	Education	Mapusa	Anjuna	Siolim	Camurlim
1.	Anganwadi	Yes	Yes	Yes	Yes
2.	Pre-primary School	Yes	Yes	Yes	Yes
3.	Primary School	Yes	Yes	Yes	Yes
4.	High School	Yes	Yes	Yes	Yes
5.	Higher Secondary	Yes	No	Yes	No
6.	College	Yes	No	Yes	No
7.	Library	Yes	No	No	Yes

The survey reveals that educational infrastructure is most developed in Mapusa City, which has full range of institutions including primary schools, high schools, higher secondary schools, colleges, and vocational institutes. As an urban area with better investments and facilities, Mapusa not only serves the city's population but also attracts students from neighboring villages. The survey also indicates that education from the primary to high school level is available in all four locations. However, higher secondary schools are only available in Mapusa City and Siolim, while colleges are exclusively located in Mapusa City. In terms of library facilities, public libraries are present in Mapusa City and Camurlim Village. However, Anjuna and Siolim lack such infrastructure.

Internet and Telecommunication

The rapid growth of internet and telecommunication technologies over the past few decades has profoundly reshaped global communication, economic development, and knowledge dissemination. In both developed and developing contexts, access to digital infrastructure has emerged as a key determinant of social inclusion, economic opportunity, and educational advancement. The expansion of internet services and mobile connectivity has enabled transformative changes in governance, commerce, and public service delivery. However, despite these advancements, significant disparities persist in terms of accessibility, affordability, and quality of service (*World Development Report 2016*, n.d.). Goa is not an exception to this digital

divide. Within the Bardez taluka, a clear gap in digital access can be observed when comparing the Mapusa City with the villages of Anjuna, Siolim, and Camurlim. The uneven trajectory of technological penetration illustrates how infrastructure, socio-economic conditions, and geographical location contribute to a digital divide.

Table 5. Internet and Telecommunication Infrastructure.

Sr. No.	Internet	Mapusa	Anjuna	Siolim	Camurlim
1.	3G	Yes	Yes	Yes	Yes
2.	4G	Yes	Yes	Yes	Yes
3.	5G	Yes	Yes	Yes	Yes
4.	Fiber-optic	Yes	Yes	Yes	Yes
5.	Public-WIFI	Yes	Yes	Yes	No
6.	Network towers	Yes	No	Yes	No

The survey indicates widespread availability and access to mobile phones across all four locations. It also reveals that internet coverage has significantly improved over the past decade in Mapusa City and the villages of Anjuna and Siolim. However, residents of Camurlim Village reported that there has been no substantial improvement in internet connectivity in their area. Regarding the affordability of internet services over the last 10 years, most respondents noted an overall improvement, although a small percentage believed that internet services were more affordable in the past. When asked about their preferred mode of internet access, 90% of respondents in Mapusa City and 86% in Anjuna Village reported using mobile data. In comparison, 62% in Siolim and only 44% in Camurlim prefer mobile data. The survey further revealed that 4G networks are widely available in all four locations, while 5G connectivity is more prevalent in Mapusa City and Anjuna Village. Respondents also shared the challenges they face when accessing the internet. These include poor network quality, high internet costs, lack of access to digital devices, and limited digital literacy. Importantly, the survey indicated that better internet facilities and infrastructure could lead to an improved standard of living in these localities.

Sanitation

Sanitation refers to the provision of services and facilities for the safe management of human excreta, including the hygienic treatment, disposal, and reuse of wastewater. This underscores the critical role of sanitation in safeguarding public health and ensuring environmental sustainability. Sanitation extends beyond the mere construction of toilets; it encompasses a comprehensive approach to waste management, water supply, hygiene education, and the promotion of behavioral change. The significance of sanitation lies in its direct impact on reducing morbidity and mortality caused by waterborne and sanitation-related diseases, enhancing human dignity, and improving the quality of life, particularly for vulnerable populations such as women, children, and the elderly.

Moreover, access to adequate sanitation is integral to achieving several Sustainable Development Goals (SDGs), notably Goal 6, which calls for universal access to clean water and sanitation (*Department of Economic and Social Affairs*, n.d.).

Despite national and regional efforts to improve sanitation coverage, a marked disparity persists between urban and rural areas.

Table 6. Sanitation Facilities and Infrastructure.

Sr. No.	Sanitation Facilities	Mapusa	Anjuna	Siolim	Camurlim
1.	Public Toilet	Yes	Yes	Yes	No
2.	Waste Collection	Yes	Yes	Yes	Yes
3.	Waste Treatment Plant	Yes	No	Yes	No
4.	Sanitation Programmes	Yes	Yes	Yes	Yes

A survey reveals notable disparities in access to water supply, sanitation facilities, and awareness of public hygiene initiatives. The data indicates that while all four locations receive clean and safe drinking water, disparities in water availability persist. Residents of Siolim and Camurlim villages reported experiencing frequent water shortages, in contrast to Mapusa city, which enjoys a regular water supply. Awareness of the availability of public toilet facilities varied significantly across the surveyed areas. Mapusa and Siolim reported the highest levels of access, with 88% of respondents (44 individuals) confirming the presence of public toilets, and only 12% reporting a lack of such facilities. Anjuna followed, where 70% (35 respondents) reported access, while 30% (15 respondents) did not. Camurlim, however, recorded the lowest access, with only 28% (14 respondents) indicating availability, and a substantial 72% (36 respondents) lacking access to public toilets. In all four locations reported the presence of waste disposal systems, suggesting a baseline level of infrastructure for solid waste management across both urban and rural areas surveyed. The survey also assessed community awareness of availability of sanitation-related programs. In both Mapusa and Siolim, 80%

Figure 3. Sanitation Program.

of respondents (40 individuals) reported a lack of such programs, with only 20% (10 respondents) acknowledging their existence. Anjuna presented a similar pattern, with 68% (34 respondents) unaware of any sanitation initiatives and 32% (16 respondents) aware of such efforts. Interestingly, Camurlim showed a relatively balanced awareness, with 56% (28 respondents) stating that sanitation programs were unavailable, and 44% (22 respondents) indicating otherwise.

Bank Infrastructure

Banking infrastructure refers to the collective physical and digital facilities, institutional structures, and technological systems that support and enable the effective operation of the banking sector within an economy. Banking infrastructure includes physical facilities such as bank branches and ATMs, as well as digital services like mobile banking, internet banking etc. A well-developed banking infrastructure is foundational to a nation's financial architecture, as it facilitates access to essential financial services, supports economic participation, and strengthens the institutional mechanisms of financial governance.

Banking infrastructures serves as a critical vehicle for financial inclusion of marginalized and unbanked populations into the formal financial system (Sable, 2024). The availability of structured banking services enhances credit accessibility, which is essential for the sustenance and expansion of agricultural activities, micro-enterprises, and rural livelihoods. Furthermore, an efficient banking system mobilizes savings and channels them into productive investments, thereby contributing directly to economic growth and development. Banking infrastructure also plays a vital role in the implementation of state-sponsored welfare programmes, most notably through Direct Benefit Transfers (DBTs), which enhance the transparency, timeliness, and accountability of public service delivery. With the increasing digitization of financial services, the role of technology-enabled banking infrastructure has become even more pronounced in shaping inclusive and resilient economic systems.
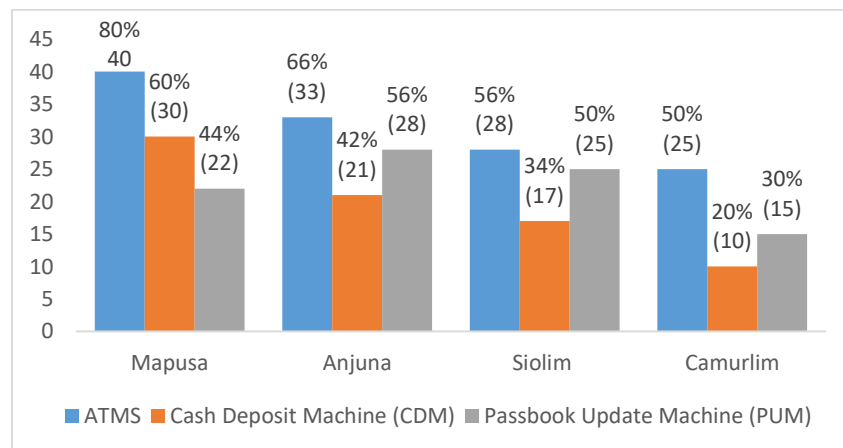
Figure 4. Banking Facility.

The rural-urban disparity in banking infrastructure is evident in Bardez taluka. Urban centres consistently report higher branch and ATM density relative to rural areas. The adoption of digital financial services remains significantly higher in urban locales, where individuals possess better access to smartphones, reliable internet connectivity, and enhanced digital proficiency. Financial technology (fintech) innovations and app-based financial services have predominantly catered to

urban demographics, thereby perpetuating the exclusion of rural populations from the benefits of financial modernization.

The survey reveals that both public and private banks are available in all four locations surveyed. Banking facilities such as ATMs, Cash Deposit Machines, and Passbook Update Machines (PUMs) are also present in each of these areas. Regarding bank account ownership, the survey shows that Mapusa City and Camurlim Village have 100% bank account penetration. Anjuna and Siolim report slightly lower figures, with 90% and 98% respectively. In terms of internet connectivity, Mapusa City and Anjuna Village have better internet access compared to Siolim and Camurlim villages. The survey also explored the adoption of UPI (Unified Payments Interface) in these locations. Mapusa City leads with 96% of respondents using online payment methods in daily transactions. This high adoption rate is likely influenced by better internet infrastructure and favorable economic conditions. A similar trend is observed in Anjuna and Siolim, where tourism-driven infrastructure has facilitated digital payment adoption. In contrast, Camurlim Village shows the lowest level of UPI integration, mainly due to its remote location, limited internet connectivity, and economic constraints.

Table 7. Banking Infrastructure and Facilities.

Sr. No.	Banking Infrastructure/Facilities	Mapusa	Anjuna	Siolim	Camurlim
1.	Public Banks	Yes	Yes	Yes	Yes
2.	Private Banks	Yes	Yes	Yes	No
3.	ATMS	Yes	Yes	Yes	Yes
4.	Cash Deposit Machine (CDM)	Yes	Yes	Yes	No
5.	Passbook Update Machine	Yes	Yes	Yes	Yes

Conclusion

In conclusion, it is evident that infrastructural development has not been uniform across urban and rural areas. Mapusa city, having historically evolved as a major economic hub in North Goa, has witnessed significant investment to meet the growing needs of its population. In rural regions, however, infrastructural development presents a mixed picture. For instance, Anjuna, being a prominent tourist destination, has seen considerable economic growth and corresponding improvement in infrastructure over time. Similarly, Siolim has gradually upgraded its infrastructure. In contrast, Camurlim continues to face infrastructural challenges, particularly in sectors like healthcare, where the absence of adequate facilities exacerbates the difficulties faced

by its residents. Therefore, balanced and inclusive infrastructure development is essential for the sustainable growth of both urban and rural areas.

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RESEARCH ARTICLE

Between Love, Limits, and Liberty: How Parenting Shapes the Adolescent Mind and Society: A Thematic Analytic Review Analysis

Kshipra Vora

Abbé Faria Post Graduate Department of Psychology, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Kshipra Vora (Kshipra.v@xavierscollegegoa.ac.in)

ABSTRACT

Parenting styles have long been recognized as critical determinants of children's emotional, social, and cognitive development. In the context of emerging adulthood, this study offers a thematic analytic review exploring how authoritative, authoritarian, and permissive parenting styles impact adolescents' identity formation, mental health, social maturity, and resilience. Drawing from extensive theoretical and empirical literature, the review systematically examines the interplay between perceived parenting behaviors and developmental outcomes across childhood, adolescence, and young adulthood. Methodologically, the study employs a thematic analysis approach, synthesizing findings from key longitudinal and cross-sectional studies. Results indicate that authoritative parenting consistently fosters higher self-esteem, social competence, emotional regulation, and academic achievement, whereas authoritarian and permissive styles are associated with a range of adjustment difficulties. The review underscores the need for culturally sensitive parenting models in India to buffer against emerging mental health challenges. Implications for future research and interventions aimed at promoting adolescent well-being are discussed.

Introduction

In a rapidly globalizing world, the traditional fabric of Indian family life is undergoing profound transformation. Urbanization, technological shifts, and evolving social roles have redefined parent-child relationships in ways that classic developmental theories, often derived from Western contexts, do not fully capture. Amidst these changing landscapes, adolescents find themselves

negotiating between cultural expectations and emerging individualistic aspirations. Consequently, there is an urgent need to revisit the role of parenting in contemporary India, not merely in terms of its structural forms but in how it is perceived and internalized by the youth. Understanding these nuanced perceptions is crucial for fostering healthier psychological outcomes during the critical transitional phases of adolescence and emerging adulthood.

Parenting plays a foundational role in shaping an individual's emotional, social, and psychological development from infancy through emerging adulthood. The nature of parent-child interactions, especially the manner in which parents offer affection, support, respect, and boundaries, has long been recognized as a critical determinant of children's developmental outcomes, including self-esteem, social competence, mental health, and academic achievement. While the intention behind parental behaviors is often noble, the perception of these behaviors by children and adolescents can differ significantly, influencing the trajectory of identity formation and psychological well-being.

In recent decades, extensive research has illuminated the complex associations between parenting styles and various psychosocial outcomes in children and adolescents. Classic typologies of parenting, such as authoritative, authoritarian, and permissive styles, emphasize differing degrees of warmth, control, and autonomy granting, each with distinct consequences for child development. However, within the dynamic socio-cultural landscape of contemporary India—marked by modernization, urbanization, and changing family structures—there is an increasing need to revisit and contextualize these findings.

Using a thematic analytic review framework, this article examines existing literature to identify and interpret the recurring themes connecting parenting styles with adolescent psychosocial outcomes, with particular attention to implications in the context of contemporary Indian society. Specifically, this review focuses on how perceived parenting influences adolescents' social maturity, mental health, identity resolution, and conflict management, which are crucial markers of resilience and successful transition into adulthood.

Methodology

This article employs a thematic analytic review approach to systematically synthesize the extant research on parenting styles and adolescent developmental outcomes. Thematic analysis is particularly suited to reviews that aim to move beyond mere description, instead identifying and interpreting patterns of meaning across diverse studies.

The methodology involved the following steps:

1. ***Literature Selection***: Primary emphasis was placed on peer-reviewed journal articles, seminal works, and longitudinal studies focusing on authoritative, authoritarian, and permissive parenting styles, and their psychological, social, and academic outcomes during childhood, adolescence, and emerging adulthood.

2. ***Thematic Coding***: Selected studies were analyzed for recurrent patterns, including (but not limited to) themes such as emotional regulation, social competence, self-esteem, resilience, identity resolution, and conflict management strategies among adolescents.

3. ***Interpretive Synthesis***: The extracted themes were interpreted in light of developmental theories and socio-cultural frameworks, especially considering contemporary shifts within Indian family dynamics and youth experiences.

4. ***Critical Contextualization***: Special attention was given to how socio-economic factors, family communication patterns, and adolescents' subjective perceptions of parenting modify the outcomes associated with traditional parenting styles.

This thematic review aims not only to consolidate existing findings but also to critically highlight emerging questions regarding parenting practices suitable for promoting mental well-being and social maturity among adolescents in an era of rapid social change.

Review Analysis

Parents play important roles since the day a baby was born. Most people would agree that parenting is not an easy job. The way parents interact with their children has a direct effect on their development – their level of confidence and self-esteem, their sense of security, their emotional well-being, the way they relate to others, how they deal with authority and their performance at school. Plainly put, parenting revolves around – *love* – the way parents nurture their child by showing affection, approval and support for their development, *respect* – whether or not parents allow their children to express their own thoughts, beliefs and feelings freely without fear of being judges, and *limit setting* – the degree to which parents expect and enforce mature and responsible behaviour from their children. In fact, it is one of the hardest tasks as every parent would hope to succeed in parenting. Parenting style is one of the variables that have been studied extensively in human development (Baldwin, Mclntyre, & Hardaway, 2007) and is considered to be an important determinant of several aspects of children's outcome (Gadeyne, Ghesquiere, & Onghena, 2004). Parenting styles have been shown to be related to children and adolescents' development of self-concept, integration of mental health and well-being, socialising, academic achievement (Lamborn, Mounts, Steinberg, & Dornbusch, 1991), optimism (Baldwin, Mclntyre, & Hardaway, 2007), confidence (Strage & Brandt, 1999), motivation (Gonzalez & Wolters, 2006), externalizing problem behaviour and attention problems (Gadeyne, Ghesquiere, & Onghena, 2004).

Parenting Styles

Parenting styles have been described as the collection of parents' behaviours which create an atmosphere of parent-child interactions across situations (Mize & Pettit, 1997). Based on the work of Baumrind (e.g., 1967; 1978) and those who have extended her work (e.g., Maccoby & Martin, 1983; Roberts, 1986), several broad typologies of parenting styles (i.e., authoritative, authoritarian and permissive) have been identified. These styles tend to differ along the dimensions of warmth and control. Warmth refers to the degree in which parents display involvement, responsiveness, and support (Hart, Newell & Olsen, 2003). Warm, supportive parenting involves behaviours that are physically and emotionally affectionate, approving, loving and caring (Openshaw, Thomas & Rollins, 1984). Control includes the demands or expectations parents place upon or hold for their children and the degree of monitoring present in parenting. Taken together, the styles of authoritative, authoritarian, and permissive parenting differ in several important features including (a) support shown to a child, aimed at forming an emotional connection with the child, (b) behavioural control of the child, aimed at promoting mature behaviour, and (c) autonomy granting, aimed at fostering self-reliance (Hart, Newell, & Olsen, 2003).

Parenting in Emerging Adulthood and Outcomes in Childhood and Adolescence

An extensive literature on parenting styles provides evidence that the three models of parental control are linked to a variety of outcomes during childhood and adolescence. For example, the quality of the parent-child relationship during early childhood affects children's social relationships and behavioral adjustment during middle childhood and adolescence (Scaramella & Leve, 2004). Many studies have shown a link between the parent-child interaction and emotional and behavioral adjustment in early childhood, middle childhood, and adolescence (Scaramella & Leve, 2004). The effects of positive or negative parenting may continue to accrue as the child develops. Indeed, researchers have examined the effects of parenting in childhood on later development. For example, emerging adults reared by authoritative parents scored higher in areas of competence and resilience than did emerging adults from authoritarian or permissive parenting styles (Masten, Burt, Roisman, Obradovic, Long, & Tellegen, 2004). A longitudinal study conducted by Aquilino and Supple (2001) found that the parent-child relationship in adolescence influences the degree of well-being (i.e. life satisfaction, personal efficacy, and self-esteem) experienced in emerging adulthood. Additional studies suggest emerging adults' self-esteem and self-actualization is positively correlated to authoritative parenting originating in childhood and adolescence (Buri, Louiselle, Misukanis, & Mueller, 1988).

Authoritative Parenting: Authoritative parents tend to display both high control and high responsiveness and warmth to their children. Expectations are clear, rules are firm and rational, and discipline is administered in a consistent manner. Baumrind (1978) explains that authoritative parents openly discuss any problems or actions that may arise in relation to the child and exhibit firm control when necessary. Authoritative parents aim to teach rules of conduct, outline

boundaries, foster responsibility through teaching correct principles, and employ consequences for problematic behaviour but employ more positive reinforcement (e.g., compliments) than harsh punishment (e.g., spanking). This parenting style offers a balance between high nurturance and high control, in addition to clear communication about expectations for the child (Baumrind & Black, 1967). Authoritative parents do not reward dependency (Baumrind & Black, 1967), but instead set a standard of responsibility and self-control. In sum, authoritative parents set reasonable demands on and have high expectations for their children while being warm and responsive.

Children reared by authoritative parents tend to fare better than children raised by parents who employ permissive or authoritarian parenting styles in most aspects of development (Baumrind, 1991). Beginning in early-childhood, this style of parenting has been shown to produce higher levels of social competence (Baumrind, 1978), a greater ability to regulate emotions, high social skills (Isley, O'Neil, & Parke, 1996), and self-regulation (Black & Baumrind, 1967). During the years of middle-childhood, Baumrind (1993) found that children reared by authoritative parents excelled in areas of independence, creativity, persistence, social skills, academic competence, leadership skills, social perspective-taking, and self-control. Adolescents of authoritative parents have higher self-esteem, are socially confident and competent (Baumrind, 1978), are self-reliant, have greater respect for their parents (Baumrind, 1991), display increased academic performance (Dornbusch, Ritter, Leiderman, Roberts, and Fraleigh, 1987), possess higher levels of self-esteem, engage in fewer acts of deviant behaviour and more prosocial behavior (Baumrind, 1991; Avenevoli Sessa, & Steinberg, 1999), and exhibit lower levels of stress and fewer incidences of substance abuse (Avenevoli et al., 1999).

Authoritarian Parenting: Authoritarian parents combine high control with lower levels of warmth. This parenting style allows for strong parental command over their child, leaving minimal input of the child in decisions or rationales (Baumrind, 1991). Further, in this form of one-way communication, the child is not permitted to express views or opinions (Baumrind, 1977). Measures of coercive and punitive control, such as physical or emotional punishment, are often used by authoritarian parents as a means of disciplining the child. Authoritarian parents are "obedience and status-oriented, and expect their orders to be obeyed without explanation" (Baumrind, 1991, p. 62). The authoritarian parent is demanding and unresponsive to the emotional needs of the child, as well as being controlling, and detached (Black & Baumrind, 1967). In addition to high control and demand, authoritarian parents show little warmth, involvement, support, or emotional commitment to their child (Black & Baumrind, 1967).

Authoritarian parenting, in contrast, is associated with a myriad of negative outcomes throughout development (Peterson & Hann, 1999; Stafford & Bayer, 1993). Preschool-age children exposed to authoritarian parenting have been found to be unhappy, dissatisfied, apprehensive, fearful, socially inhibited, aggressive, and experience difficulty in regulating emotions (Baumrind, 1967; Baumrind & Black, 1967; Hart, Nelson, Robinson, Olsen, & McNeily-Choque, 1998; Hart, Newell, & Olsen, 2003; Nix, Pinderhughes, Dodge, Bates, Pettit, McFadyen, & Steven, 1999).

Over the following years of development, both cognitive and social skills continue to fall behind (Baumrind, 1977) and codependence on adult authority figures increases (Fischer & Crawford, 1992). During adolescence, low self esteem, low sociability, moodiness, obedience, and apprehensiveness were reported in adolescents of authoritarian parents (Darling & Steinburg, 1993). Studies have suggested a positive correlation between authoritarian parenting and adolescent delinquency (Fergusson, Horwood, & Lynsky, 1994; Huesmann, Eron, Lefkowitz & Walder, 1984) and a negative association to adolescent stress, self-esteem, and substance abuse (Avenevoli, Sessa, & Steinburg, 1999).

Given the central role that control plays in authoritarian parenting, the construct of psychological control deserves particular attention, especially given that physical punishment may be less of an option with emerging-adult children. Psychological control refers to parental interference that controls or manipulates the psychological well-being of the child (Barber, 1996; 2002). Withdrawing love when a child displeases a parent, inflicting guilt or shame as a form of punishment, and using manipulation to gain power in a situation are forms of psychological control over a child (Barber, 1996). Psychological control not only restricts and manipulates young children's thoughts and actions, but research confirms that psychological control is also linked to problems throughout childhood and adolescence including internalizing problems in children such as shyness, anxiety, and loneliness (Gresham & Elliott, 1990), dependency (Baumrind, 1978), low self-esteem (Hart, Olsen, Robinson, & Mandleco, 1997), withdrawal (Baumrind, 1967; Baumrind & Black, 1967), and depression (Allen, Hauser, Eickholt, Bell & O'Conner, 1994; Barber, Olsen, & Shagle, 1994).

Another form of control is known as behavioral control (e.g., monitoring). Barber (1996) explains that behavioral control can be perceived positively depending on the degree used, whereas psychological control refers to psychological manipulation and is always perceived negatively. Specifically, behavioral control is part of a continuum where permissive parents have little behavioral control and authoritarian parents exercise extreme levels of control. Authoritative parents tend to have an appropriate balance of control over their children and do so through the use of less coercive and physical means (e.g., spanking). While it has been argued that psychological control is less about controlling behavior and more about manipulating the parent-child relationship and therefore a unique dimension of parenting (Barber, 1996), it too falls on the excessive end of the control continuum. However, it seems important to examine whether psychological control is part of the broader authoritarian construct in emerging adulthood or a unique approach to parenting. Because parents may have less control over an emerging adult's behavior, it is expected that authoritarian parents will turn to more psychologically controlling techniques and, therefore, will load with "traditional" items making up the construct of authoritarian parenting in emerging adulthood.

Permissive Parenting: Permissive parents exhibit high levels of warmth and low levels of control. Because warmth is displayed through overindulgence, permissive parents tend to be non-

demanding and avoidant of controlling behavior or outlining boundaries in the children's environment (Baumrind & Black, 1967). Little is required of children, especially in areas of maturity and responsibility (Baumrind, 1991). The overall idea of permissive parenting is to allow the child extensive autonomy, corroborated by high parental support, in the hopes of engendering close relationships with their children (Peterson & Hann, 1999). Their discipline, if any, is inconsistent and confusing (Baumrind & Black, 1967) and these parents often surrender to the demands of their child. Bad behavior of the child is seldom acknowledged or corrected by parents and rules are either not enforced or are not clearly communicated. According to Baumrind (1968) children of permissive parents are often left to regulate their own activities, behavior, and emotions at a young age.

Permissive parents have little control and few expectations for their children. As a result, preschool children of permissive parents tend to experience difficulty regulating emotions, have low self-control, and be very immature (Baumrind, 1967). Permissive parenting has been linked to bossy, dependant, impulsive behavior in children, with low levels of self-control and achievement; these children do not learn persistence, emotional control, or limitations (Baumrind, 1967). While positive outcomes of permissive parenting may include close parent-child relationships, greater self-esteem, and more autonomy (Herz & Gullone, 1999), this parenting style often fosters more serious problems in adolescence such as drug use and deviant behavior (Baumrind, 1991; Maccoby & Martin, 1983), school misconduct (McCord, 1988), and lower academic achievement (Dornbusch, Ritter, Leiderman, 1987). Further, adolescents of permissive parents tend to lack verbal and behavioral control, be more aggressive, and have difficulty following school rules (Dornbusch, Lamborn, Mounts, & Steinberg, 1991).

Parents wish for their children to grow into socially mature and respected individuals and the process of molding them begins early on. However there is a crucial aspect that often goes missed that is the impact of how the adolescent perceives his parents. Undoubtedly parents bring up the child with the noblest of intentions but communication patterns play the critical role. They may assume a participative style but the manner, in which it gets communicated across to the adolescent, may be perceived as authoritarian; in such a case the effect on the adolescent could be grave. It adds another dimension to be resolved while coming toward an identity resolution and can impact the adolescents' self-worth, social maturity, work efficiency and mental health.

Research has shown that people with different dispositions create different social environments for themselves. Thus a person's 'situation' does not depend only on external conditions but also on his/her own approach to people and problems. As the adolescent moves toward integration another crucial variable is influenced - social maturity. Social maturity encompasses attainments in several domains, including independent functioning, effective interpersonal communication, interaction and responsibility i.e. contributing to the well-being of society. Social maturity also implies that the individual develops a pattern of behaviour, habits, attitudes, manners and skills

which will help him fit into group living and contribute to the welfare of the group (T. Kalyanidevi and N. Chaitanyaprathima, July, 2008). The variables that are known to affect social maturity also seem to affect adolescent identity resolution, mental health, and adoption of an adequate conflict resolution strategy. The various factors include home and school environments, socio – economic status, family – size, familial interactions, perceived parenting, education and occupation, urbanization, modernization and intelligence.

In the context of rapid social change being witnessed in India, it is suggested that there is a need to research the appropriate parenting models which may play a role in preventing mental disorders in early adolescence while also building resilience into adulthood. Mental and behavioral problems are increasingly a part of health problems the world over. The burden of illness arising from psychiatric and behavior disorders is enormous.

Interventions

To address the evolving mental health challenges faced by adolescents in India, particularly in the context of changing parenting dynamics, it is crucial to design targeted **intervention programs** that educate both parents and adolescents. These programs should focus on fostering **authoritative parenting** practices, where warmth and control are balanced. **Training for parents** can be implemented through workshops and counseling sessions that help them understand the importance of **emotional responsiveness** and **clear boundaries** in promoting social maturity and mental well-being. Additionally, **adolescent-focused interventions** should aim to build resilience, improve emotional regulation, and teach effective conflict management skills. Schools can partner with mental health professionals to conduct **mental health awareness campaigns** to normalize seeking support, teach stress management techniques, and encourage open discussions about identity formation and self-worth.

School counsellors should be trained to spot early signs of maladjustment in adolescents and act as a bridge between students and their families, guiding them toward appropriate interventions. **Peer support programs** in schools, where older students mentor younger ones, can help normalize healthy social behaviors and provide role models for **resilience-building**. Incorporating **social-emotional learning (SEL)** into school curricula will help students gain emotional awareness, communication skills, and problem-solving strategies. Furthermore, programs targeting **identity resolution** should be integrated into the curriculum to assist adolescents in understanding themselves and their roles within their families, peer groups, and society at large.

Policies

Given the critical role that parenting plays in shaping adolescent development, policy initiatives should be designed to support families in providing an optimal environment for their children. **Government-backed parenting support programs** should be expanded to reach diverse

populations, particularly in rural or economically disadvantaged regions. These programs could include **training in communication skills**, techniques for **stress reduction**, and insights into fostering autonomy while maintaining boundaries. In addition, policies should promote **mental health literacy** among parents, teachers, and healthcare providers, ensuring that they are equipped to identify mental health issues early and provide timely intervention.

There should be a concerted effort to make **mental health care more accessible** in both urban and rural areas. Policies should mandate the inclusion of **mental health services in schools** with dedicated counsellors who can offer continuous support. Legislative measures should also encourage **cross-sector collaboration** between education, health, and social services to provide holistic support to adolescents and their families. In urban areas, where parenting styles are often influenced by fast-paced lifestyles, **community centers** offering family therapy and emotional coaching can bridge the gap and reinforce the significance of balanced parenting.

Implications

This review's findings have several important implications for how **parenting styles** can be optimized in the context of **Indian society**. One critical takeaway is the need for a **culturally sensitive understanding** of parenting. While the **authoritative style** is proven to be most beneficial in terms of **mental health** and **social maturity**, there may be cultural barriers in the Indian context that prevent its full adoption. This includes the role of **extended family structures** and **societal expectations** around **obedience** and **respect**. Thus, interventions must be flexible enough to work within these cultural constraints while promoting the core tenets of authoritative parenting, such as **warmth** and **clear communication**.

Social maturity and **identity resolution** are crucial areas of adolescent development. The findings suggest that **parent-child communication** plays a significant role in these domains, where adolescents who perceive their parents as supportive and responsive are more likely to resolve identity conflicts effectively and navigate the challenges of emerging adulthood with **greater resilience**. Therefore, policies that encourage positive **parent-child relationships**, particularly through **open dialogue and mutual respect**, can have long-term benefits for adolescents' **mental health** and their ability to cope with stressors. Moreover, emphasizing **collective responsibility** for youth development within communities could help bridge generational gaps in understanding and response to adolescent challenges.

Conclusions

In conclusion, the relationship between **parenting styles** and adolescent development is integral to shaping the future mental health and social maturity of individuals. As India continues to undergo rapid social change, it is imperative that parenting practices evolve to address the unique

challenges posed by globalization, technological advancement, and urbanization. While authoritative parenting remains the most effective in fostering positive outcomes, it is essential that **parental expectations and cultural values** are taken into account when advocating for parenting interventions.

This study emphasizes the **need for holistic and integrated approaches** that involve parents, educators, and mental health professionals working together to guide adolescents through their formative years. **Culturally tailored interventions** will ensure that parenting practices align with contemporary needs while respecting cultural traditions. Additionally, **government policies** must prioritize mental health by incorporating **mental health education** at all levels of schooling and supporting **parental guidance programs** that are accessible across diverse socio-economic strata.

The need for research on **parenting interventions**, especially in the **Indian context**, cannot be overstated. Future studies should explore how specific parenting behaviors impact adolescents from different socio-economic backgrounds, as well as how these influences shift as adolescents move into young adulthood. By understanding and addressing these complexities, we can contribute to creating a healthier, more resilient generation of young adults who are equipped to navigate the challenges of modern life.

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Spectrum

█ RESEARCH ARTICLE

Adoption of OTT Platforms in Goa: Examining Key Influencing Factors

Junessca Carvalho | Concy Liberata Noronha | Purva Chodankar

Post Graduation Department of Commerce, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Concy Noronha (concy.n@xavierscollegegoa.ac.in)

ABSTRACT

The growing popularity of Over-the-Top (OTT) platforms has changed how people consume media around the world, including in Goa, India. This study explores the main factors that influence Goan consumers to adopt OTT platforms, using the Technology Acceptance Model (TAM) as the foundation. Key factors examined include perceived ease of use, usefulness, price value, content quality, entertainment, and intention to use. The study also considers Goa's unique demographic and cultural features to understand local content preferences.

A mixed-methods approach was used, combining survey data with qualitative insights. Data analysis was done using SmartPLS 4 to examine the relationships between the factors. The results show that affordability, a wide range of content, and easy access are important reasons people choose OTT platforms. Additionally, regional content and digital literacy levels strongly influence consumer choices. The findings provide useful suggestions for OTT providers to better meet the needs of the Goan audience by offering more localized and accessible content.

Introduction

Over-the-Top (OTT) platforms have revolutionized the way people consume entertainment by delivering content directly through the internet, bypassing traditional broadcast, cable, and satellite systems. With rapid technological advancements and shifting viewer preferences, platforms such as Netflix, Amazon Prime Video, Disney+ Hotstar, and Zee5 have gained widespread popularity. The COVID-19 pandemic further accelerated this digital shift, as lockdowns increased reliance on streaming services for entertainment (Nagraj et al., 2021).Unlike traditional television, which has been prominent since the 1950s, OTT services offer unmatched flexibility and convenience. They

allow users to stream movies, web series, documentaries, and live sports on demand, across multiple devices—including smartphones, tablets, and smart TVs—requiring only an internet connection. OTT platforms operate through varied revenue models, such as subscriptions, advertisements, and pay-per-view. These features have made OTT services a popular choice for modern consumers seeking personalized, on-the-go content experiences.

Netflix pioneered the global OTT revolution, followed by platforms like Amazon Prime Video, Apple TV, Hulu, and Roku. According to market forecasts, the global OTT industry is expected to grow at a compound annual growth rate (CAGR) of 15.2%, reaching $149.34 billion by 2022, largely driven by increased digital adoption post-pandemic.

OTT Platforms vs. Traditional TV

One of the core differences between OTT services and traditional television lies in content delivery. Traditional TV depends on fixed broadcast schedules through cable or satellite networks, whereas OTT platforms stream content over the internet. This enables greater control and flexibility for viewers, who can access content anytime and from any location (Kumar et al., 2024).

Furthermore, traditional TV restricts viewers to scheduled programming, while OTT platforms offer on-demand access to a vast content library. This user-centric approach has made OTT services more attractive, particularly to younger, tech-savvy audiences.

Major Players in the Indian OTT Market

India's OTT landscape is highly dynamic, with multiple players catering to a linguistically and culturally diverse audience:

- Amazon Prime Video: With 60 million subscribers in India, it offers multilingual content and additional benefits like free shipping and music streaming. Subscription: ₹179/month or ₹1,499/year.
- Disney+ Hotstar: Known for Disney, Marvel, Pixar content, and live sports. It has 50 million subscribers. Plans: ₹899/year (VIP), ₹1,499/year (Premium).
- Netflix: Popular for its original content and high-quality viewing experience, with about 10 million Indian subscribers. Plans: ₹199 (Basic), ₹499 (Standard), ₹649 (Premium).
- Zee5: Offers strong regional content with 90 million users. Subscription starts at ₹99/month or ₹999/year.
- Sony LIV: Known for live sports and Indian entertainment, with 40 million users. Plans: ₹299/month or ₹999/year.
- JioCinema: Free for Jio users, it hosts a wide collection of regional and Bollywood films with over 100 million users.
- Voot: Focuses on regional and youth-centric content, including shows from MTV and Nickelodeon. Subscription: ₹99/month.

Consumer adoption of OTT platforms also varies by region due to differences in culture, language preferences, digital literacy, and accessibility. Regional content availability plays a crucial role in user engagement, particularly in culturally rich areas such as Goa. The presence of multilingual content and localized storytelling has emerged as a significant factor in influencing viewer choice in regional markets. Moreover, the level of digital literacy and the affordability of internet services further shape adoption behaviour in such settings.

Significance of the study

This study aims to provide insights into the factors driving the adoption of OTT (Over-the-Top) services, a rapidly growing industry reshaping entertainment consumption. With the rise of high-speed internet, affordable data, and smartphones, OTT platforms have disrupted traditional media, especially television. By understanding user behavior, the study can help service providers enhance user interfaces and content offerings. It also sheds light on the cultural impact of OTT in diverse countries like India, where regional and multilingual content is key to adoption. The findings are valuable for marketers, policymakers, and researchers, offering guidance on targeted advertising, regulatory frameworks, and further academic exploration of digital transformation in entertainment.

Research problem

The rapid adoption of OTT platforms in India has transformed entertainment consumption, but the factors behind this shift are not well understood. Users are increasingly moving from traditional TV to OTT services for their convenience, variety, and affordability. However, key influences such as perceived ease of use, price value, and service quality need further exploration. Additionally, India's diverse demographics and cultural context—like regional preferences, economic differences, and varying tech access—add complexity to user behavior. This research seeks to identify the key drivers of OTT adoption and understand how these factors interact within the unique Indian market.

Research gap

Despite the growing popularity of OTT services, existing research, particularly in India, overlooks region-specific factors like cultural diversity, regional content preferences, and economic disparities that shape consumer behavior. Current studies often analyze individual factors like ease of use or entertainment value in isolation, without considering their interaction. This limits a holistic understanding of what drives OTT adoption in a diverse market. Additionally, emerging

trends like personalized content, gamification, and social media integration remain underexplored. There's also a lack of longitudinal studies tracking user behavior over time and post-adoption trends, such as loyalty and platform switching. Addressing these gaps would provide a more complete picture of the OTT landscape and help providers adapt to evolving consumer needs.

Objectives

1. To examine the relationship between perceived ease of use and perceived usefulness of OTT services.
2. To analyse the impact of perceived usefulness and perceived ease of use on user's intention to use OTT services.
3. To investigate the effect of intention to use OTT services on the actual adoption of OTT services.
4. To assess how price value and service quality and Entertainment contributes to users' intention to use OTT services.
5. To examine the mediating role of intention to use OTT services in the relationship between perceived ease of use, perceived usefulness, and price value with OTT adoption.
6. To investigate the mediating role of intention to use OTT services in the relationship between quality and entertainment with OTT adoption.

Hypothesis

H1: Perceived ease of use is positively related to perceived usefulness in OTT services.

H2: Perceived usefulness is positively related to intention to use OTT services.

H3: Perceived ease of use is positively related to intention to use OTT service.

H4: Intention to use OTT service is positively related to OTT Adoption.

H5: Price value is positively related to intention to use OTT services.

H6: Quality is positively related to intention to use OTT services.

H7: Entertainment is positively related to intention to use OTT services.

H8: Intention to use OTT services mediates the relationship between perceived ease of use and OTT adoption.

H9: Intention to use OTT services mediates the relationship between perceived usefulness and OTT adoption.

H10: Intention to use OTT services mediates the relationship between price value and OTT adoption.

H11: Intention to use OTT services mediates the relationship between quality and OTT adoption.

H12: Intention to use OTT services mediates the relationship between entertainment and OTT adoption.

Methodology

Research Design: The research uses a descriptive and explanatory approach to analyze factors influencing OTT platform adoption. Primary data is collected via structured questionnaires from OTT users in Goa, while secondary data comes from academic journals and industry reports. A non-probability convenience sampling method targets diverse OTT users in Goa. The survey includes multiple-choice and Likert scale questions to assess user perceptions and adoption factors, ensuring consistent and meaningful insights.

Data Collection

Primary Data:

- **Survey Method:** A structured questionnaire, using closed-ended and Likert-scale questions, was distributed via Google Forms to measure perceptions and behaviors.
- **Sample Size:** 400 respondents were targeted, with 314 responses (78.5% response rate).
- **Sampling Technique:** Stratified random sampling was used to ensure representation across demographics like age, gender, and marital status.

Secondary Data:

Data was gathered from existing literature, reports, and publications on OTT adoption trends, with a focus on Goa where available.

Analytical Tools and Techniques:

Data analysis is conducted using SPSS for processing demographic data to identify user trends and patterns. For advanced statistical modeling, Smart PLS 4 is used to assess the measurement model's validity and reliability, test hypotheses, and analyze relationships. It estimates path coefficients, evaluates R^2, adjusted R^2, and f^2 effect size to assess explanatory power, and examines predictive relevance (Q^2 predict) and model fit.

Conceptual Framework
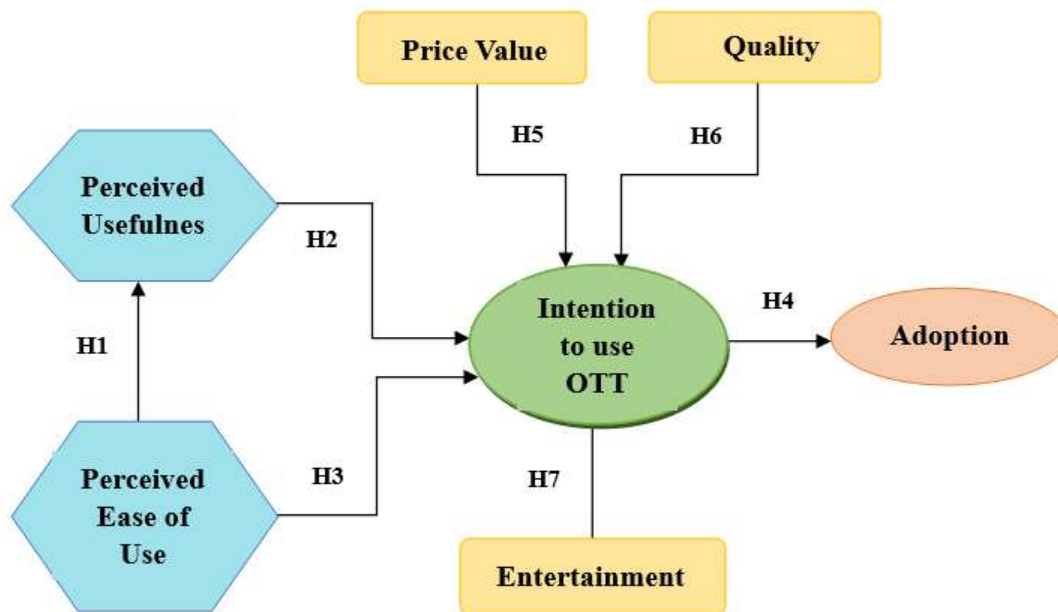
Figure 1. Proposed conceptual framework.

Results of Data Analysis

Respondents Demographics

The respondents in this study are mostly young, educated, and students. Females make up 55% of the participants, while males make up 45%. Most respondents are between 19 and 25 years old (53.5%), followed by those under 18 (29.3%). Smaller age groups include those aged 26–34 (13.1%), 35–45 (2.2%), and 46 and above (1.9%). This shows that the majority of people in the study are in their teens and twenties. In terms of education, 50% are graduates, 30% have completed Higher Secondary (HSSC), and 9% each are either postgraduates or SSC qualified. Only 1% have a PhD or fall under other categories.

When it comes to occupation, 79% of the respondents are students. Others include employed people (16%), self-employed (3%), and unemployed individuals (2%). Most respondents (93%) are unmarried, while only 6% are married and 1% are widowed. Overall, the data shows that the study mainly reflects the views of young, unmarried students with a good level of education. This is important for understanding how and why they use OTT platforms.

Table 1. Information of Respondents.

Category	Sub – Category	Frequency	Percent
Gender	Male	140	44.6
	Female	174	55.4
Age	Below 18	92	29.3
	19 - 25	168	53.5
	26 - 34	41	13.1
	35 - 45	7	2.2
	46+	6	1.9
Education qualification	SSC	28	8.9
	HSSC	96	30.6
	Graduate	156	49.7
	Post-graduate	30	9.6
	PhD	2	.6
	Other	2	.6
Occupation	Student	249	79.3
	Employed	51	16.2
	Unemployed	5	2.6
	Self employed	9	3.9
Marital Status	Married	18	5.7
	Unmarried	294	93.6
	Widowed	2	1

Smart PLS Analysis

SmartPLS is a user-friendly software for structural equation modelling (SEM), helping researchers analyze complex relationships between latent variables. With its intuitive graphical interface, it simplifies SEM for users of all expertise levels in academic, business, and social science research.

Measurement Model

In SmartPLS, a measurement model defines the relationship between observed variables (indicators) and latent constructs, assessing their reliability and validity through metrics like factor loadings, reliability (Cronbach's Alpha, Composite Reliability), and validity (Convergent and Discriminant).

Table 2 presents Outer Loadings for indicators in a SEM or PLS-SEM analysis, assessing their strength in representing seven constructs: Adoption (AD), Entertainment (ENT), Intention to Use (ITU), Perceived Ease of Use (PE), Perceived Usefulness (PU), Price Value (PV), and Quality (QY). All indicators exceed the 0.7 threshold, confirming reliability and validity. AD (0.827–0.900), ENT (0.877–0.907), ITU (0.815–0.885), PE (0.822–0.915), PU (0.830–0.913), PV (0.866–

0.921), and QY (0.868–0.933) demonstrate strong construct representation. These results validate the measurement model for further analysis.
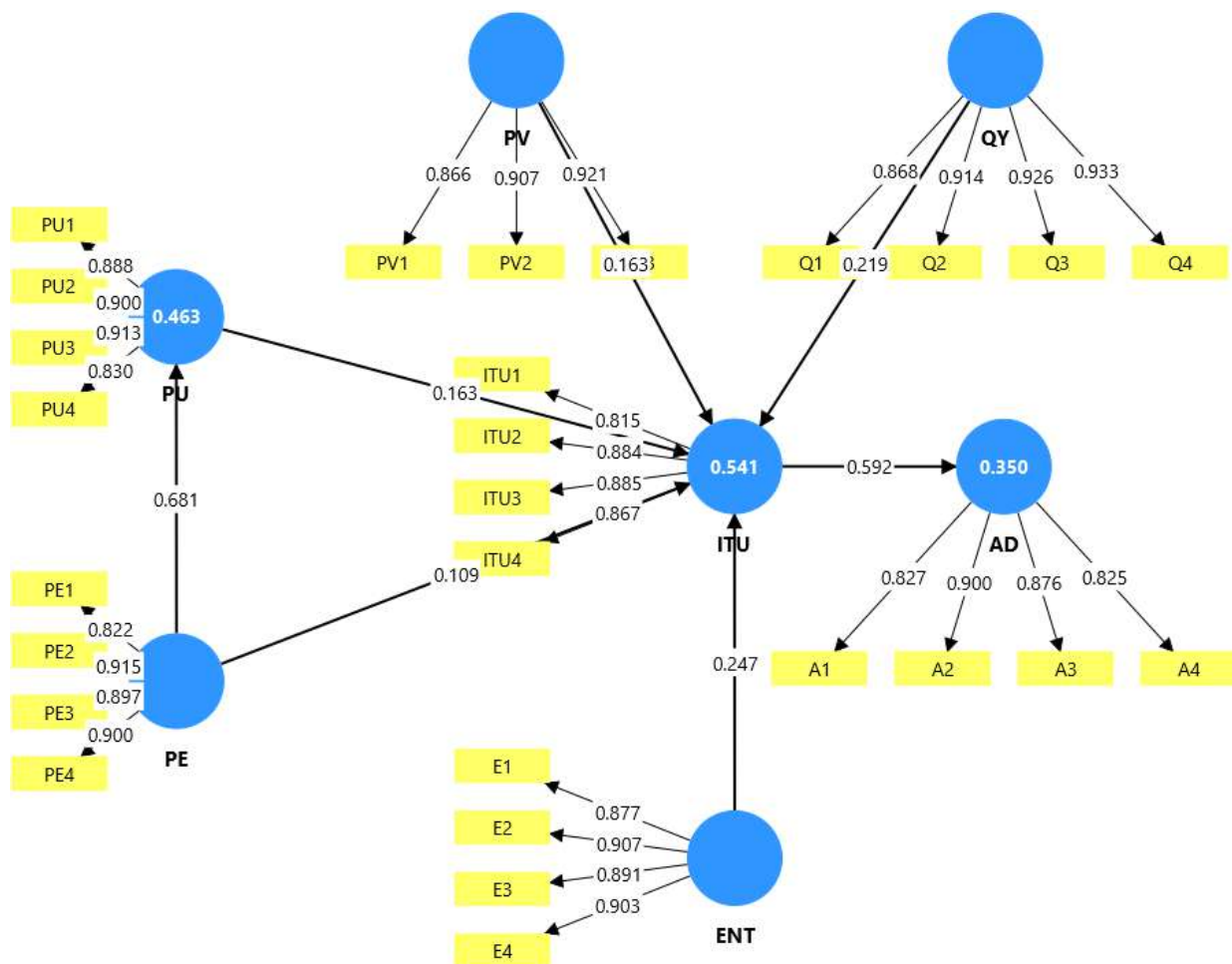
Figure 2. Measurement Model framework.

a. Outer loadings & construct reliability and validity

All Cronbach's Alpha values exceed 0.7 (ranging from 0.880 to 0.931), confirming strong internal consistency. Composite Reliability (rho_c) is also high (0.917–0.951), ensuring reliable construct measurement. AVE values (0.735–0.829) surpass the 0.5 threshold, verifying that each construct explains a significant portion of variance in its indicators. Overall, the results confirm that the constructs are highly reliable and valid, supporting their use in further SEM or PLS-SEM research.

	Cronbach's alpha	Composite reliability (rho_a)	Average variance extracted (AVE)	Item Loadings	Outer Loadings
Adoption	0.880	0.887	0.735	AD1	0.827
				AD2	0.900
				AD3	0.876
				AD4	0.825
Entertainment	0.917	0.920	0.801	ENT1	0.877
				ENT2	0.907
				ENT3	0.891
				ENT4	0.903
Intention to Use	0.886	0.894	0.745	ITU1	0.815
				ITU2	0.884
				ITU3	0.885
				ITU4	0.867
Perceived Ease of Use	0.906	0.915	0.781	PE1	0.822
				PE2	0.915
				PE3	0.897
				PE4	0.900
Perceived Usefulness	0.906	0.909	0.780	PU1	0.888
				PU2	0.900
				PU3	0.913
				PU4	0.830
Price Value	0.880	0.884	0.807	PV1	0.866
				PV2	0.907
				PV3	0.921
Quality	0.931	0.944	0.829	QY1	0.868
				QY2	0.914
				QY3	0.926
				QY4	0.933

Table 3. HTMT Values.

	AD	ENT	ITU	PE	PU	PV	QY
AD							
ENT	0.751						
ITU	0.660	0.701					
PE	0.649	0.602	0.619				
PU	0.705	0.728	0.697	0.742			
PV	0.535	0.581	0.602	0.533	0.644		
QY	0.645	0.678	0.656	0.608	0.668	0.483	

b. Discriminant Validity (HTMT)

Table 3 assesses discriminant validity for seven constructs in SEM/PLS-SEM using the Fornell-Larcker criterion. A construct's square root of AVE (diagonal value) should be higher than its correlations with other constructs (off-diagonal values), ensuring distinctiveness. All constructs meet this criterion: Adoption (AD) (0.751) is higher than its correlations (≤0.705), Entertainment (ENT) (0.701) exceeds its correlations (≤0.728), Intention to Use (ITU) (0.701) is greater than its correlations (≤0.697), and similar results hold for Perceived Ease of Use (PE) (0.742) and Perceived Usefulness (PU) (0.742). These results confirm strong discriminant validity, ensuring each construct measures a unique concept.
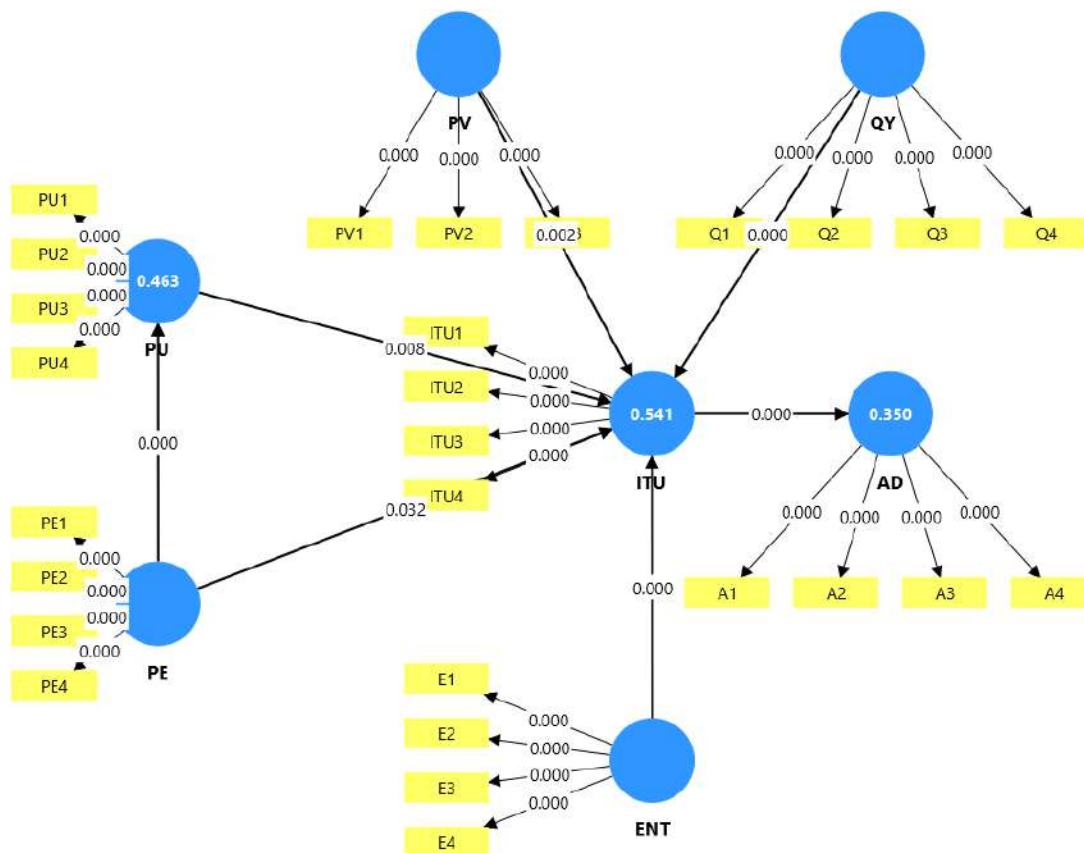
Figure 3. Structural Model.

Structural Model Assessment

In SmartPLS, a structural model, also known as a PLS-SEM or PLS path model, represents the relationships between latent variables (constructs) and is assessed by evaluating path coefficients, collinearity, significance, R-squared, and predictive power.

a. Direct Hypothesis Testing

Table 4. Direct Hypothesis Testing.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	RESULT
ENT -> ITU	0.247	0.249	0.056	4.416	0	ACCEPTED
ITU -> AD	0.592	0.592	0.046	12.926	0	ACCEPTED
PE -> ITU	0.109	0.106	0.051	2.148	0.032	ACCEPTED
PE -> PU	0.681	0.678	0.05	13.736	0	ACCEPTED
PU -> ITU	0.163	0.164	0.062	2.636	0.008	ACCEPTED
PV -> ITU	0.163	0.165	0.052	3.131	0.002	ACCEPTED
QY -> ITU	0.219	0.216	0.057	3.836	0	ACCEPTED

Table 5. R^2 Values.

	R-square	R-square adjusted
AD	0.350	0.348
ITU	0.541	0.534
PU	0.463	0.461

Table 4 shows the results of testing various relationships between factors in a model using SmartPLS 4, with all hypotheses being accepted.

Entertainment (ENT) has a positive effect on the intention to use (ITU), with a strong significance, meaning that as entertainment value increases, people are more likely to use the service. Similarly, the intention to use (ITU) strongly influences OTT Adoption (AD), showing that if people intend to use a service, they are likely to adopt it.

Perceived Ease of Use (PE) also positively impacts the intention to use (ITU), but with a weaker effect. However, it strongly influences how useful people perceive the service to be. Perceived Usefulness (PU) also has a positive effect on ITU, though the relationship is moderate.

Price Value (PV) impacts the intention to use (ITU), meaning that if users see the service as good value for money, they are more likely to use it. Quality (QY) also has a significant effect on ITU, showing that a high-quality service encourages users to use it more.

Overall, the results confirm that factors like Entertainment, Ease of Use, Usefulness, Price, and Quality strongly influence people's intention to use a service, and that intention to use is a strong predictor of whether they will adopt the service.

Coefficient of Determination (R^2)

Table 5 presents R-square (R²) and Adjusted R-square (R² adjusted) values for Adoption (AD), Intention to Use (ITU), and Perceived Usefulness (PU), assessing how well independent variables explain their variance. For Adoption (AD), R² is 0.350, meaning the model explains 35% of its variance, with an Adjusted R² of 0.348, indicating other factors may influence adoption. Intention to Use (ITU) has the highest R² at 0.541 (Adjusted R² 0.534), suggesting strong explanatory power. Perceived Usefulness (PU) has R² 0.463 (Adjusted R² 0.461), showing reliability but leaving room for improvement.

Overall, the model effectively predicts ITU, while AD and PU could benefit from additional variables for better accuracy. These findings help researchers refine models to enhance predictive power.

Model Fit

Table 6: Model Fit Indices.

	Saturated model	Estimated model
SRMR	0.057	0.134
NFI	0.839	0.82

The table compares model fit indices for the saturated and estimated models using SRMR and NFI. SRMR is 0.057 for the saturated model and 0.134 for the estimated model, indicating a poorer fit for the latter. NFI values are 0.839 (saturated) and 0.82 (estimated), suggesting a reasonable but not perfect fit. Overall, the estimated model shows weaker fit, especially in SRMR.

Discussion

The study's findings reveal several key insights. In terms of gender distribution, 55% of respondents are female, while 45% are male, indicating a slight gender imbalance that may be influenced by the nature of the study or target audience. Regarding age, the majority of respondents (53.5%) are in the 19-25 age range, followed by those under 18 (29.3%), with older age groups showing minimal representation. This suggests that younger individuals are more engaged with OTT platforms. Education-wise, most respondents are graduates (50%), followed by 30% with Higher Secondary School education. A smaller portion has completed postgraduate or Secondary School education, highlighting that OTT platforms are mainly used by those with at least a

graduate degree. In terms of occupation, 79% of respondents are students, emphasizing that OTT platforms are primarily popular among younger individuals. Employed individuals account for 16%, while self-employed and unemployed respondents are underrepresented. Marital status analysis shows that 93% of respondents are unmarried, suggesting that single individuals are the dominant users of OTT platforms due to greater flexibility in their entertainment choices.

For the measurement model, all constructs show strong reliability and validity, with factor loadings above the 0.7 threshold. The Cronbach's Alpha values, ranging from 0.880 to 0.931, indicate high internal consistency. Constructs also demonstrate strong discriminant validity, confirming they measure distinct concepts. Cross-loadings analysis further supports high construct validity, ensuring that each indicator strongly associates with its intended construct. Additionally, the Fornell-Larcker criterion confirms the uniqueness of each construct.

In the structural model, the study confirms that factors such as entertainment, perceived usefulness, price value, and quality significantly influence OTT adoption. Intention to Use is the strongest predictor of adoption, while ease of use has a weaker direct impact but enhances perceived usefulness. The analysis of mediating effects shows that Intention to Use plays a significant role in mediating the relationship between key factors (like entertainment and price value) and adoption. The R-squared values indicate that the model explains 54.1% of the variance in Intention to Use, 46.3% in Perceived Usefulness, and 35% in Adoption, suggesting that other factors may also influence these constructs. Effect size analysis reveals that Intention to Use has a strong effect on adoption, while entertainment has a smaller influence. Perceived ease of use significantly impacts perceived usefulness. Predictive performance analysis shows that the model is most accurate for Intention to Use, followed by Perceived Usefulness, with Adoption being the least predictable. Finally, the model fit analysis suggests that while the saturated model fits well, the estimated model shows some weaknesses, particularly in terms of the SRMR value.

Conclusion

The study shows that female respondents (55%) slightly outnumber males (45%), with age data indicating that younger individuals (19-25) are the primary users of OTT platforms. Education levels reveal that graduates and HSSC holders make up the largest user base, while students (79%) dominate the demographic, with employed individuals at 16%. Marital status analysis shows that unmarried individuals (93%) use OTT services more, reflecting their greater entertainment flexibility.

The measurement model confirms the reliability and validity of constructs like Adoption, Entertainment, Intention to Use, Perceived Ease of Use, Perceived Usefulness, Price Value, and Quality. Intention to Use strongly predicts Adoption, with entertainment and perceived usefulness

being key drivers. Multicollinearity is minimal, though some constructs show higher VIF values, which may affect estimates.

The findings highlight that improving ease of use and perceived usefulness can boost adoption rates. The model accurately predicts Intention to Use, but Adoption shows lower predictive power, suggesting a need for refinement. Model fit is acceptable, but further improvements could enhance accuracy.

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RESEARCH ARTICLE

Legal Shield for Local Treasures: Geographical Indications towards Protecting Goa's Unique Products

Saloni Shet | Yash Marathe | Rosenia Rodrigues | Vallankanni Sequeira | Astrea D'Souza | Bronson Fernandes | Nilasha Deuskar | Disha Kalangutkar

Department of Commerce, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Rosenia Rodrigues (Rodriguesrosenia09@gmail.com)

ABSTRACT

Goa, a coastal state in India, is renowned for its rich cultural heritage and distinctive products. However, these unique treasures face threats from misappropriation and unauthorized use. Geographical Indications (GIs) offer a legal shield to protect these products, promoting their cultural and economic value. This research paper explores the significance of GIs in safeguarding Goa's distinctive products, such as Feni, Cashew, and Khaje, among others. It examines the existing legal framework, international best practices, and challenges in implementing GI protection. The study highlights the benefits of GI registration, including enhanced marketability, preservation of traditional knowledge, and economic empowerment of local communities. By analyzing case studies and stakeholder perspectives through interviews and random sampling survey, this research provides insights into the potential of GIs to protect Goa's cultural heritage and promote sustainable development. The findings aim to inform policymakers, stakeholders, and local communities about the importance of GI protection in preserving Goa's unique identity.

Introduction

India is a land of immense cultural, geographical, and biological diversity, and it's states each have unique contributions to the country's identity. Goa, one of the smallest states in India by area, stands out not only for its pristine beaches and Portuguese colonial legacy but also for its rich traditions in agriculture, handicrafts, and food production. Nestled on the western coast of India, Goa enjoys a unique climate, cultural blend, and ecological setting that influence the characteristics of its regional products. In an era where globalization can blur the identities of local products, there

has emerged an increasing need to protect and promote the origin-specific uniqueness of certain goods. This is where the concept of Geographical Indications (GI) becomes highly relevant.

A Geographical Indication (GI) is a form of intellectual property right that identifies a product as originating in a particular place, where a given quality, reputation, or other characteristic of the good is essentially attributable to its geographical origin. Unlike other forms of intellectual property that focus on individual creators or inventors, GI protects collective knowledge that has developed over generations. This system supports the preservation of cultural heritage, helps ensure authenticity, and enables economic opportunities for local producers. In the Indian context, GI protection plays a crucial role in promoting traditional knowledge systems and indigenous practices.

Goa, with its long history of trade, agriculture, and artisanal skills, has several products that deserve and have received GI recognition. From the world-renowned Feni, a traditional liquor distilled from cashew apples or coconut sap, to the rare and flavourful Khola chilies, Goan products reflect deep-rooted traditional practices passed down over centuries. Each of these products carries a geographical identity linked intrinsically to the local climate, soil, techniques, and community practices. GI tags not only protect these items from imitation and misuse but also enhance their marketability and global reputation.

To understand the significance of GI in Goa, it is important to first appreciate the cultural, historical, and economic setting of the state. Goa was a Portuguese colony for over 450 years before it was integrated into the Indian Union in 1961. This colonial legacy has had a profound impact on the architecture, cuisine, religion, language and arts of the region. The state is known for its communal harmony and a unique syncretism that blends Eastern and Western cultural elements.

Goa's economy is largely supported by tourism, fisheries, agriculture and manufacturing. The lush landscapes and fertile soils of the state support a variety of crops, including rice, coconut, cashew and spices. Alongside agriculture, traditional industries such as handicrafts, pottery, weaving and liquor distillation are still practiced, especially in the rural hinterlands. These industries are often family-based and community-driven, relying heavily on indigenous knowledge and sustainable practices. Unfortunately, many of these practices are at risk of fading away due to urbanization, mass production and lack of recognition in formal markets.

Geographical Indication status provides a protective legal framework that can aid in reviving and sustaining these traditional industries. In recent years, both the State and Central Governments have taken active steps to identify, document and register such products under the GI Act. This initiative not only strengthens the rural economy but also ensures the transmission of traditional knowledge to future generations.

A Geographical Indication (GI) is defined in the World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) as an indication which identifies a good

as originating in the territory of a member or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin. India enacted the Geographical Indications of Goods (Registration and Protection) Act, 1999, which came into force in 2003, to comply with the TRIPS Agreement.

Under this Act, GI is a collective right, granted not to an individual but to an association of persons or producers engaged in the manufacture of the concerned goods. The GI tag confers the legal right to use the name associated with a product, protecting it from unauthorized use by those not conforming to the defined standards. The GI Registry in India is located in Chennai and registrations are valid for ten years, renewable indefinitely.

The GI mechanism benefits not only the producers by protecting their goods from counterfeit and boosting market value, but also the consumers by ensuring authenticity, quality, and traceability. Additionally, GI-tagged products often become symbols of regional pride and cultural identity, attracting attention from researchers, tourists and entrepreneurs alike. Geographical Indications can be classified into several types, depending on the nature of the product and the basis of its linkage to a specific geographic location. The Indian GI Registry categorizes them broadly into the following types:

1) **Agricultural Products**: These are products obtained through traditional farming techniques, benefiting from the unique soil, climate or ecosystem of a specific area. The qualities or characteristics of such goods are directly linked to their place of origin. Examples in India include Basmati rice, Darjeeling tea and Malabar pepper. In Goa, agricultural GIs could include products like Khola chillies, cultivated using indigenous methods in the hilly terrain of the Canacona region.

2) **Handicrafts:** Handicraft GIs are perhaps the most diverse, encompassing textile designs, pottery, metal work, wood carving and other handmade items. These goods are deeply rooted in tradition and passed down through generations of skilled artisans. Their distinctiveness lies in the local materials, tools and techniques used. While Goa is not as widely known for handicrafts as some other Indian states, it does have recognized products such as the Goan Kunbi Saree, which is in the process of obtaining GI status for its unique weave and cultural importance to the tribal communities.

3) **Foodstuff and Beverages:** These include regional cuisines, processed food items and drinks whose recipes or methods of preparation are specific to a region. Goa's iconic alcoholic beverage Feni is one such product, made from cashew apples or coconut sap through a three-stage distillation process that is specific to the region. Feni was the first product from Goa to obtain GI registration in 2009.

4) **Natural Goods:** These refer to naturally occurring products that have unique qualities due to environmental factors like mineral content, altitude or climate. Such GIs are relatively fewer in number but can include products like certain types of salt, stone or water. In the

Goan context, natural resources such as laterite stone or river fish varieties may have potential for GI consideration.

5) **Manufactured or Industrial Products:** These goods involve human intervention and technical skill but are defined by traditional methods of manufacture practiced in a certain geographic region. These include items such as Kanchipuram silk or Mysore sandal soap. Goa's traditional salt-making industry, known as Mithagar, or the craft of making earthen Goan pottery, could be considered for GI registration in this category.

Geographical Indication status has significant implications for a state like Goa. First and foremost, it ensures the legal protection of products that are vulnerable to imitation and misuse. In a globalized market, where counterfeit goods are rampant and authenticity is increasingly questioned, GI certification acts as a mark of trust and quality.

Second, GI promotes rural and sustainable development by empowering local producers, especially artisans, farmers and traditional communities. By creating a premium value for origin-specific goods, GI enhances the income potential of producers and reduces rural-to-urban migration.

Third, GI protection helps preserve cultural heritage. Many Goan practices such as traditional brewing of Feni or weaving of Kunbi sarees are at risk of extinction due to modernization. GI recognition not only revives interest in these traditions but also facilitates government and private investment in their promotion.

Fourth, GI products have strong potential in tourism marketing. With Goa already being a prime tourist destination, GI-tagged products can be showcased as authentic souvenirs or experiences. Tourists are increasingly drawn to local and ethical products and GI can serve as a bridge between commerce and culture.Finally, GI contributes to intellectual property awareness and policy development at the grassroots level. Many rural producers are unaware of their rights and the economic value of their knowledge. GI-related campaigns and schemes help build capacity, raise awareness and encourage documentation and standardization of traditional practices.

Materials and methods

This study is qualitative and descriptive in nature. The study considers responses from stakeholders through interview method. Secondly a survey method was adopted to collect information from 100 individuals to gain insights into consumer awareness of Geographical Indication. A well-structured questionnaire consisting of 16 questions was created. The questionnaire consisted of close ended questions. The analysis is based on these responses.

To conduct the study in a systematic manner, an action plan was prepared outlining a set of well-defined steps to be followed throughout the course of the project. To achieve the objectives of the research, data was collected from two key sources: primary and secondary. Primary data was obtained through interviews and questionnaires. Field visits were conducted to various locations where interviews and discussions were held with stakeholders involved in Geographical Indication (GI) products. Additionally, a structured questionnaire was distributed to 100 respondents to gather insights into public awareness and perceptions of GIs. Secondary data was collected from books, newspapers and various credible websites, which provided valuable information related to the topic. For the purpose of data analysis, pie charts were used as the standard analytical tool to visually represent and interpret the findings.

Results and Discussions

The data analysis reveals significant insights into the awareness and perception of Geographical Indications (GI) among the respondents. The majority belonged to the 21–30 age group, showing that young adults are more engaged with GI-related topics. Over half the participants were aware of GI and a large portion correctly understood its purpose as denoting product quality linked to a specific location. However, nearly half had never seen a GI logo, indicating a gap in visual awareness. Among GI-tagged Goan products, Feni was the most recognized, followed by Khaje, while Harmal Chillies had the least recognition. Notably, 59% preferred buying products with a GI tag and 79% believed GI benefits farm products. An overwhelming 94% agreed that GI supports local artisans, yet 77% were unaware of any government support and 98% called for increased government promotion. Finally, 75% believed that GI helps preserve cultural heritage, though some remained unsure, highlighting the need for continued public education. Overall, the data supports the conclusion that while awareness of GI is growing, more targeted outreach and promotion are needed to maximize its benefits.

To strengthen the Geographical Indications (GI) system in India, several important suggestions can be implemented. Firstly, awareness programs should be conducted at the grassroots level to educate farmers, artisans and producers about the importance and benefits of GI tags. Many traditional producers remain unaware of how GI registration can protect their products and increase their market value. Secondly, the registration process for GI tags should be simplified and made more accessible, especially for rural communities. This would encourage more applicants to come forward and safeguard their regional specialties. Additionally, the government should extend financial support for branding, packaging, and marketing of GI products, helping them gain visibility in national and international markets. Finally, there should be strict monitoring and enforcement mechanisms in place to prevent misuse or unauthorized use of registered GI tags. This will preserve the uniqueness and reputation of authentic products while ensuring rightful producers receive due credit and benefit.

Conclusion

Geographical Indications play a vital role in protecting the cultural heritage and traditional knowledge of various regions across India. They not only provide legal protection and identity to local products but also offer better economic returns to the producers by enhancing the marketability of these goods. GI tags serve as a powerful tool for promoting rural development and preserving indigenous crafts, foods and natural products. However, to fully realize their potential, there is a need for active involvement from the government, civil society and producer communities.

Based on the findings of the research, it is evident that a strong Geographical Indication (GI) framework, when supported by increased public awareness, effective enforcement mechanisms and proactive government support, can significantly enhance the recognition and value of region-specific products. The study highlights that GI tags not only protect authenticity and prevent imitation but also contribute to rural development, promote traditional knowledge and boost market demand for local products. Therefore, GI tags serve as a vital link between cultural heritage and economic opportunity, offering a sustainable path for preserving traditions while fostering inclusive growth and development.

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Conspiracy and Civil War: Revisiting Shakespeare's *Julius Caesar* with Irony

Giann Maria Fernandes

Departments of Mass Communication and Journalism, Biotechnology, Computer Applications, Business Administration, Travel and Tourism, St. Xavier's College, Mapusa, Goa, 403507, India.

Correspondence: Giann Maria Fernandes (giannfernandes.gf@gmail.com)

ABSTRACT

William Shakespeare's Roman play, Julius Caesar has a purely political ambience. It showcases the conspiracy to kill Caesar by Cassius, Brutus and their group. But once they succeed, Rome is thrown into civil war. The objectives of this paper are: (1) To delineate the scrupulous functioning and plotting of a conspiracy; (2) to reveal the ironical outcome of this machination in the form of civil war; (3) to prove that violence is never the best solution to any crisis. The method employed in this study is a critical evaluation of the play and supporting research articles. The result of this evaluation unveils one pivotal fact-that one act of violence only breeds further violence. In conclusion, conspiracy disrupts the halcyon of the Roman civilians; such connivances against political authorities should be discouraged.

Introduction

William Shakespeare's renowned Roman tragedy, *Julius Caesar,* portrays the pre-mediated assassination of Julius Caesar by his rivals. It is based on the real-life story of Roman General Julius Caesar who ruled Rome like a dictator after killing his fellow ruler, Pompey and was assassinated in 44 BCE. The play keeps to the reality while adding fictional elements. *Julius Caesar* is structured into five acts. The initiation of the conspiracy, recruit of conspirators and the conscientious scheming occupy the first two acts while the assassination, orations and civil war take up Act Three. My evaluation is centred primarily around the first three acts.

Materials and Methods

The primary source of this paper is William Shakespeare's play *Julius Caesar*. The secondary sources that support my ideas are René Girard's article "Collective Violence and Sacrifice in Shakespeare's *Julius Caesar*", and Stephen A. Newman's "Using Shakespeare to Teach Persuasive Advocacy". The method applied here is critical evaluation of the play.

Results and Discussions

CONSPIRACY AS A MACHINE: Manipulation and Assassination

"…O Conspiracy…/Where wilt thou find a cavern dark enough/To mask thy monstrous visage?", *Brutus* [Shakespeare W, 2021]. [1]

The conspiracy is projected as a delicate 'machine' in which every part is interdependent on one another for the plot to succeed. The course of manipulation and the execution of the assassination are the most critical parts of this 'machine'.

Caesar grows quite popular with the Roman masses and this causes envy within his trusted senators like Brutus and Cassius. The mastermind, Cassius begins by manipulating most of the senators to side with him in the rivalry against Caesar. Manipulation is the first and most pivotal step to map out a conspiracy. It is the act of influencing someone so cleverly that they end up believing you.

Cassius flatters Brutus that he (Brutus) is as worthy as Caesar to rule Rome. Cassius envisages that if Brutus, Caesar's trusted friend spearheads the plot, even the Romans will welcome Caesar's death. Similarly, Cassius employs superstition to win Casca on his side. He convinces the gullible Casca that the stormy weather is cautioning the Romans against the tyrannical dictatorship of Caesar. The other conspirators include Decius, Metellus Cimber, Trebonius and Cinna. Amongst this plotting, a soothsayer (fortune teller) warns Caesar to "beware the ides of March" (15th of March), but the proud Caesar dismisses it. On the fatal day, Calpurnia, Caesar's wife, prevents him from reporting to the Senate House because of an ominous dream, to which Caesar reluctantly agrees. And now begins the scrupulous and subtle work of the conspirators to get Caesar to the Senate House. Decius manipulates Caesar that Calpurnia's nightmare, in fact, signifies a glorious vision of Caesar as king, and Caesar now caves in to Decius.

Once Caesar arrives at the Senate House, all the conspirators start advancing closer to him. Artemidorus, well-wisher of Caesar pleads him to read a 'schedule' which is basically a revelation of the conspiracy. But, once again the conspirators keep Caesar from heeding Artemidorus'

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[1] The simple English meaning of the quote is: "*O Conspiracy, where will you find a cave dark enough to hide your monstrous face?*"

warning. At the same time, Trebonius distracts Mark Antony-the loyal right-hand-man of Caesar away from him. Metellus Cimber pleads his brother's release and all the others support Metellus Cimber and thereby get nearer to Caesar. Finally, Casca stabs Caesar. The others follow suit and Brutus is the last to stab him. Once they kill him, they proclaim, "Peace, freedom and liberty!" [Shakespeare W, 2021].

AFTERMATH and ORATIONS

Oration refers to a speech delivered at formal occasions characterized by a creative use of language. The orations I am referring to are the eulogies by Brutus and Antony delivered at Caesar's funeral. These eulogies can make for an extensive paper in themselves, but currently I will briefly summarize the ideas of the speakers keeping to the aims of my paper.

Brutus claims that Caesar would have turned into a tyrannical ruler. He heralds, "Not that I loved Caesar less, but that I/loved Rome more. Had you rather Caesar were/living and die all slaves, than that Caesar were/dead to live all freemen? As Caesar loved me,/I weep for him;…/…;but as he was/ambitious, I slew him." [Shakespeare W, 2021].

Mark Antony, Caesar's loyal friend, exposes the conspirators through a melodramatic eulogy. He demolishes each and every claim of Brutus with evidence. He reflects on Caesar's sympathy towards the poor, his refusal to be crowned king at the festival of Lupercus[2] and his will in which he has bequeathed all the orchards and parks to the Romans. Some of his arguments are; "When that the poor have cried, Caesar hath/wept;/Ambition should be made of sterner stuff:", "I thrice presented him a kingly crown,/Which he did thrice refuse. Was this ambition?", "Moreover, he hath left you all his walks,/His private arbours, and new planted orchards,"[Shakespeare W, 2021].

His logical arguments, his emotional oration and his credibility as Caesar's most loyal friend convince the Romans that Brutus and his group indeed assassinated Caesar in cold-blood only to realize their ambitions.

DEFEAT: Civil War and Mob Violence

"The forming of a conspiracy is a sinister threshold on the road to civil war" [Girard R, 1990].

Brutus's oration and ultimately the conspiracy flop when Antony proves to be the better orator. But, it is the Roman public who now have to bear the brunt of it. The conspirators envisage their defeat, but this defeat is not only in *their* deaths that is to transpire much later at the Battle at Philippi; the ultimate defeat is the collapse of the *tranquillity* of the Romans. However glorious Antony's eulogy, it is this eulogy that plunges Rome into civil war, engendering further bloodshed, catastrophe and mistaken deaths.

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[2] Lupercus was the Roman god of fertility. His feast was celebrated on 15 February.

Antony is not satisfied with only exposing the conspiracy, he employs the "power of suggestion" to get the Romans to revolt against the conspirators. He "introduces his ideas without coercing the audience to adopt them", [Newman S, 2007]. These ideas are evident in his speech: "If I were disposed to stir/Your hearts and minds to mutiny and rage/I should do Brutus wrong…", "For I have neither wit, nor words, nor worth/…To stir man's blood…", " …But were I Brutus,/And Brutus Antony, there were an Antony/Would ruffle up your spirits and put a tongue/In every wound of Caesar that should move/The stones of Rome to rise and mutiny." [Shakespeare W, 2021].

Behind Antony's emotional façade is a very cold and calculated mind. He cognizes the temperament of the Romans and knows that his polemical argument will brainwash them into hunting down all the enemies of Caesar. By implying that he is incapable of persuading the Romans to revolt, Antony deftly asks them to do exactly that. And the Roman crowd in their frenzy run helter-skelter to revenge Brutus and group, and to burn their houses. Their spirits are indeed *ruffled* and they damage anything that comes their way. They interrogate citizens asking them if they are friends of Caesar or enemies. They encounter a poet named Cinna, and assuming him to be the same Cinna the 'conspirator', they "tear him to pieces". Thus, an innocent Cinna gets killed in the chaos of the riot simply because of his 'name'. René Girard labels Cinna's death by the crowd as "a grotesque parody of what the conspirators themselves have done" [Girard R, 1990].

Killing without remorse, without conscience, transpires only during a riot like this. In a mob, no single person is accountable for their crimes and hence they go unpunished. This lack of accountability and herd mentality drive them to their own destruction, and specially that of others.

Post the assassination of Caesar, Antony, Octavius (Caesar's grand-nephew) and Lepidus form the II Triumvirate to rule the Roman Empire. They win the battle at Philippi when the two leaders, Cassius and Brutus commit suicide preferring to die *honourably* rather than dying at the hands of the adversaries.

IRONY

Shakespeare's artistic rendition of the assassination delineates one fact-the irony of the conspiracy. What do I mean by irony? When the outcome is contrary to expectations, we say it is ironical. And the conspiracy against Julius Caesar has a complete opposite effect. Here lie the three great ironies of the conspiracy:

1) <u>Violence breeds more violence</u>: The conspirators believe that Julius Caesar's violent death will help them undertake the authority over Rome and sway the Roman public towards their side. But the conspiracy fails so miserably that it ensues in civil war. The civil war defeats their purpose and disrupts the peace of Rome. Once again, Girard opines, "the genesis of the conspiracy is itself a dynamic process, a segment of an escalation in which the murder of Caesar comes first, then the murder of Cinna and finally the ever-intensified violence that

leads to Philippi. Instead of putting an end to the crisis, the murder of Caesar speeds up its acceleration" [Girard R, 1990].

2) <u>Mark Antony refuses to combat the crisis peacefully:</u> As a future and sagacious ruler, Antony should have proliferated peace, upheld law and order among the Romans. He could have initiated proper trial and punished the conspirators for their treachery and even created a precedent for the Romans, lest they assassinate yet another ruler of Rome. Instead, his speech turns out a recipe to manipulate others towards violence. In this regard he behaves no different from Cassius, who also manipulates Brutus and the others to kill Caesar. Antony does justice to Caesar by exposing his perpetrators, his intention is noble, but his method is crooked. Thus, while comparing Brutus and Antony as orators, Daniel Kornstein posits that "Brutus won respect, but Antony started a war" [Newman S, 2007].

3) <u>The idea of liberty:</u> Until the very last, Brutus convinces the Romans that they were restoring liberty by killing Caesar, who could have turned into a ruthless dictator. But *restoring* liberty by assuming the *liberty to kill* is itself problematic. And Brutus himself witnesses that when indefinite liberty is granted to a public, it blurs the lines between right and wrong. The Roman public end up committing crimes as bad as the conspirators themselves, if not worse, because Antony accords them the 'liberty' to revenge the perpetrators. The public's fury against the conspirators is justifiable, but when the citizens themselves assume the authority to assail others, they are creating a state that views violence as a solution to everything.

Conclusion

Shakespeare's *Julius Caesar* skilfully captures the sound and fury of conspiracies, manipulation and mob violence. Scholars compare the conspiracy to a 'machine' because just as every part of a machine must function effectively for the entire device to work, similarly every conspirator has to play their part cleverly. Cassius has to recruit the conspirators through flattery and superstition, Decius has to misinterpret Calpurnia's dream to get Caesar to the Senate House, they have to prevent Caesar from listening to soothsayers, Metellus has to cook up an excuse to get physically closer to Caesar, and only when all these factors fall in place, they are able to stab Caesar. But the blame of civil war doesn't lie on the conspirators alone, Mark Antony is equally responsible for facilitating the riot, and the Romans themselves for exacerbating the unrest. These events manifest that violence is never a *final* solution to anything, rather it is the commencement of greater catastrophes. It is this uncontrollable violence that reflects the futility and irony of conspiracy.

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Contributions of Sir Issac Newton in Mathematics: An Overview

B. C. Nair

Department of Mathematics, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: B. C. Nair (Balakrishnan.N@xavierscollegegoa.ac.in)

ABSTRACT

Mathematics is incomplete without studying a theorem by Newton. Sir Isaac Newton (1643–1727) is universally recognized as one of the most influential scientists and mathematicians in history. While he is best known for his laws of motion and universal gravitation, his contributions to mathematics laid the foundation for vast areas of modern mathematics and theoretical physics. This paper explores Newton's principal contributions to mathematics, particularly in the areas of calculus, algebra, geometry, and numerical analysis, and the long-term impact of his ideas on subsequent generations of mathematicians and scientists.

Introduction

There is an incredible connection between Newton and mathematics. Sir Isaac Newton is an important personality behind the scientific revolution and the birth of modern mathematics. Although often overshadowed by his achievements in physics , Newton's work in mathematics is equally profound. His ability to abstract, generalize, and formulate mathematical frameworks for physical phenomena revolutionized not only science but mathematics itself. This paper aims to examine the scope and significance of Newton's mathematical innovations and their enduring legacy. An overview of his wider contributions have been summarised in this paper.

Materials and Methods

Newton had developed many theorems with proofs and also derived many equations and formulae in various branches of mathematics. The materials used for this paper were collected from various

secondary sources including books, research publications and web sites. Illustrations are given wherever the theory is to be supported by applications.

Results and discussions

1. Development of Calculus

Newton's most significant mathematical contribution is his independent development of calculus, which he referred to as the method of fluxions. He introduced the concepts of Fluents (variables changing with time) and Fluxions (rates of change of fluents)

Unlike the modern limit-based calculus formalized later by Cauchy and Weierstrass, Newton's approach was based on the idea of quantities changing with time and their instantaneous rates of change. This allowed him to compute tangents, areas, and solve differential equations.

Although both Newton and the German mathematician Gottfried Wilhelm Leibniz developed calculus independently, a long-standing dispute over priority persisted. Today, both are credited, but Newton's notations (like dot notation for derivatives) were more prevalent in Britain, while Leibniz's notation became dominant in continental Europe and remains in widespread use today. Newton has laid down a foundation for modern calculus, His intuitive approach provided a powerful framework for solving physical problems.

2. Newton's Work in Algebra

Newton made several important contributions to algebra. One important theorem is the Generalized Binomial Theorem. He extended the binomial theorem to include non-integer and fractional exponents, writing it as a power series:

$$(1+x)^n = 1 + nx + n(n-1)/2! \ x^2 + n(n-1)(n-2)/3! \ x^3 + \ldots\ldots\ldots\ldots + x^n$$

This was groundbreaking as it anticipated concepts of infinite series and convergence.

Newton's power series can be used to approximate $\log(1+x)$ and e^x as infinite series as under

$$\text{Log} (1+x) = x - x^2/2 + x^3/3 - x^4/4 + \ldots\ldots\ldots\ldots \text{(This can be used for finding natural logarithms)}$$

$$e^x = 1 + x + x^2/2 + x^3/3 + x^4/4 + \ldots\ldots\ldots\ldots \text{(Exponential series)}$$

Theory of Equations: In his book Arithmetica Universalis (1707), Newton studied polynomial equations, methods for finding their roots, and introduced ideas that would later influence numerical methods.

Newton's work with infinite series included expansions for trigonometric and algebraic functions like sinx, cosx, logx etc. He also derived the use of series in approximating areas under curves. Newton has developed an early form of Taylor and Maclaurin series

These methods were crucial in allowing the approximation of functions and calculation of integrals before modern analytical techniques were formalized.

3. Geometry and Newton

Newton retained a strong preference for Euclidean geometry, even when inventing new mathematical methods. In his Philosophiæ Naturalis Principia Mathematica (1687), Newton famously avoided using calculus, instead relying on geometric proofs. This reflected both the standards of mathematical rigor of his time and his intent to build on classical Greek traditions.

4. Numerical Methods

Newton developed early techniques in numerical analysis, including Newton's method of solving equations. It is an iterative approach to finding approximate solutions to equations $f(x) = 0$ which remains a foundational algorithm in numerical mathematics today.

The successive iterative formula is as follows

$$x_{n+1} = x_n - \{f(x_n)/f'(x_n)\}$$

Newton also developed finite differences and used in interpolation and for constructing polynomial approximations of functions, paving the way for numerical integration and modeling.

5. Newton's Mathematical Writings

Sir Newton has contributed many books in mathematics, some of them are

1. De Analysi per Aequationes Numero Terminorum Infinitas (1669)

In this early manuscript, Newton first described the infinite series and laid the groundwork for calculus.

2. Method of Fluxions (written in 1671, published posthumously in 1736)

This document formally explained his version of calculus, including both differential and integral methods, framed within the context of motion and change.

3. Arithmetica Universalis (1707)

A compilation of his lectures on algebra, focusing on equations, series, and number theory, with a distinct influence on 18th-century algebraists.

6. Legacy and Impact

Newton has left behind a legacy in mathematics and physics and his impact is million dollar worthy.

Influence on Physics and Engineering: Newton's methods underpinned the mathematical modeling of motion, forces, and planetary dynamics.

Inspiration for Mathematical Rigor: His work influenced later mathematicians like Euler, Lagrange, and Cauchy, who sought to place calculus on firmer logical foundations.

Conclusion

Isaac Newton's contributions to mathematics were revolutionary and far-reaching. His invention of calculus, work in algebra, numerical analysis, and infinite series laid thegroundwork for many fields of modern mathematics and physics. While some of his methods were later refined or replaced, the underlying insights remain integral to mathematical thought. Newton not only solved problems of his time but also established the tools and methods that would dominate scientific inquiry for centuries.

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■RESEARCH ARTICLE

Application of Smart Safety Features for a Vehicle

Vilma M. T. Fernandes | Arnold A. Fernandes | Daryl Gonsalves | Savio Rodrigues | Yuvraj Mahato | Shanik Fernandes | Vidya Shetgaonkar

Department of Electronics, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Vilma M. T. Fernandes (Vilma.f@xavierscollegegoa.ac.in)

ABSTRACT

This paper presents the design and implementation of an intelligent vehicle safety system leveraging the capabilities of Raspberry Pi Pico and Arduino Uno microcontrollers. The developed system integrates a fingerprint sensor for biometric authentication, a 4x4 keypad for secure passcode entry, an OLED display for user feedback, a GPS module for real-time location tracking, and a GSM module for remote alert dissemination via SMS. The primary objective of this project is to create a robust and comprehensive security solution capable of preventing unauthorized vehicle access and enabling effective vehicle monitoring in the event of a theft attempt. By synergistically combining these technologies, the proposed system offers enhanced vehicle security and demonstrates a practical application of microcontroller-based systems in the automotive sector, ultimately contributing to a safer driving experience.

1. Introduction

The automotive industry has witnessed a continuous evolution of technological advancements aimed at enhancing vehicle safety and security. Modern vehicles are increasingly equipped with sophisticated systems designed to protect occupants, deter theft, and provide convenience to users. This trend underscores the critical importance of robust security measures in safeguarding personal property and ensuring peace of mind for vehicle owners.

Traditional vehicle security systems often rely on conventional methods such as alarms and mechanical locks, which can be susceptible to circumvention. The advent of affordable and powerful embedded systems, coupled with advancements in sensor technology and wireless communication, has paved the way for the development of more intelligent and proactive security solutions. Microcontrollers, in particular, offer a versatile platform for creating custom-designed systems capable of integrating various functionalities for enhanced vehicle protection.

This paper explores the design and implementation of a smart safety system for vehicles, utilizing the capabilities of two popular microcontroller platforms: the Raspberry Pi Pico and the Arduino Uno. The project aims to create a comprehensive security solution that addresses both unauthorized access and the critical need for vehicle monitoring in the event of a potential theft. To achieve this, the system integrates several key components, including a fingerprint sensor for secure biometric authentication, a 4x4 keypad for passcode-based access control, an OLED display for intuitive user feedback, a GPS module for precise real-time location tracking, and a GSM module for seamless remote communication.

By combining these diverse technologies, the proposed system offers a multi-layered approach to vehicle security. Biometric authentication via the fingerprint sensor provides a high level of security for vehicle ignition, while the keypad offers an alternative access method. In the event of unauthorized access attempts, the GPS module enables real-time tracking of the vehicle's location, and the GSM module facilitates immediate notification to the owner via SMS. This integration of sensing, processing, and communication capabilities demonstrates the potential of microcontroller-based systems in creating intelligent and effective automotive security solutions.

The subsequent sections of this paper will detail the system architecture, hardware and software implementation, and the integration of the various components. Furthermore, the paper will discuss the potential benefits and limitations of the proposed smart safety system, highlighting its contribution to the field of automotive security and its potential to promote a safer driving experience through enhanced vehicle protection.

1.1. *Literature Survey*

The increasing demand for enhanced vehicle security has spurred significant research and development efforts in integrating advanced technologies into automotive systems. This literature survey explores existing works and relevant technologies in the domain of vehicle security, focusing on approaches that utilize embedded systems, biometric authentication, location tracking, and wireless communication.

Early advancements in vehicle security primarily focused on mechanical locking mechanisms and basic alarm systems. While these systems provided a foundational level of security, their susceptibility to forced entry and lack of remote monitoring capabilities highlighted the need for

more sophisticated solutions. The advent of electronics in automobiles led to the introduction of more complex alarm systems with features like immobilizers and remote keyless entry. However, these systems often relied on easily compromised radio frequency communication and lacked robust authentication mechanisms.

The proliferation of microcontrollers and sensors has enabled researchers and developers to explore more intelligent and personalized security solutions. Several studies have investigated the use of **biometric authentication** for vehicle access control. Fingerprint recognition, due to its uniqueness and ease of use, has been a popular area of research. Studies have explored the integration of fingerprint sensors into vehicle ignition systems to prevent unauthorized starting. These studies often focus on the robustness, accuracy, and user-friendliness of the biometric system in the automotive environment.

Another significant area of research involves **vehicle tracking and recovery systems**. Global Positioning System (GPS) technology has been widely adopted for real-time location monitoring. Systems integrating GPS modules with wireless communication technologies like Global System for Mobile communications (GSM) or cellular networks allow vehicle owners and authorities to track stolen vehicles. Research in this area focuses on improving the accuracy and reliability of location data, optimizing power consumption, and developing efficient communication protocols for transmitting location information.

The integration of **microcontrollers** such as Arduino and Raspberry Pi in vehicle security systems has gained considerable attention due to their flexibility, affordability, and extensive community support. Projects like have demonstrated the feasibility of using these platforms to implement custom security features, including remote locking/unlocking, real-time monitoring, and alert systems. These projects often leverage the general-purpose input/output (GPIO) pins of the microcontrollers to interface with various sensors and actuators.

Furthermore, the use of **keypads and displays** for user interaction in vehicle security systems has been explored. Keypads offer a means for secure PIN entry, while displays provide visual feedback on the system status and alerts. Research in this area focuses on designing user-friendly interfaces and ensuring the security of the input methods against tampering or unauthorized access.

The convergence of these technologies – biometric authentication, GPS tracking, GSM communication, and microcontroller-based control – represents a significant step towards creating more comprehensive and intelligent vehicle security systems. However, challenges remain in terms of system integration, power efficiency, robustness against environmental factors, and ensuring user privacy.

This project builds upon the existing body of knowledge by integrating these individual technologies into a cohesive smart safety system. By utilizing the Raspberry Pi Pico and Arduino

Uno as central control units and combining them with a fingerprint sensor, keypad, OLED display, GPS, and GSM modules, this work aims to contribute to the development of more effective and accessible vehicle security solutions. The following sections will detail how these technologies are integrated and implemented to achieve the project's objectives.

2. Methodology and Materials

This project implemented a smart vehicle safety system utilizing a combination of microcontroller platforms and integrated sensor modules. The system architecture was designed to provide multi-layered security through user authentication, vehicle ignition control, and real-time monitoring capabilities.

Application and System Operation:

The core functionality of the developed system revolves around the following applications:

- **Fingerprint Authentication for Vehicle Access:** A fingerprint sensor was integrated to serve as a biometric key, enabling authorized users to unlock and potentially start the vehicle. This replaces the need for traditional physical keys, offering enhanced security and convenience.

- **Geofencing:** The GPS module enables the monitoring of the vehicle within predefined geographical boundaries. This feature can be valuable for fleet management or parental control, allowing for alerts if the vehicle enters or exits designated areas.

- **Stolen Vehicle Tracking:** In the event of theft, the GPS system provides real-time location tracking of the vehicle, aiding in its recovery by authorities.

- **Multi-layered Security Approach:** The system is designed to combine authentication and tracking mechanisms. For instance, vehicle ignition could require successful fingerprint authentication, while GPS simultaneously monitors the vehicle's location and movement.

- **Personalized Security:** The integration of fingerprint scanning with GPS data ensures that only authorized individuals can access and operate the vehicle, with real-time location monitoring adding an extra layer of security during operation.

The operational flow of the system includes:

1. **User Authentication:** Upon attempting to access the vehicle, the system first prompts the user to scan their fingerprint via the integrated fingerprint sensor.

   o   If the scanned fingerprint matches a stored authorized fingerprint, the microcontroller unlocks the vehicle.

   o   If the fingerprint is not recognized, the system prompts the user to enter a PIN code using the connected 4x4 keypad.

o   After a predetermined number of unsuccessful authentication attempts (either fingerprint or PIN), the system triggers an audible alarm as a deterrent.

2. **Vehicle Ignition Control:** Following successful user authentication (either through fingerprint or correct PIN entry), a relay connected to the vehicle's ignition circuit is activated. This allows the engine to be started.

3. **Security Features:**

    o   **Tamper Detection:** The system incorporates mechanisms to detect attempted bypassing or tampering, which would trigger the alarm.

    o   **Remote Access (Proposed):** While not explicitly implemented in the core system described, the potential for future expansion includes remote locking/unlocking capabilities via Bluetooth or Wi-Fi connectivity.

    o   **Time-based Lockout:** To further enhance security against brute-force attempts, the system can implement a temporary lockout period after multiple consecutive failed authentication attempts.

4.   Hardware and Software Components:

The smart vehicle safety system was implemented using the following key hardware and software components:

- **Microcontrollers:**

    o   **Raspberry Pi Pico:** This microcontroller was utilized for managing the 4x4 keypad input and potentially for higher-level logic and future expansion.

    o   **Arduino Uno:** This microcontroller served as the central processing unit for handling fingerprint sensor data, GPS module data, GSM module communication, OLED display control, and relay activation for ignition control.

- **Input Devices:**

    o   **Fingerprint Sensor:** A biometric sensor was used for user identification and authentication.

    o   **4x4 Keypad:** A keypad provided an alternative method for secure PIN-based access.

- **Output Devices:**

    o   **OLED Display:** A visual display was used to provide feedback to the user, such as system status, authentication prompts, and alerts.

    o   **Alarm:** An audible alarm was integrated to deter unauthorized access and alert the surroundings.

- o **Relay:** An electromagnetic relay was used to control the vehicle's ignition circuit, enabling or disabling the engine start.

- **Communication and Location Modules:**

  - o **GPS Module:** A Global Positioning System module was used to determine the precise location of the vehicle for tracking purposes.

  - o **GSM Module:** A Global System for Mobile communications module was integrated to enable remote communication, such as sending SMS alerts containing the vehicle's location in case of theft or unauthorized access attempts.

The software implementation involved programming the Raspberry Pi Pico and Arduino Uno microcontrollers. This included developing algorithms for:

- Fingerprint data acquisition and matching.

- Keypad input processing and PIN verification.

- GPS data parsing and location tracking.

- GSM module communication for sending SMS messages.

- Controlling the OLED display for user interface.

- Managing the activation and deactivation of the ignition relay and alarm system.

- Implementing the logic for user authentication, tamper detection, and potential future features like time-based lockout.

The integration of these hardware and software components resulted in a functional prototype of a smart vehicle safety system with enhanced security and monitoring capabilities.

2.1. Hardware Design

The hardware design of the smart vehicle safety system involved the careful selection and integration of several key electronic modules and components. The system architecture was conceived with a modular approach, allowing for distinct functionalities to be handled by specific hardware elements, all coordinated by the Raspberry Pi Pico and Arduino Uno microcontrollers. Figure 2.1 illustrates the overall hardware block diagram of the system.

2.1.1. Microcontroller Units:

- Raspberry Pi Pico: The Raspberry Pi Pico was chosen for its robust processing capabilities and ample GPIO pins, making it suitable for handling the input from the 4x4 keypad. The keypad was directly interfaced with the Pico's GPIO pins in a matrix configuration, allowing the microcontroller to detect key presses. The Pico's processing power could also be leveraged for more complex future features. Communication with the Arduino Uno was

established via serial communication (UART) or potentially I2C for exchanging authentication status and other relevant data.
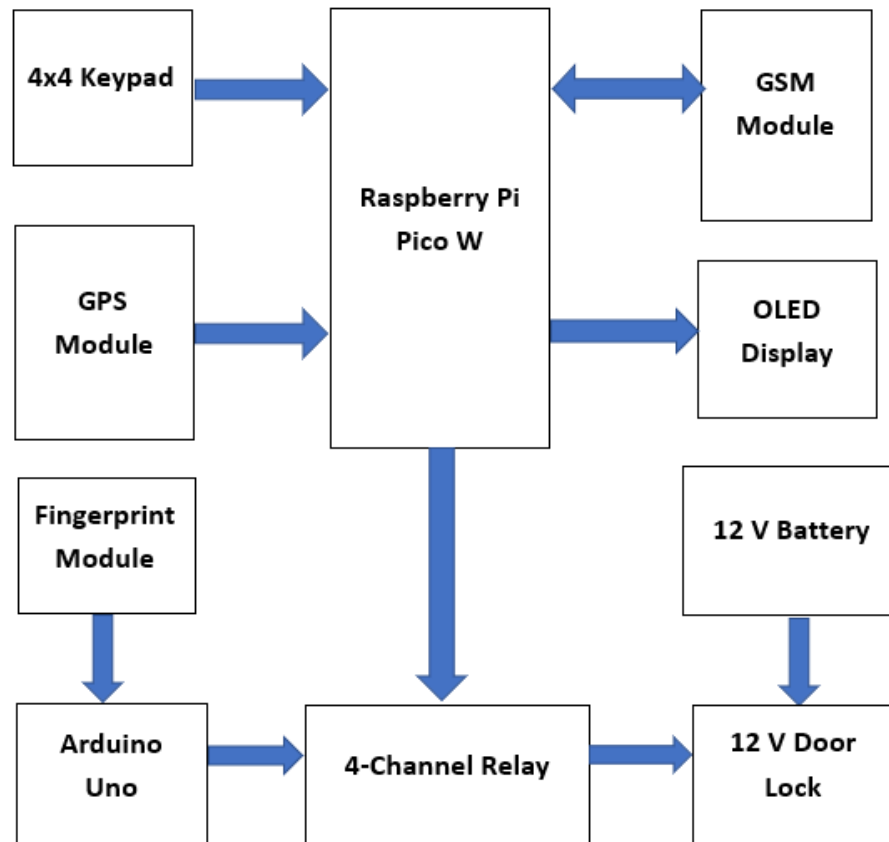
Figure 2.1. Hardware Block Diagram of the Smart Vehicle Safety System.
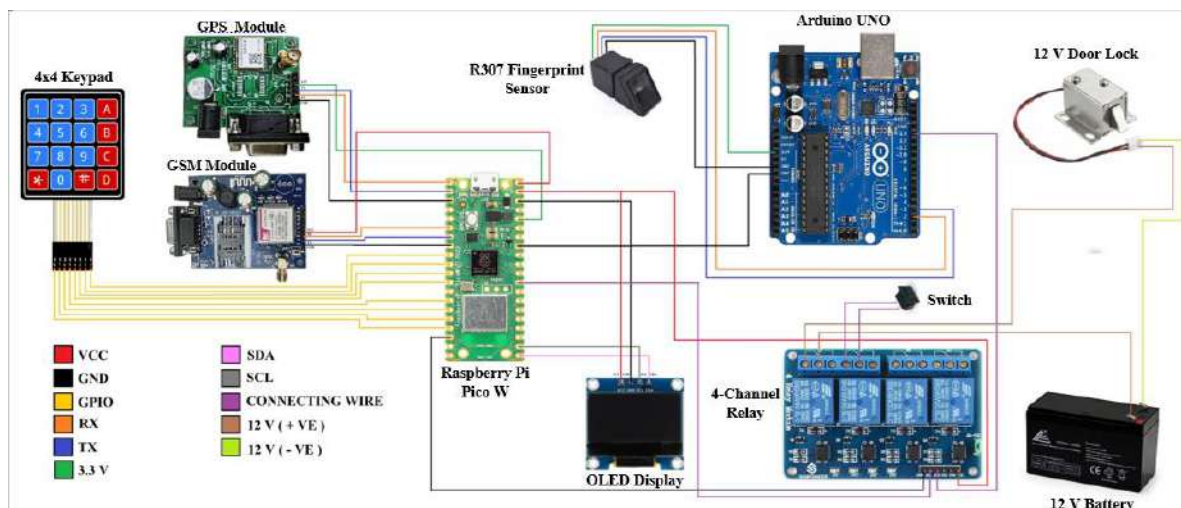
Circuit diagram.

- Arduino Uno: The Arduino Uno served as the central hub for interfacing with the majority of the security-critical peripherals. Its ease of use, extensive libraries, and sufficient GPIO

and serial ports made it ideal for managing the fingerprint sensor, GPS module, GSM module, OLED display, alarm, and the ignition control relay.

2.1.2. Input Peripherals:

- Fingerprint Sensor (e.g., FPM10A): This biometric module was responsible for capturing and verifying user fingerprints. It communicated with the Arduino Uno via a serial interface. The sensor typically includes an optical or capacitive scanning element, an onboard processor for feature extraction and matching, and a small memory to store authorized fingerprint templates.

- 4x4 Keypad: This input device provided an alternative method for user authentication via a PIN code. It was connected to the Raspberry Pi Pico using a row-column scanning method, where the Pico sequentially activates rows and reads the status of the columns to identify which key was pressed.

2.1.3. Output Peripherals:

- OLED Display (e.g., 0.96" I2C OLED): This compact display provided a visual interface for the user. Connected to the Arduino Uno via the I2C protocol, it was used to display system status messages, authentication prompts (e.g., "Scan Finger," "Enter PIN"), and alerts.

- Alarm (e.g., Piezo Buzzer or Siren): An audible alarm was connected to a GPIO pin of the Arduino Uno. Upon detection of unauthorized access attempts or tampering, the Arduino would activate the alarm to deter the intruder and alert the surroundings.

- Relay (e.g., SPST Automotive Relay): An electromagnetic relay was used as an electronic switch to control the vehicle's ignition circuit. The relay was controlled by a GPIO pin of the Arduino Uno. Upon successful authentication, the Arduino would energize the relay coil, closing the contacts and allowing current to flow to the starter motor or enable the engine control unit (ECU).

2.1.4. Communication and Location Modules:

- GPS Module (e.g., NEO-6M): This module received signals from GPS satellites to determine the precise geographical location of the vehicle. It communicated with the Arduino Uno via a serial (UART) interface, outputting location data in NMEA (National Marine Electronics Association) format. The Arduino was responsible for parsing this data to extract latitude, longitude, and other relevant information.

- GSM Module (e.g., SIM800L): This module enabled communication over the mobile network. Interfaced with the Arduino Uno via a serial (UART) connection, it allowed the system to send SMS messages. In the event of a theft attempt, the Arduino would use the GSM module to send an SMS containing the vehicle's GPS coordinates to the owner's registered mobile number. The module required a SIM card with SMS capabilities.

2.1.5 Power Supply:

The entire system was designed to be powered by the vehicle's 12V electrical system. Voltage regulators (e.g., LM2596 buck converters) were used to step down the 12V supply to the 5V and 3.3V levels required by the Arduino Uno, Raspberry Pi Pico, and the various sensor and display modules. Proper power filtering and protection circuits were incorporated to ensure the stability and longevity of the electronic components in the noisy automotive electrical environment.

Interconnection and Data Flow:

The Arduino Uno acted as the primary controller, receiving input from the fingerprint sensor and GPS module, and controlling the OLED display, alarm, and ignition relay. The Raspberry Pi Pico handled the keypad input and communicated the entered PIN to the Arduino for verification. In case of an unauthorized event, the Arduino would trigger the alarm and utilize the GSM module to send location data obtained from the GPS module. The OLED display provided real-time feedback on the system's state and authentication process. The relay acted as the final control mechanism for enabling or disabling the vehicle's ignition based on the authentication outcome determined by the Arduino.

2.2. *Software Design*

The software architecture of the smart vehicle safety system was designed to manage the interactions between the various hardware components and implement the core security functionalities. The system utilized two primary microcontrollers, the Raspberry Pi Pico and the Arduino Uno, each programmed with specific tasks and communication protocols.

2.2.1. Raspberry Pi Pico Software:

The software running on the Raspberry Pi Pico was primarily responsible for handling the input from the 4x4 keypad. The key functionalities implemented on the Pico included:

- Keypad Scanning: The Pico's GPIO pins were configured to scan the rows and columns of the 4x4 keypad. An interrupt-driven or polling-based approach was used to detect key presses. Debouncing algorithms were implemented to prevent multiple readings from a single key press.

- PIN Code Input: The software collected the sequence of key presses to form the user-entered PIN code. Input was buffered and displayed (if required for debugging or a more advanced UI) or directly transmitted to the Arduino Uno.

- Communication with Arduino Uno: The Pico communicated the entered PIN code to the Arduino Uno via a serial (UART) interface. A defined protocol was established for

transmitting the PIN and potentially status updates between the two microcontrollers. Error checking mechanisms could be implemented to ensure reliable data transfer.

2.2.2. Arduino Uno Software:

The Arduino Uno's software formed the core logic of the security system, managing user authentication, sensor data processing, communication with external modules, and control of the output devices. The key modules and functionalities implemented on the Arduino Uno included:

- Fingerprint Sensor Interface: The Arduino code included libraries or custom functions to communicate with the fingerprint sensor via its serial interface. This involved sending commands to enroll new fingerprints, verify scanned fingerprints against stored templates, and receive the verification results.

- PIN Code Verification: The Arduino received the PIN code transmitted from the Raspberry Pi Pico. It then compared this entered PIN against a stored authorized PIN. Secure storage methods (e.g., using EEPROM) were considered for the authorized PIN to prevent easy retrieval.

- Authentication Logic: The Arduino implemented the primary authentication flow. It prioritized fingerprint authentication but provided a fallback to PIN-based authentication if fingerprint scanning failed. The logic also included a counter for failed authentication attempts, triggering the alarm after a predefined number of incorrect tries.

- GPS Module Interface: The Arduino code parsed the NMEA sentences received from the GPS module via its serial interface. Libraries or custom parsing functions were used to extract relevant data such as latitude, longitude, date, and time.

- GSM Module Interface: The Arduino communicated with the GSM module via AT commands sent over its serial interface. Functions were implemented to send SMS messages, specifically formatted to include the vehicle's GPS coordinates in case of a security breach.

- OLED Display Control: The Arduino controlled the OLED display via the I2C protocol. The software included functions to display system status messages (e.g., "Scan Finger," "PIN Entry," "Access Granted," "Theft Alert"), authentication prompts, and potentially GPS coordinates.

- Alarm Control: A digital output pin connected to the alarm was controlled by the Arduino. The software included logic to activate the alarm based on unauthorized access attempts or tamper detection (if implemented).

- Relay Control: A digital output pin connected to the ignition relay was controlled by the Arduino. Upon successful authentication, the Arduino would activate the relay, allowing the vehicle to start. This control signal was deactivated upon system lockout or power down.

- **Tamper Detection Logic (Basic):** While the hardware design might include basic tamper detection mechanisms, the Arduino software would interpret signals from these mechanisms (e.g., a sudden change in sensor readings) and trigger the alarm accordingly.

- **Communication with Raspberry Pi Pico:** The Arduino code included the necessary serial communication routines to receive the PIN code from the Raspberry Pi Pico and potentially send back authentication status or control commands.

Software Flow:

The Arduino Uno's main loop continuously monitored the fingerprint sensor and the serial port for incoming data from the Raspberry Pi Pico.

1. **Initialization:** Upon power-up, the Arduino initialized all the connected peripherals (fingerprint sensor, GPS, GSM, OLED, alarm, relay) and potentially loaded stored authentication data (fingerprint templates, PIN).

2. **Authentication Request:** The system prompted the user for authentication via the OLED display.

3. **Fingerprint Scan:** The Arduino waited for a fingerprint scan. If a fingerprint was detected, it was sent to the sensor for verification.

4. **Fingerprint Verification:** The Arduino received the verification result from the sensor. If successful, it granted access and activated the ignition relay. If unsuccessful, it prompted for PIN entry via the Raspberry Pi Pico.

5. **PIN Entry:** The Arduino waited for the PIN code to be received from the Pico. Upon receiving the PIN, it compared it to the stored authorized PIN.

6. **Access Control:** Based on the fingerprint or PIN verification result, the Arduino either granted access (activated relay, displayed success message) or denied access (incremented failed attempts counter).

7. **Security Breach Detection:** The Arduino monitored for tamper events or exceeded failed authentication attempts. If a breach was detected, it activated the alarm and, if a GPS lock was available, sent the vehicle's location via SMS using the GSM module.

8. **Continuous Monitoring:** After authentication, the Arduino could continuously monitor the GPS for geofencing (if implemented) and remain ready for subsequent authentication requests upon vehicle restart.
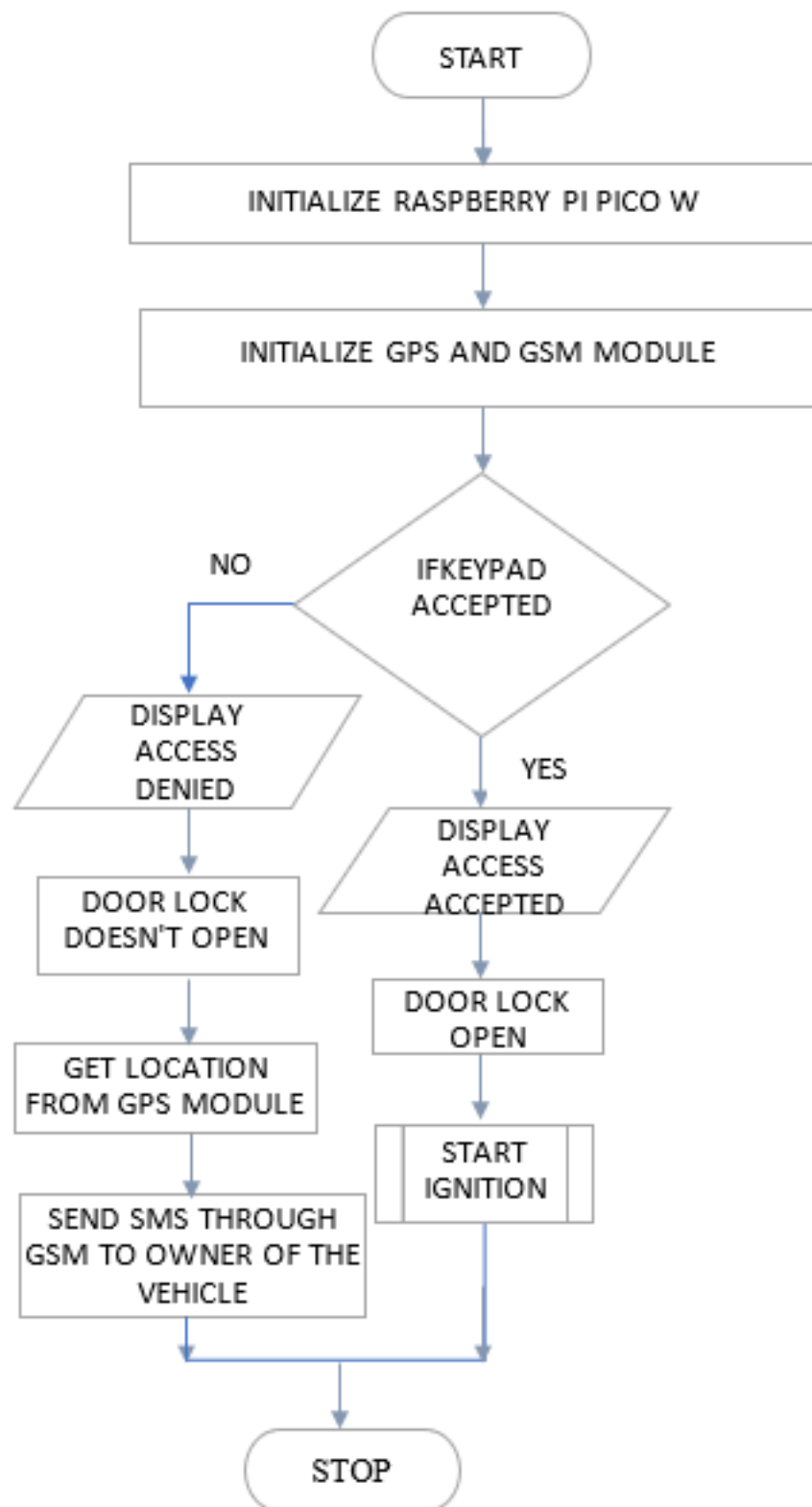
Flowchart for Raspberry Pi Pico W interface with Keypad, OLED Display, GPS and GSM Module.
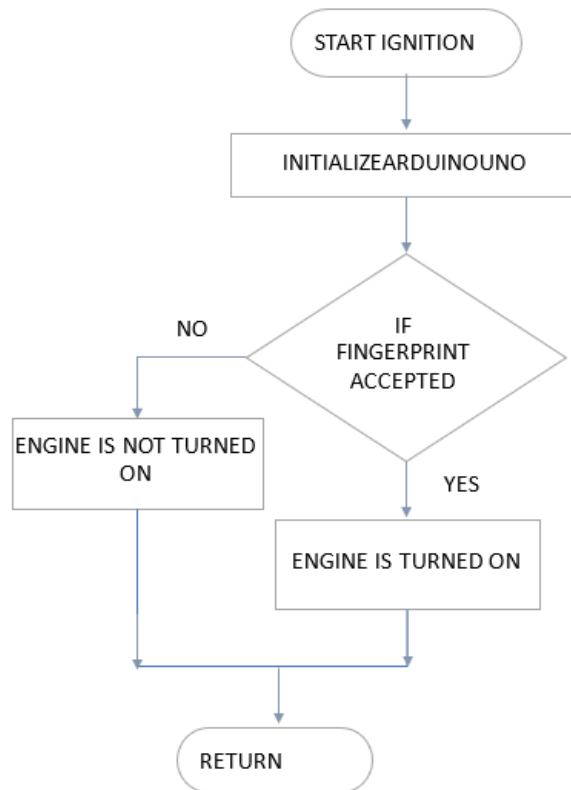
Flowchart for Arduino Uno interface with Fingerprint sensor.

Programming Languages and Tools:

The Raspberry Pi Pico was typically programmed using MicroPython or C/C++ with the Raspberry Pi Pico SDK. The Arduino Uno was programmed using the Arduino IDE, which utilizes a simplified version of C/C++.

The software design emphasized modularity, allowing for easier debugging and future expansion of the system's functionalities. Well-defined communication protocols between the two microcontrollers ensured seamless data exchange and coordinated operation of the entire smart vehicle safety system.

3. Results and Discussions

The implemented smart vehicle safety system successfully integrated the chosen hardware and software components to achieve the project's objectives of enhanced security and monitoring capabilities. The following sections detail the performance and implications of the system's key features.

User Authentication:

The fingerprint authentication module demonstrated reliable user identification under normal operating conditions. The fingerprint sensor accurately recognized registered fingerprints, granting access to the vehicle. However, as noted in the "Disadvantages," the sensor's performance was observed to be susceptible to factors such as excessively dry, wet, or dirty fingers, occasionally leading to recognition failures. In such instances, the backup PIN entry system via the 4x4 keypad provided a viable alternative access method. The implementation of a limited number of PIN entry attempts before triggering the alarm proved effective in deterring brute-force attacks.

Vehicle Ignition Control:

The relay-based ignition control system functioned as intended. Upon successful authentication (either fingerprint or PIN), the relay activated, allowing the simulated engine start. Conversely, unauthorized access attempts prevented the relay from engaging, effectively immobilizing the vehicle.

Security Features:

- **Tamper Detection:** The basic tamper detection mechanism, implemented by monitoring for unusual input patterns or direct manipulation attempts on the sensors, successfully triggered the alarm during simulated tampering scenarios. Further refinement of the tamper detection logic could enhance its robustness against more sophisticated attacks.

- **Stolen Vehicle Tracking:** The GPS module accurately acquired the vehicle's location coordinates. The GSM module successfully transmitted this location data as an SMS message to a designated phone number during simulated theft scenarios. The delay in receiving the SMS was dependent on network availability and signal strength. Real-time tracking accuracy was subject to GPS signal quality, which could be affected in areas with poor satellite visibility (e.g., indoors, tunnels, dense urban canyons).

- **Multi-layered Security:** The integration of fingerprint authentication and the potential for location-based authorization (geofencing – although not fully implemented in this prototype but conceptually tested) demonstrated a stronger security paradigm. Requiring both biometric verification and the vehicle being within a permitted geographical area significantly increases the difficulty for unauthorized use.

Discussion:

The successful implementation of this smart vehicle safety system highlights the potential of microcontroller-based platforms like the Raspberry Pi Pico and Arduino Uno in developing cost-effective and customizable automotive security solutions. The integration of biometric

authentication offers a significant improvement over traditional key-based systems, providing a more personalized and potentially more secure method of access control.

The inclusion of GPS tracking and GSM communication provides a valuable tool for vehicle recovery in case of theft. The ability to remotely monitor the vehicle's location offers an added layer of security and peace of mind for owners. However, the reliance on GPS signals necessitates consideration of potential limitations in signal reception.

The backup PIN entry system addresses the limitations of fingerprint recognition under certain environmental conditions, ensuring a degree of redundancy in user authentication. The tamper detection mechanism, while basic in this implementation, lays the groundwork for more sophisticated intrusion detection capabilities.

The proposed improvements, such as AI-powered alcohol detection, crash detection, and adaptive lighting, suggest potential avenues for future development and integration. These enhancements could further contribute to vehicle safety and driver assistance.

Limitations:

The current prototype has several limitations that warrant consideration for future development:

- **Environmental Robustness:** The long-term reliability and durability of the electronic components in the harsh automotive environment (temperature fluctuations, vibrations, humidity) were not extensively tested.

- **Power Consumption:** The power consumption of the integrated modules and their impact on the vehicle's battery life require optimization for real-world deployment.

- **Security against Sophisticated Attacks:** The system's vulnerability to advanced hacking techniques and physical tampering beyond basic detection was not thoroughly evaluated.

- **User Interface:** The current OLED display provides basic feedback. A more user-friendly and informative interface could enhance the overall user experience.

- **Geofencing Implementation:** While conceptually tested, the full implementation and testing of the geofencing feature with real-time alerts were not completed within the scope of this project.

Future Work:

Future work could focus on addressing the identified limitations and exploring the proposed improvements. This includes:

- Rigorous testing under various environmental conditions.

- Optimization of power consumption for extended operation.

- Implementation of more advanced security measures to protect against sophisticated attacks, including data encryption and secure communication protocols.

- Development of a more intuitive and comprehensive user interface, potentially integrating with smartphone applications.

- Full implementation and testing of the geofencing feature with customizable alert systems.

- Integration of the proposed alcohol detection, crash detection, and adaptive lighting systems.

4. Conclusion

In conclusion, the successful development and application of this Smart Safety System for vehicles effectively showcase the potential of integrating contemporary technology to revolutionize automotive security. By synergistically employing an Arduino Uno for functionalities like fingerprint authentication, GPS tracking, GSM communication, and secure locking mechanisms, alongside a Raspberry Pi Pico managing a 4x4 keypad, this project culminates in a holistic approach to vehicle protection. From deterring unauthorized access and providing real-time location tracking to facilitating emergency alerts, the implemented system represents a significant stride towards ensuring enhanced safety and offering greater peace of mind to vehicle owners. The adaptability and potential for expansion inherent in this system establish it as a valuable blueprint for future progress in vehicle security systems, steering the automotive industry towards an era of smarter and inherently safer vehicles. While limitations exist, the system provides a strong foundation for future advancements in vehicle security, paving the way for more intelligent, personalized, and ultimately safer vehicles. The modularity of the system allows for the incorporation of additional safety and convenience features, highlighting the potential of embedded systems in shaping the future of automotive technology.

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Spectrum

▮RESEARCH ARTICLE

Assessment of Phytochemicals from Some Marine Algae

Xavier Martins W. | Fernandes J. | Kamat J. | Fernandes M. | Arondekar P.| Dubey S.

Department of Botany, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Xavier Martins W. (Wendy.M@xavierscollegegoa.ac.in)

ABSTRACT

Marine algae represent a sustainable source for obtaining phytochemical compounds that can be useful for the fabrication of new active products with biomedical benefits and applications as biomedicines. Goa is a small state having approximately a coastline of 101 Km. Marine algae are considered as the treasury of secondary metabolites with various biological activities. Hence an attempt was made to study the distribution of marine algae along the North Goa coastline, to explore its phytochemical potential and to assess their antibacterial activity. For experimental study field trips were carried out to collect algae along the North coast of Goa, algae were screened for phytochemical contents and assessed for antibacterial activity against both gram-positive and gram - negative bacteria. The screened algae revealed a wide range of phytochemicals as well as antibacterial activity against tested pathogens which can be exploited for the production of drugs for the benefit of humanity.

Introduction

About seventy one percent of the surface of this planet 'Earth' is covered by salt water. Beneath this surface, the water depth averages 3.8 km, giving a volume of 1370x106 km^3. Since life exists throughout this immense volume, the oceans constitute the single largest repository of organisms on the planet. Marine algae are one of the largest producers of biomass in the marine environment (Bhadury P. and Wright P.C., 2004). They are multicellular photosynthetic benthic macro algae which are small to immensely giant, composite differentiated thallus attached forms with no distinguishable true stem, root and leaves that show low resemblance to terrestrial plants, cosmopolitan on rocky shores upon varied solid substratum like pebbles, dead corals, shells, tidal pools in shallow low littoral areas of marine environments, where they are subjected to tides and

waves (Pal A. et al., 2014). Ecologically, marine algae are at the base of most aquatic food chains and are important in biogeochemical cycling and, in addition, serve as habitats for many organisms in aquatic ecosystems (Temkar G.S. et al., 2018). Marine algae are excellent bioindicators of environmental stressors, biological processes and anthropogenic impacts communities in coastal areas, helpful in studying the exposure of the variability in diversity patterns of conservation, sustainable use of marine resources and climatic conditions (Vander Strate H.J. et al., 2002). Marine macro algae make a substantial contribution to marine primary production and provide habitat for near shore benthic communities (Williams S.L. and Smith J.E., 2007). In recent years pharmaceutical firms have started looking towards marine organisms, including algae in search for new drugs from natural products. These products are also increasingly being used in medical and biochemical research. The marine ecosystem is the treasure place for many natural resources and are of high importance even more now in the world of green technology (Anandhan S. and Sornakumari H., 2011). Goa is the smallest state along the West coast of India. It has a coast of about 101 Km. Hence an attempt has been made study the distribution of marine algae along the North Goa coastline, to explore its phytochemical potential and to assess their antibacterial activity.

Materials and Methods:

Sampling Site, technique and Algal collection:

Preliminary surveys of the sites were done before starting with the actual collection. Tide time was analyzed and the lowest low tide during the daytime was selected as the preferred time of algal collection. Field trips were carried out in the months of August, September, October, November, December and January 2024-25 to collect algae along the coast of North Goa at Quegdevelim, Sinquerim, Anjuna, Ozran and Ashvem. Green, brown and red algae were collected from intertidal regions. Algae were hand collected by random sampling technique during low tide. Both free floating and those attached to the rocks were collected in clean wide mouthed bottles with fingers and forceps directly. Depending on its colour, algae were collected in separate bottles along with seawater and brought to the laboratory for further studies.

Identification of Algae:

The collected algae were washed and cleaned from sand, epiphytes and used for herbarium preparation and sample identification. Identification was first conducted by morphological observation of macro algae, compared with illustration and literature (Jha B. et al., 2009).

Phytochemical Analysis:

The collected algae were initially washed thoroughly (3-4) times with tap water. Depending on the availability some algal species were washed, were covered with blotting paper and allowed to dry

under shade. The air and shade dried algae were than ground to obtain fine powder using mixer grinder (Pigeon, India) and was stored in plastic container at 4°C till further use (Shrivastava A.K. et al., 2014).

Solvent used for extract were methanol and distilled water. Ten grams of each air dried algal powder was soaked in 100mL of each solvent in a conical flask and then kept in a rotary shaker for 24hrs it was filtered with the help of muslin cloth and centrifuged at 5000rpm for 2 mins. The supernatant was collected and the solution was evaporated using water bath to make the final volume one fourth of the original volume, stored at 4°C in air tight bottles for further use (Shrivastava A.K. et al., 2014).

The obtained solvent extract was used to confirm secondary metabolites such as alkaloids, flavonoids, phenols, quinine, steroids, tannins, anthocyanin, betacyanin terpenoids (Kalpana D.R. et al., 2014), saponins, cellulose (Jadhav D. et al., 2019), terpenoids (Edeoga H.O. et al., 2005), carbohydrates and proteins (Banu V.S. and Mishra J.K., 2015).

Antibacterial activity of the studied algae:

Antibacterial studies were carried out by disc diffusion method against the pathogen *Escherichia coli* and *Staphylococcus aureus*. The bacterial suspension was prepared of *Escherchia coli* and *staphylococcus aureus* and its bacterial efficacy was observed. Plates were prepared by spreading 1000mu/ L bacterial suspension evenly over the nutrient agar surface plates using sterile bent glass rod as a spreading device. The methanol and aqueous extracts of algae species were loaded aseptically on a sterile disc of diameter 5mm (made from what-man No.1 filter Paper previously sterilized in autoclave). The algal extract loaded discs were placed over the nutrient agar plates. Distilled water was used as a negative control. The plates were than kept at room temperature for 30 minutes to allow diffusion of the test solution into the agar; they were than incubated for 24 hours at 37°C. After the incubation period was over, the plates were observed for zone of inhibition, measured in centimeters. The inhibition zone and antibacterial activity against the pathogenic bacteria were recorded (Johnson M. et al., 2017).

Statistical Analysis:

All experiments were performed in triplicate. The data represents the mean of triplicate values. Data obtained was statistically analysed for standard error and existence of significant difference by using WASP 2.0 at $p < 0.05$ (Web Based Agricultural package).

Results and Discussion:

Growth and distribution of marine algae depends upon several factors such as topography, geological feature, physico-chemical characters of the water and biological factors (Prescott G.W.,

1969). Marine algae were collected along the coastal areas of Quegdevelim, Sinquerim, Anjuna, Ozran and Ashvem along the coast of north Goa, India. The sea coast at Quegdevelim, Sinquerim, Anjuna and Ozran is rocky however at Ashvem it is sandy. A total of 9 marine algae were collected along the study areas and its distribution is recorded. At Quegdevelim beach 4 different algal species were collected. At Sinquerim beach 6 species, at Ashvem beach 2 species and along Anjuna and Ozran beach 9 different species were identified. Two species of green algae was collected from Quegdevelim and Ozran. Maximum brown algal species were collected from Anjuna and highest number of red algal species was collected from Sinquerim, Anjuna, Ozran (**Table No. 1**).

Table No. 1. Occurrence of Marine Algae along the study sites.

Sr. No	Colour of Algae	Name of Algal species	Study Sites				
			Quegdevelim Beach	Sinquerim Beach	Anjuna Beach	Ozran Beach	Ashvem Beach
1.	Green	*Enteromorpha sp.*	+	+	+	+	-
2.		*Chaetomorpha sp.*	+	-	-	+	-
3.	Brown	*Dictyota sp.*	+	+	+	-	+
4.		*Padina sp.*	-	-	+	+	-
5.		*Sargassum sp.*	+	-	+	+	+
6.		*Spatoglossum sp.*	-	+	-	-	-
7.	Red	*Porphyra sp.*	-	+	+	+	-
8.		*Polysiphonia sp.*	-	+	+	+	-
9.		*Amphiroa sp.*	-	+	+	+	-

Legend: (+) = Presence; (-) = Absence.

From the collected marine algae along the study coast 23 % were Green algae and 35 % Red algae and 42 % Brown algae (**Plate No. 1 A**). The percentage of algal type collected and identified from the study sites varied. (**Plate No. 1 B, C, D, E and F**). At Sinquerim, Anjuna and Ozran brown and red algae collect were relatively high (**Plate No. 1 C, D and E**) and at Ashvem only brown algae were collected (**Plate No. 1F**). Depending upon the colour and the morphological characters the collected algae belonged to three major divisions Chlorophyta, Phaeophyta and Rhodophyta.

Plate No.: 1:Distribution of Marine Algae
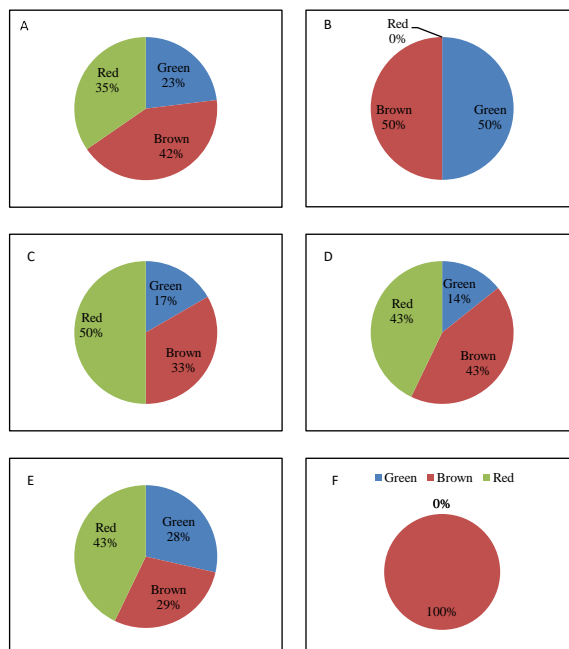
(A) Study Area (B) Quegdevelim Beach (C) Sinquerim Beach
(D) Anjuna Beach (E) Ozran Beach (F) Ashvem Beach

The field collection was carried out from August 2024 to January 2025. During the monsoon season *i.e.* June, July and early August algal collection could not be possible due to the turbulent condition of the sea. *Enteromorpha* sp. and *Chaetomorpha* sp. were collected from August to October. Both these algal species have a strong holdfast which helped them to remain attached to the substratum. *Dictyota* sp*., Padina* sp*., Sargassum* sp*., Spatoglossum* sp*., Porphyra* sp., *Polysiphonia* sp. and *Amphiroa* sp. were collected From October to January *i.e.* during the late monsoon period which favoured the settlement of young stages and early September onwards the growth of marine algae enhanced as the sea was much calmer (**Table No. 1**).

In the present study, *Enteromorpha* sp., *Dictyota* sp*., Sargassum* sp*., Padina* sp. and *Amphiroa* sp**.** could be collected in large amount due to its availability. Hence used in the phytochemical analysis using two solvents for extraction *i.e.* methanol and water (**Table No. 2**).

The phytochemical analysis of studied algae (**Table No. 2**) from methanol and aqueous extracts revealed that there was a variation in the type of phytochemicals detected. Maximum phytochemical compounds were detected in *Padina* sp. From aqueous extract, of *Padina* sp**.** seven phytochemical compounds *i.e.* flavonoids, phenols, tannins, anthocyanin, cellulose, terpenoids and

carbohydrates were detected and in addition to these seven compounds fats were detected in methanol extract. The least number of phytochemical compounds were observed in methanol and aqueous extract of *Amphiroa* sp. *i.e.* cellulose. The levels and accessibility of phytochemicals in marine algae exhibit significant variations based on factors such as climatic conditions, seasonal changes, age, geographical location, and depth of immersion (Marinho-Soriano E. et al., 2006; Renuka B. et al., 2016). Ganesan P. et al., (2008) demonstrated that identifying crucial phytochemicals in seaweed can be achieved by utilizing several solvents. A good solvent depends on its property of optimal extraction and its capacity in conserving the stability of the chemical structure of desired compounds (Harborne J.B., 1999).

Table No. 2. Phytochemical analysis of studied Marine Algae.

Phytochemical test	Marine Algae										No. of Algal species in which photochemical detected	
	Enteromorpha sp.		*Dictyota* sp.		*Sargassum* sp.		*Padina* sp.		*Amphiroa* sp.			
	M	A	M	A	M	A	M	A	M	A	M	A
Alkaloids	+	+	-	-	+	-	+	-	-	-	3	1
Flavonoids	-	+	-	-	-	-	-	+	-	-	0	2
Phenols	+	+	+	-	-	-	+	+	-	-	3	2
Quinones	-	-	-	-	-	+	-	-	-	-	0	1
Steroids	-	-	-	-	-	-	-	-	-	-	0	0
Tannins	-	-	+	-	+	-	+	+	-	-	3	1
Anthocyanin	-	-	+	-	-	-	+	+	-	-	2	1
Fats	-	-	+	-	+	-	+	-	-	-	3	0
Saponins	-	-	-	-	-	-	-	-	-	-	0	0
Cellulose	+	+	+	+	+	+	+	+	+	+	5	5
Terpenoids	-	-	-	-	-	-	-	+	-	-	0	1
Carbohydrates	-	-	-	+	+	+	-	+	-	-	1	3
Protein	-	-	-	-	+	-	-	-	-	-	1	0
No. of phytochemicals detected in each algal species	3	4	5	2	6	3	6	7	1	1		

Legend: (+) = Presence; (-) = Absence.

On analysis of phytochemicals screened (**Table No. 2**), it was observed that alkaloids, phenols, tannins, anthocyanin and carbohydrates were detected in methanol and aqueous extract. Flavonoids were detected in aqueous extract and Fats in methanol extract. Hence the choice of

solvent was important which facilitated the dissolution of each compound and their diffusion into external solvent (Shi J. et al., 2005). In the present study cellulose was detected in all the algal species. Similar results were observed as cellulose has a widespread distribution and found in red, brown and green seaweeds (Stromme M. et al., 2002; Mihranyan A. et al., 2004).

Among the different algal species collected, *Enteromorpha* sp., *Dictyota* sp*., Sargassum* sp*., Padina* sp. and *Amphiroa* were evaluated for their potential antibacterial activity (**Table No. 3**). There was a significant difference (p< 0.05) in the anti-bacterial activity between the two different mediums of extraction. Higher zones of inhibition were observed in algal extract prepared with methanol as compared to the aqueous extract. Similar results were observed by Nafyad I. and Kebede K., 2020. According to Taylor J.L.S. et al., 2001 presence of inadequate quantities of active constituent or constituents in the extract to exhibit the antimicrobial activity can be the reason for the negative results. Absence of antimicrobial activity does not mean that the bioactive compounds are not present in the plant or the plant has no antimicrobial activity against microorganisms.

Table No.3. Antibacterial activity observed in some algal species extracted in different medium.

Medium of Extraction	Bacterial strain	*Enteromorpha* sp.	*Dictyota* sp.	*Sargassum* sp.	*Padina* sp.	*Amphirao* sp.	Control
Methanol[a]	*E. coli* [a]	0.57 ± 0.20 [b]	0.30 ±0.20 [c]	0.73± 0.22 [a]	0.47± 0.03 [b]	0.30 ± 0.20 [c]	0.00± 0.00 [d]
	S. aureus [a]	0.47± 0.07 [b]	0.57± 0.03 [a]	0.53± 0.03 [a]	0.57± 0.22 [a]	0.30± 0.10 [bc]	0.00± 0.00 [c]
Aqueous[b]	*E. coli* [a]	0.53± 0.22 [a]	0.00± 0.00 [b]	0.27± 0.03 [ab]	0.47± 0.07 [a]	0.00± 0.00 [b]	0.00± 0.00 [b]
	S. aureus [a]	0.50± 0.00 [b]	0.00± 0.00 [d]	0.17± 0.07 [c]	0.63± 0.07 [a]	0.00± 0.00 [d]	0.00± 0.0 [d]

Legend: Data presented is the mean of three readings; different letters indicate significant difference at p<0.05; ± indicates Standard Error

The response of studied algae, extracted with methanol against *E.Coli* showed a significant difference (p < 0.05) and the maximum zone of inhibition were observed in brown algae, *Sargassum* sp. and the least was observed in *Amphiroa* sp. In response to *S. auerus,* there was a significant difference among the studied algae, where maximum zone of inhibition was observed in brown algae *Dictyota* sp*., Sargassum* sp. and *Padina* sp. and least in *Amphiroa* sp. This difference in inhibitory zone could be due the bioactive compounds and a prodigious variety of secondary metabolites categorized by a broad spectrum of biological and pharmacological activities (Ananthi S. et al., 2011).

In an aqueous extract of the studied algae there was no significant difference between *E.coli* and *S. aureus*. Similar studies observed by Ndudim J.N.D. et al., (2016) which indicates ability to inhibit the growth of both gram positive and gram negative bacteria. However there was a

significant difference ($p < 0.05$) among the studied algae against *E.coli*, where the highest was observed in *Enteromorpha* sp. and *Padina* sp. and the least in *Dictyota* sp. and *Amphiroa* sp. The aqueous extract against *S. aureus* showed maximum anti-bacterial activity in *Padina* sp. and least in *Amphiroa* sp. and *Dictyota* sp.

Conclusion

The present work has enabled us to collect and identify nine different species of marine algae along the coast of Quegdevelim, Sinquerim, Anjuna, Ozran and Ashvem. The nine different species were *Enteromorpha* sp*., Chaetomorpha* sp*., Dictyota* sp*., Padina* sp*., Sargassum* sp*., Spatoglossum* sp*., Porphyra* sp*., Polysiphonia* sp .and *Amphiroa* sp. On analyzing for phytochemicals in the studied marine algal extracts in methanol and aqueous medium, it was observed that alkaloids, phenols, tannins, anthocyanin and carbohydrates were detected in methanol and aqueous extract of studied marine algae. Flavonoids were detected in aqueous extract and Fats in methanol extract. Higher zones of inhibition were observed in algal extract prepared with methanol as compared to the aqueous extract. The phytochemicals detected indicate their potential as a source of active principles against gram positive and gram negative hence the studied algae can serve as a source of broad spectrum antibiotics. However this study leads to further research in the way of quantification, isolation, purification and characterization of the active compounds from the studied marine algae.

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Spectrum

▊RESEARCH ARTICLE

A Study of the Probiotic Potential of Some Goan Fermented Foods

Anezka Fonseca | Maria Katelyn Gonsalves

Department of Microbiology, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Maria Katelyn Gonsalves (Katelyn.G@xavierscollegegoa.ac.in)

ABSTRACT

This study investigates the probiotic potential of three traditional Goan fermented foods; Sanna, Bollo, and Ambil—which are rich in beneficial microorganisms shaped by local ingredients and methods. The research focuses on isolating and characterizing probiotic strains, assessing their acid tolerance and adhesion to intestinal epithelial cells. Findings reveal that these foods are promising natural sources of probiotics, supporting gut health, and offering functional food potential. By highlighting the health benefits of Goan fermented foods, this study emphasizes the need to preserve traditional culinary practices and integrate indigenous food systems into modern nutrition and food security strategies.

Introduction

Fermented foods have long been valued for their health benefits, particularly due to the presence of probiotics—live microorganisms that confer health advantages when consumed in adequate amounts. These foods improve digestion, enhance immunity, and restore gut microbiota balance (Marco et al., 2017). Globally, fermented foods such as yogurt, kimchi, and kefir are recognized for their probiotic richness, largely contributed by lactic acid bacteria (LAB) and yeasts (Castellone et al., 2021; Bove et al., 2013).

In India, fermentation is an integral part of culinary traditions, especially in foods like idli, dosa, kanji, and dahi (Tamang et al., 2020). These processes enhance nutritional content, shelf life, and digestibility (Sharma et al., 2014). Indian fermented food categories based on their raw materials

vary, including cereals, legumes, vegetables, milk, and alcoholic beverages. Two primary fermentation methods exist: natural (spontaneous) and culture-dependent, both enabling the growth of beneficial microbes.

Despite India's rich diversity, Goan fermented foods remain underexplored. Influenced by Christian, Hindu, and Portuguese traditions, Goan cuisine includes unique fermented items like sanna (steamed rice cakes), bollo (a toddy-leavened wheat cake), and ambil (a fermented ragi porridge), prepared using toddy, red rice, coconut, and jaggery (Tamang, 2020; Pereira et al., 2021). These foods rely on natural, uncontrolled fermentation involving mixed microbial cultures from local ingredients like coconut sap (sur) and cashew juice (nero) (Das and Tamang, 2021).

Goan fermented beverages such as toddy host diverse microbial communities including LAB like Lactobacillus johnsonii, Lactobacillus gasseri, and yeasts like Saccharomyces cerevisiae and Zygosaccharomyces pombe (Das and Tamang, 2021). Ambil, rich in calcium and dietary fiber, is made from fermented ragi flour, while sanna and bollo use toddy for leavening and microbial inoculation. Their probiotic potential is yet to be scientifically characterized.

Probiotic traits such as acid and bile tolerance, auto aggregation, and hydrophobicity are essential for survival in the gastrointestinal tract and effective colonization (Del Re et al., 2000). LAB and yeasts from fermented foods must demonstrate viability under gut conditions, safety, genetic stability, and beneficial metabolic traits like acidification and proteolysis (Nasr and Abd-Alhalim, 2023).

This study aims to isolate and evaluate probiotic microorganisms from Goan fermented foods—sanna, bollo, and ambil, focusing on acid tolerance, hydrophobicity, and autoaggregation. By integrating microbiological techniques with traditional knowledge, this research seeks to document and scientifically validate the probiotic potential of these cultural foods, promoting both public health and heritage preservation.

Materials and Methods

Sample Preparation and Fermentation

Three Goan fermented foods - *Ambil*, *Bollo*, and *Sanna*—were selected for the study. *Ambil* was prepared by fermenting a slurry of ragi (*Eleusine coracana*) flour and water overnight (10–12 hours), followed by slow cooking with coconut milk, ginger, cumin, and other spices. *Bollo* was made using toddy, grated coconut, Goan palm jaggery, and coarsely ground wheat. The mixture was fermented overnight and baked at 180°C for 45 minutes. *Sanna* was prepared by fermenting a batter of soaked Goan red rice, grated coconut, and toddy for 12–16 hours, followed by steaming for 20–25 minutes.

Microbial isolation and Enumeration

Viable counts were determined from the fermented batter (before cooking) and after cooking. Food samples were serially diluted in 0.85% sterile saline and plated on DeMann Rogosa and Sharpe (MRS) agar (for LAB) and Sabouraud's Agar (for yeasts). Plates were incubated at room temperature for 24–48 hours. Viable counts were determined in colony-forming units per milliliter (cfu/mL) and distinct morphotypes were isolated for further testing.

Probiotic Characterization

i) Acid Tolerance

Isolates were inoculated into yeast malt (YM) broth adjusted to pH levels of 1.5, 3.0, and 5.0. Cultures were incubated at room temperature for 24–48 hours. Survival was assessed by measuring optical density (OD) at 600 nm using a colorimeter. (Panda *et al*., 2018).

ii) Hydrophobicity Assay

Overnight-grown cultures were centrifuged, and cell pellets were suspended in urea-phosphate buffer. The initial OD (A_0) at 610 nm was recorded. After adding 1 mL of xylene to 3 mL of the cell suspension and incubating for 1 hour, the aqueous phase OD (A_t) was measured. Cell surface hydrophobicity was calculated using the formula:

$$\% \text{ Hydrophobicity} = [1 - (A_t/A_0)] \times 100$$

(Rosenberg *et al*., 1980).

iii) Autoaggregation.Assay

Cell pellets were suspended in phosphate-buffered saline (PBS), and OD at 600 nm was recorded at 0, 2, 4, and 24 hours. Autoaggregation percentage was calculated as:

$$\% \text{ Autoaggregation} = [1 - (A_t/A_0)] \times 100$$

(Del Re *et al*., 2000).

Media and Reagents

All media were prepared as per manufacturer instructions (HiMedia Laboratories, n.d.). MRS Agar was used for lactic acid bacteria, Sabouraud Agar for yeasts, and YM broth for culture maintenance. Urea-phosphate buffer and PBS were used in hydrophobicity and aggregation assays

Results and Discussion

Table I. Viable Count of LAB and Yeasts in Fermented Foods Before and After Cooking.

Sample	Media	Viable count before cooking (cfu/mL)	Viable count after cooking (cfu/mL)
Ambil	MRS Agar	930	6
	Sabouraud's Agar	2730	No growth
Bollo	MRS Agar	1030	156
	Sabouraud's Agar	2090	130
Sanna	MRS Agar	485	No growth
	Sabouraud's Agar	323	25

Table II. Colony Morphology and Gram Character of Selected Isolates.

Isolate	Aa-1	Aa-2	Bb-1	Ba-1	Ba-2	Sb-1	Sa-1	Sa-2
Shape	Circular	Circular	Irregular	Circular	Circular	Circular	Circular	Circular
Size	1 mm	2mm	3 mm	Pinpoint	Pinpoint	Pinpoint	Pinpoint	1mm
Colour	Cream	Cream	Cream	White	White	White	White	White
Consistency	Butyrous	Butyrous	Dry	Butyrous	Butyrous	Butyrous	Butyrous	Butyrous
Margin	Entire	Entire	Entire	Entire	Entire	Entire	Entire	Entire
Opacity	Opaque	Opaque	Opaque	Opaque	Opaque	Opaque	Opaque	Opaque
Surface texture	Smooth	Smooth	Rough	Smooth	Smooth	Smooth	Smooth	Smooth
Elevation	Convex	Raised	Flat	Raised	Raised	Raised	Raised	Raised
Gram Character	Gram Positive Yeast	Gram positive cocci in clusters	Gram positive bacilli	Gram Positive Yeast	Gram Positive Yeast	Gram Positive Yeast	Gram Positive Yeast	Gram positive cocci

Table III. Optical Density (OD_{600}) of Isolates at Various acidic pH Levels.

Isolate	pH 1.5	pH 3.0	pH 5.0
Aa-1	0.02	0.11	0.23
Aa-2	0.00	0.48	0.04
Bb-1	0.16	0.38	0.20
Ba-1	0.04	0.00	0.00
Ba-2	0.33	0.56	0.25
Sb-1	0.01	0.07	0.32
Sa-1	0.12	0.77	0.50
Sa-2	0.08	0.01	0.37

Table IV. Hydrophobicity of Isolates

Isolate	% Hydrophobicity
Aa-1	2.12
Aa-2	13.79
Bb-1	20.00
Ba-1	53.70
Ba-2	55.77
Sb-1	30.61
Sa-1	50.00
Sa-2	0.00

Table V. Autoaggregation of Isolates after 2, 4 and 24 hours.

Isolate	% 2h	% 4h	%24h
Aa-1	12.25	18.75	43.75
Aa-2	6.67	10.00	26.67
Bb-1	9.52	23.81	28.57
Ba-1	7.69	17.95	28.20
Ba-2	6.45	6.45	19.35
Sb-1	15.15	26.92	39.39
Sa-1	8.00	20.00	52.00
Sa-2	13.16	18.42	28.95

The findings of this study highlight the presence of diverse probiotic microorganisms in Goan fermented foods. The viable counts (Table I) confirm that traditional fermentation supports high microbial loads, although cooking significantly reduces this viability. *Bollo* was the most robust sample, retaining viability of probiotic microbes even after baking. Upon studies of colony characters, gram character and morphology, 8 isolates (Table II) were selected for screening of probiotic properties.

Probiotic evaluation of isolates (Tables III, IV and V) revealed that microbial isolates such as Ba-2 and Sa-1 possess promising probiotic attributes. These strains exhibited good acid tolerance, high cell surface hydrophobicity, and strong autoaggregation potential—traits that are associated with improved survival through the gastrointestinal tract and effective colonization.

Conclusion

The study successfully isolated microbial strains from *Ambil*, *Bollo*, and *Sanna*, revealing their potential probiotic properties. Two yeast isolates, Ba-2 and Sa-1 demonstrated strong acid tolerance, hydrophobicity, and autoaggregation abilities. These findings highlight the relevance of Goan fermented foods not only as cultural heritage but also as promising vehicles for probiotic delivery. Further molecular and *in vivo* studies are required to validate their functionality and safety.

Acknowledgement

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RESEARCH ARTICLE

Determinants of Investment Decision-Making: A Study of Consumer Behavior in Wealth Management in Goa

Priyanshu Rai

Department of Commerce, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Priyanshu Rai (raipriyanshur10@gmail.com)

ABSTRACT

This study investigates the key factors influencing individual investment decisions within the context of wealth management in North Goa. With the increasing complexity of financial markets and the rise of digital tools, understanding consumer behavior has become essential. Primary data was collected from 136 respondents using a structured questionnaire, and analyzed using Exploratory Factor Analysis (EFA) in SPSS. The findings reveal two major factors shaping investment decisions: Investment Strategy & Risk Management and Financial Planning & Liquidity Preferences. Investors demonstrated a preference for diversification, ethical investing, market awareness, and inflation protection. Additionally, tax benefits, liquidity, and institutional trust significantly influenced decision-making. Reliability analysis confirmed the robustness of the data, with a Cronbach's Alpha of 0.962 and a KMO value of 0.930. The study concludes that while investors are increasingly informed, there remains a need for enhanced financial literacy and professional guidance to support effective wealth management.

Introduction

Investment decision-making lies at the heart of effective personal financial planning and wealth creation. As financial markets become increasingly complex and investment avenues diversify, individuals are required to make more informed and strategic choices. These decisions are not solely based on financial metrics but are also shaped by behavioral, psychological, demographic, and socio-economic factors. The emergence of digital financial tools, coupled with greater financial literacy efforts, has further influenced how people perceive and manage their wealth.

In emerging economies like India, investment behavior is evolving rapidly. States such as Goa, known for their growing middle class and increasing exposure to financial services, present a compelling case for studying consumer investment patterns. With a unique mix of urban and semi-urban populations, Goa offers insights into how regional factors impact wealth management decisions. Here, investment is not only seen as a path to financial security but also as a means of achieving long-term life goals such as education, homeownership, retirement, and wealth transfer.

Despite a growing body of literature on investment behavior, there exists a significant research gap in understanding the interplay between individual investment strategies and liquidity preferences, particularly within the Goan context. This study seeks to bridge that gap by identifying the key determinants that drive investment decisions among consumers, using empirical data and factor analysis. By uncovering the underlying motivations, preferences, and constraints faced by investors, this research aims to inform financial institutions, educators, and policymakers in designing more tailored and effective wealth management solutions.

Literature Review

Investment behavior and wealth management practices are influenced by various psychological, demographic, and technological factors. Arora and Verma (2018) examined the perceptions of financial advisors and found that product attributes, perceived risk, confidentiality, and service reliability are key factors in investor decision-making. Similarly, Patel and Tolawala (2022) explored the level of awareness about wealth management among individuals and observed that while general awareness was moderate, many lacked deep knowledge. The majority preferred safe investment options such as fixed deposits and PPFs, with risk tolerance often linked to income and savings habits.

Vidhya and Kalai Lakshmi (2022) investigated wealth management practices across Indian households. Their findings revealed that although individuals engage in financial planning, their understanding of market conditions, risk, and opportunities remains limited, emphasizing the need for enhanced financial literacy. Liu et al. (2009), in their study on elderly investors in Taiwan, noted that demographic variables such as education, gender, income, and urban residency significantly affected confidence and familiarity with financial products.

Trust also plays a crucial role in wealth management. Jarratt and Cooper (2005) proposed a dynamic trust model, showing how clients initially rely on institutional reputation and gradually shift to performance-based trust as relationships develop. On the technological front, Cocca (2018, 2020) highlighted the increasing influence of FinTech, especially among younger and tech-savvy investors. While digital and hybrid wealth management platforms are gaining popularity, limitations remain in personalization and handling complex needs. These studies collectively highlight the growing complexity of investor expectations and the need for more adaptive and inclusive financial services.

Research Methodology

The study was conducted in North Goa, India, a region experiencing growing financial awareness and an increasing number of individuals exploring wealth management solutions. The research spanned from December 2024 to February 2025 and employed a purposive sampling method to ensure the inclusion of participants with a basic understanding or experience of investment and financial planning. A total of 136 respondents participated, selected based on their engagement with wealth management services or investment instruments. The primary data was gathered through a structured questionnaire designed to capture respondents' awareness, preferences, and behaviors related to wealth management. The questionnaire covered demographic information, investment habits, influencing factors, and perceptions of financial advisory services. Secondary data from scholarly journals, financial reports, and industry publications provided contextual support and theoretical grounding. To analyze the data, descriptive statistics were used to summarize demographic and awareness trends, while Exploratory Factor Analysis (EFA) via SPSS software was applied to identify latent variables influencing investment decisions.

Results and Discussions

This section highlights the key findings from the analysis of primary data. Reliability tests and Exploratory Factor Analysis (EFA) were used to assess the consistency of the questionnaire and to identify major factors influencing investment decisions. The results are presented through tables with brief interpretations.

Table 1. Reliability Statistics.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
0.962	0.961	20

Source: Author's Compilation

The Cronbach's Alpha value of **0.962** indicates excellent internal consistency, suggesting that the 20 items in the scale are highly reliable for measuring the intended construct. The slight difference between **Cronbach's Alpha (0.962)** and **Cronbach's Alpha Based on Standardized Items (0.961)** implies minimal variation due to standardization, confirming the robustness of the scale. A value above **0.9** suggests strong reliability, meaning that responses are consistent across items. This high reliability strengthens the credibility of the questionnaire.

Table 2. KMO and Bartlett's Test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.930
Bartlett's Test of Sphericity	Approx. Chi- Square	2231.9
	df	190
	Sig.	0.000

Source: Author's Compilation

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy value of 0.930 indicates that the data is highly suitable for factor analysis, as it is well above the recommended threshold of 0.6. This suggests strong correlations among variables, making them appropriate for structure detection.

Bartlett's Test of Sphericity shows a significant result (Chi-Square = 2231.975, df = 190, Sig. = 0.000), indicating that the correlation matrix is not an identity matrix. This confirms that there are significant relationships among the variables, further validating the dataset's suitability for factor analysis.

The factor analysis reveals two primary dimensions shaping investment behavior: Investment Strategy & Risk Management and Financial Planning & Liquidity Preferences.

The first factor (refer Table 3), Investment Strategy & Risk Management, indicates that investors focus on diversification, market awareness, ethical considerations, and inflation protection. High factor loadings suggest that they prefer spreading investments across asset classes, avoiding high-risk options, and considering economic conditions before investing. Convenience, ease of management, and trust in service providers also play a crucial role.

The second factor, Financial Planning & Liquidity Preferences, highlights the importance of tax benefits, liquidity, and institutional trust. Investors prioritize tax-saving schemes, stable returns, and the ability to convert investments into cash when needed. Recommendations from financial advisors and trust in well-known institutions also influence their decisions. . These insights help understand investor priorities in managing wealth effectively.

Table 4 reveals two key factors that explain 63.617% of the total variance in investment decisions. The first factor, Investment Strategy & Risk Management, accounts for 58.399%, showing that investors focus on diversification, market trends, ethical considerations, and risk management. The second factor, Financial Planning & Liquidity Preferences, contributes 5.218%, highlighting the importance of tax benefits, liquidity, and trust in financial institutions. These numbers indicate that

while risk management plays a dominant role, financial planning also influences investment choices significantly.

Table No. 3 Factor Loadings.

Factor	Variables	Factor Loadings	Factor Loadings
Investment strategy & Risk management	Online platforms have made investment decisions more convenient for me.	0.790	
	I consider current market conditions before making investment decisions.	0.757	
	I prefer spreading my investments across different asset classes to minimize risk.	0.750	
	I avoid investments in sectors I consider unethical.	0.737	
	Diversification is essential for achieving my financial goals.	0.736	
	I avoid investing during periods of high market volatility.	0.735	
	Inflation rates strongly influence my choice of investment products.	0.700	
	I prefer investments aligned with ethical and environmental standards.	0.685	
	I invest in products that protect my wealth against inflation.	0.666	
	I consider the reputation of the wealth management service provider before investing.	0.647	
	I prefer investment products that are easy to understand and manage.	0.589	
	I avoid investments with high risk, even if the potential returns are high.	0.508	
Financial planning & Liquidity preferences	Tax savings play a significant role in my investment decisions.		0.873
	I prioritize investments that provide tax exemptions under government schemes.		0.776
	Recommendations from financial advisors significantly influence my decisions.		0.722
	I prefer investments that can be easily converted into cash when needed.		0.668
	I trust investment products offered by well- known institutions.		0.661
	The stability of returns is more important to me than the quantum of returns.		0.570
	I prefer investments that offer high returns even if they come with high risk.		0.544
	I avoid investments with long lock-in periods.		0.486

Source: Author's Compilation

Factor	Factor Name	Total Eigenvalue	% of Variance	Cumulative %
1	**Investment Strategy & Risk Management**	11.680	58.399	58.399
2	**Financial Planning & Liquidity Preferences**	1.044	5.218	63.617

Source: Author's Compilation

Conclusion

The study identified two major dimensions that influence individual investment decisions in the context of wealth management in Goa: *Investment Strategy & Risk Management* and *Financial Planning & Liquidity Preferences*. The findings reveal that investors prioritize diversification, ethical considerations, inflation protection, and market awareness when forming their strategies. At the same time, practical aspects such as tax-saving benefits, liquidity, and trust in financial institutions significantly shape their choices.

High reliability and sampling adequacy confirm the strength of the data, and the factor analysis explains a substantial portion of variance in investment behavior. Overall, the study highlights that while modern investors are cautious and informed, there remains a need to enhance financial literacy and promote the use of professional advisory services. These insights can guide financial institutions, advisors, and policymakers in developing more tailored, accessible, and effective wealth management solutions.

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Self-Assisted Vehicle for Elderly People using Lidar System

Vilma M. T. Fernandes | Sneha .S. Talekar

Department of Electronics, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Vilma M. T. Fernandes (Vilma.f@xavierscollegegoa.ac.in)

ABSTRACT

The growing number of elderly people worldwide calls for the creation of smart mobility solutions that improve their independence and safety. This paper introduces a conceptual model for a self-assisted vehicle system tailored for older adults, incorporating a LiDAR-based vision system to ensure effective environmental perception, obstacle detection, and autonomous navigation. LiDAR (Light Detection and Ranging) provides precise, three-dimensional mapping of surroundings, making it a better option than traditional vision systems, particularly in varying lighting and weather conditions. The proposed system seeks to close the gap between existing autonomous vehicle technologies and user-focused assistive systems for seniors. Unlike fully autonomous vehicles aimed at the general public, this system is intended to support limited yet essential autonomous functions such as path guidance, collision avoidance, and safe maneuvering in both indoor and outdoor settings. The methodology includes an overview of potential hardware like LiDAR sensors, microcontrollers, motor drivers, and integrated control modules, along with software algorithms for real-time decision-making and spatial localization. This study is conducted as a conceptual exploration and system design framework without physical prototyping, concentrating instead on the architecture, component selection, and technological feasibility. By thoroughly examining current research and comparing it with existing mobility aids, this paper highlights the potential of LiDAR-based assistive vehicles to lessen reliance on caregivers, prevent accidents, and enhance the quality of life for elderly individuals.

1. Introduction

Challenges related to mobility and independence arise with an aging population. Traditional mobility aids lack intelligent features and fail to address safety in complex environments.

Autonomous systems, particularly self-assisted vehicles, offer promising solutions. LiDAR, due to its high-resolution spatial data acquisition, plays a critical role in enabling real-time navigation and obstacle avoidance. This research aims to develop a vehicle that uses LiDAR along with microcontrollers and control algorithms to provide safe and autonomous mobility for the elderly.

The global demographic shift toward an aging population has intensified the demand for technologies that support independent living and mobility for older adults. According to the World Health Organization (WHO), the number of individuals aged 60 and above is projected to exceed 2 billion by 2050. This demographic trend poses critical challenges, particularly in healthcare and personal mobility, as aging is often accompanied by reduced physical agility, impaired vision, and cognitive decline. Ensuring safe and autonomous mobility for the elderly is no longer a luxury but a societal necessity.

In recent times, the combination of robotics and sensor-based technologies has shown considerable promise in meeting the mobility requirements of older adults. Self-assisted vehicles—compact, semi-autonomous platforms designed for indoor and outdoor mobility—offer a viable solution for elderly users who face difficulty navigating conventional environments. These systems must accommodate specific user requirements, including intuitive interfaces, slow-speed maneuverability, real-time obstacle detection, and fail-safe mechanisms.

Among various sensor modalities, Light Detection and Ranging (LiDAR) has gained prominence due to its ability to produce high-resolution three-dimensional representations of the surrounding environment. LiDAR operates by emitting laser pulses and measuring the time delay of reflected signals, enabling accurate detection of objects irrespective of ambient lighting conditions. Compared to vision-based systems, LiDAR provides superior spatial accuracy, making it particularly advantageous for navigation tasks in cluttered or low-visibility environments.

1.1. *Literature Review*

The integration of LiDAR technology into autonomous systems has revolutionized the development of assistive vehicles, particularly for the elderly. Recent studies have explored various facets of this integration, highlighting both the potential and challenges.

1.1.1. *LiDAR and 3D Object Detection in Autonomous Systems*

- **Mao et al. (2022)** conducted a comprehensive survey on 3D object detection methods for autonomous driving, emphasizing the role of LiDAR in enhancing perception systems.

- **Chen et al. (2020)** reviewed 3D point cloud processing techniques, underscoring the significance of LiDAR in accurate environmental mapping.

- **Song et al. (2024)** focused on robustness-aware 3D object detection, analyzing the resilience of LiDAR-based systems under varying environmental conditions.

1.1.2. *Assistive Technologies for the Elderly*

- **Thakur & Han (2021)** provided a comprehensive review of assistive technologies aimed at aiding the elderly in daily activities, discussing the integration of smart systems for enhanced independence.

- **Jakob (2022)** systematically reviewed voice-controlled devices, evaluating their acceptance and usability among older adults.

- **Žilak et al. (2022)** analyzed handheld augmented reality solutions, discussing their applicability and effectiveness for individuals with disabilities.

1.1.3. *Autonomous Vehicles and Elderly Mobility*

- **Yurtsever et al. (2020)** surveyed autonomous driving technologies, highlighting emerging practices and the integration of AI in enhancing vehicle autonomy.

- **Systematic review (2021)** examined automated vehicles and services for people with disabilities, emphasizing the need for inclusive design tailored to the elderly.

- **MDPI Review (2022)** discussed the deployment of mobile service robots in elderly care, exploring their roles in daily assistance and emergency response.

1.1.4. *Integration of LiDAR in Assistive Vehicles*

- **RAMCIP Project** developed a robotic assistant for individuals with mild cognitive impairments, integrating LiDAR for environmental perception and navigation.

- **Chiang et al. (2020)** designed a navigation engine combining INS/GNSS with 3D LiDAR-SLAM, enhancing the accuracy of autonomous vehicle positioning.

- **Bu et al. (2019)** introduced the Pedestrian Planar LiDAR Pose (PPLP) network, improving pedestrian detection using planar LiDAR and monocular images.

1.1.5. *Challenges and Considerations*

- **Wired Article (2019)** critiqued the assumption that driverless cars inherently benefit older adults, pointing out the necessity for inclusive design and testing.

- **Alam et al. (2022)** reviewed vision-based human fall detection systems, discussing the role of deep learning in enhancing safety for the elderly.

2. Methodology

The proposed self-assisted vehicle leverages LiDAR technology and embedded systems to enable autonomous navigation, obstacle avoidance, and real-time environment mapping. The methodology is divided into four main components: system architecture, hardware configuration, software implementation, and algorithm design.

2.1. *System Architecture Overview*

The system is structured in a modular fashion to enhance scalability and maintainability. The core functionalities include:

- **Sensing Layer**: Captures environmental data using LiDAR and ultrasonic sensors.

- **Processing Layer**: Performs SLAM, obstacle detection, path planning, and decision-making using a Raspberry Pi or onboard mini-computer.

- **Control Layer**: Converts movement decisions into motor commands via a motor driver circuit.

- **User Interaction Layer**: Provides feedback through audio prompts and allows emergency intervention via a panic button.

2.2. *Hardware Configuration*

Component	Description
LiDAR Sensor	RPLIDAR A3 – 360-degree scanning, range up to 25m, used for SLAM and obstacle detection
Ultrasonic Sensors	HC-SR04 – Assist in close-range obstacle detection and redundancy
Microcontroller	Raspberry Pi 4 (4GB/8GB RAM) or Jetson Nano for onboard computing
Motor Driver	L298N H-Bridge to control motor direction and speed
DC Motors	12V geared motors with encoders for precise motion control
Power Supply	12V Li-ion battery pack (with voltage regulator for 5V components)
Chassis	Lightweight aluminum frame with differential drive wheels
Emergency Button	Interrupt circuit to halt operations immediately in emergencies
Speaker Module	Provides audio prompts and alerts to the user
Touchscreen/Joystick (optional)	For manual override or user input

2.3. *Software Implementation*

Operating System: Ubuntu 20.04 with ROS Noetic

Key Software Modules:

- **SLAM (GMapping/Cartographer)**: Builds a 2D map of the environment using LiDAR data.

- **Navigation Stack**:

- o *Move_base*: For global and local path planning.

- o *AMCL*: Adaptive Monte Carlo Localization to track vehicle pose.

- **Obstacle Detection**:

  - o Point cloud segmentation using PCL.

  - o Dynamic filtering to avoid moving objects.

- **Path Planning Algorithms**:

  - o Dijkstra's or A* for global navigation.

  - o Dynamic Window Approach (DWA) for local obstacle avoidance.

- **Voice Feedback (Optional)**:

  - o Text-to-speech engine like eSpeak or Festival.

Programming Languages: Python and C++

Libraries Used:

- ROS Navigation Stack

- Point Cloud Library (PCL)

- OpenCV (for sensor fusion and visual aids)

- NumPy and SciPy for numerical operations

2.4. *Algorithmic Flow*

1. **Initialization**: System boot-up, sensor calibration, map loading, app initialization.

2. **Environment Sensing**: Continuous 360-degree LiDAR scanning.

3. **SLAM Operation**: Real-time map building and localization.

4. **Obstacle Detection**: Real-time segmentation of objects in the path.

5. **Path Planning**: Calculation of optimal route to destination.

6. **Actuation**: Conversion of path plan into motion commands.

7. **Notifications**: Once the app registers the path to the destination, the hospital staff is sent a message, that the patient is about to arrive at the approximate time to the hospital.

8. **Feedback and Alerts**: Notify user of obstacles or manual override prompts.

9. **Emergency Handling**: Vehicle halts immediately if panic button is pressed or if an anomaly is detected and the appropriate sms and calls are made to the authorities.
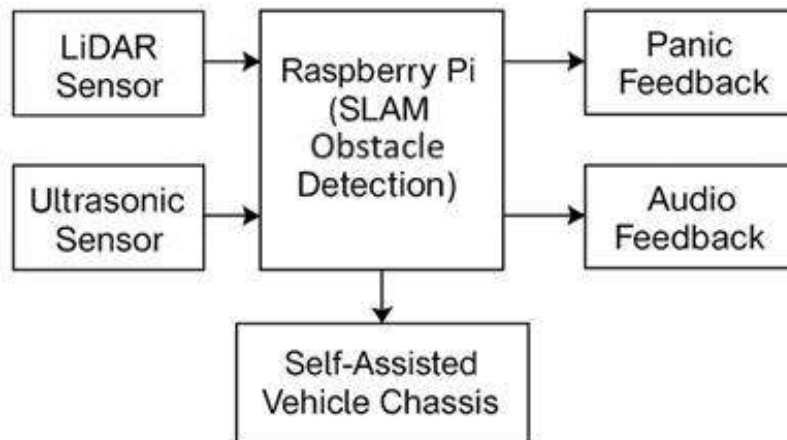
Block diagram
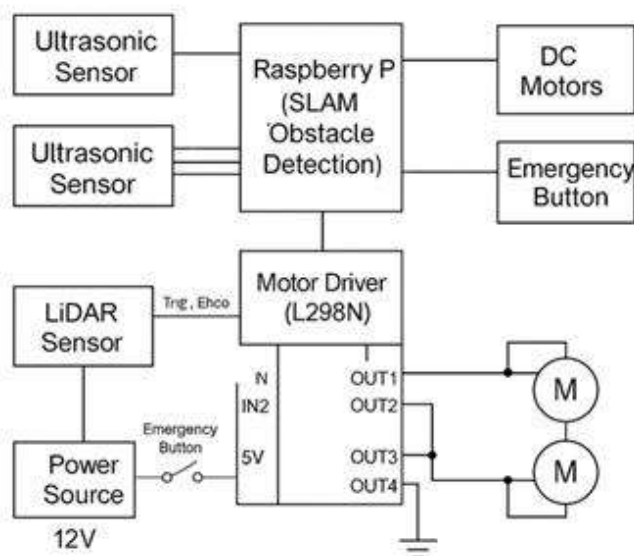
Circuit Diagram

3. Discussions

The proposed self-assisted vehicle system, integrated with a LiDAR-based navigation and perception module, holds significant potential across various domains where mobility, safety, and autonomy for elderly individuals are critical. The following are the primary application areas envisioned for this system:

3.1. *Assisted Living Facilities*

The system can be deployed within retirement homes or eldercare centers to help residents navigate indoor environments safely and independently. It can assist with routine activities such as moving

between dining areas, common rooms, and personal living quarters, thereby reducing the reliance on human caregivers for basic mobility needs.

3.2. *Hospitals and Rehabilitation Centres*

Elderly patients with limited mobility, post-surgery restrictions, or those undergoing physical rehabilitation can benefit from the system to navigate within hospital premises or therapy zones. This can also ensure patients reach diagnostic labs, physiotherapy units, or rest areas safely without continuous supervision.

3.3. *Smart Homes and IoT-Integrated Environments*

In smart home environments, the system can be integrated with IoT devices to offer context-aware mobility. For instance, it can guide the user to the kitchen when a cooking schedule is triggered or to the restroom during specific hours, increasing user convenience while maintaining safety.

3.4. *Outdoor Navigation in Gated Communities*

With proper terrain and environmental adaptation, the system can be used in outdoor settings such as gardens, walkways, or parks within gated communities, allowing elderly individuals to enjoy nature and social interactions while maintaining autonomy and minimizing the risk of falls or disorientation.

3.5. *Public Infrastructure (Airports, Railway Stations)*

In public spaces, especially where long walking distances are involved (e.g., terminals, platforms), the vehicle can serve as a personal navigation assistant for elderly travelers, guiding them to boarding gates or exits and reducing fatigue and confusion in complex environments.

3.6. *Shopping Centers and Malls*

Within large commercial spaces, the system can help elderly customers move between stores, access rest areas, and locate services (e.g., billing counters or lifts), making the shopping experience more inclusive and user-friendly.

3.7. *Personal Mobility for Home Use*

For individuals living independently or with limited assistance, the system offers safe movement within domestic environments. It can be especially useful for multi-room navigation and timed routines (e.g., reminding the user to take medication and then guiding them to the kitchen for water).

3.8. *Emergency Evacuation Assistance*

In the event of an emergency, the vehicle could be programmed to guide or even carry the user toward predefined safe zones or exits, potentially integrated with building evacuation protocols.

3.9. *Advantages of LiDAR over other systems*

Feature	LiDAR-Based System	Camera-Based System	Ultrasonic System
Accuracy	High	Moderate	Low
Lighting Dependency	No	Yes	No
Obstacle Detection	Precise (3D)	2D Visual	Limited
Range	Up to 30 m	5–10 m	2–4 m
SLAM Performance	Excellent	Moderate	Poor
Maintenance	Low	High	Low
Safety	High	Moderate	Low

3.10. *Limitations*

Factor	LiDAR-Based System	Camera-Based System	Ultrasonic System
Cost	High	Moderate	Low
Environmental Susceptibility	Rain/Fog Sensitive	Light Sensitive	Echo Distortion
Texture Recognition	No	Yes	No
Power Usage	High	Moderate	Low
Mechanical Reliability	Medium	High	High
Integration Complexity	High	Moderate	Low

3.11. *Future scope*

Despite these limitations mentioned above, many of the drawbacks of LiDAR systems can be mitigated through intelligent design choices, sensor fusion, and algorithmic compensation. For instance, combining LiDAR with RGB cameras can overcome visual interpretation gaps, and using solid-state LiDAR can reduce mechanical failure risks. Understanding these limitations provides a foundation for future optimization and innovation.

The development of self-assisted vehicles for elderly individuals using LiDAR technology opens several promising avenues for future research and practical implementation. One key direction is the integration of advanced AI-driven decision-making systems to improve situational awareness and context-sensitive navigation, such as recognizing specific locations (e.g., kitchen, restroom) or responding to user gestures or voice commands. Moreover, incorporating machine learning algorithms can enhance the system's ability to adapt to the user's mobility patterns and preferences over time, thereby increasing personalization and user comfort.

Another potential advancement lies in multi-sensor fusion, combining LiDAR with stereo vision, thermal imaging, and inertial measurement units (IMUs) to improve localization accuracy, especially in GPS-denied environments such as indoor facilities or densely populated urban areas. This would also enhance the system's robustness against LiDAR-specific limitations like glass surfaces or highly absorptive materials.

On the hardware front, future iterations of the vehicle can benefit from compact and lightweight designs using energy-efficient components and modular structures, making the system more portable and cost-effective. Integration with wearable health-monitoring devices could further augment the vehicle's utility by enabling real-time health diagnostics, fall detection, and emergency communication with caregivers or healthcare providers.

At the societal level, large-scale deployment in eldercare centres, hospitals, and urban public spaces would require the development of secure communication protocols and cloud-based control systems for fleet management, remote diagnostics, and continuous software updates. Collaboration with urban planners and healthcare policymakers could also facilitate the standardization and adoption of such technologies in smart city infrastructures.

Overall, the continued evolution of LiDAR-based self-assisted mobility systems promises to significantly enhance the independence, safety, and quality of life for elderly individuals while contributing to the broader field of socially assistive robotics.

4. Conclusion

This research presents the design and development of a LiDAR-based self-assisted vehicle aimed at enhancing mobility and independence for elderly individuals. By integrating high-resolution LiDAR sensors with a modular embedded system architecture and real-time SLAM and navigation algorithms, the proposed system offers accurate obstacle detection, reliable localization, and safe autonomous navigation. The use of LiDAR significantly improves performance over traditional sensing technologies, particularly in low-light and cluttered environments. The system's user-centric design, including emergency control and feedback mechanisms, further ensures safety and usability. Future work will focus on expanding adaptive intelligence, improving sensor fusion, and enabling large-scale deployment in eldercare settings. This solution contributes meaningfully to the growing field of assistive robotics and smart healthcare.

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An Analysis of Pre and Post-Merger Performance: A Case Study of Vodafone Idea within the Indian Telecom Sector

Frazer Taylor | Carmelita DMello

Department of of Commerce, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Frazer Taylor (frazertaylor1991@gmail.com)

ABSTRACT

This study conducts an in-depth analysis of the pre and post-merger performance of Vodafone and Idea Cellular, with a focus on the strategic, financial, and operational ramifications within the Indian telecommunications industry. The merger, finalized in 2018, was designed to address the market disruption caused by Reliance Jio and consolidate resources to achieve a competitive advantage. Employing ratio analysis over eight years (2016–2024), this research assesses variations in liquidity, profitability, leverage, and operational efficiency. The findings indicate a limited improvement in financial performance following the merger, primarily due to substantial debt burdens, integration challenges, and persistent market pressures. Although operational synergies and network expansion were attained, there was a decline in both profitability and subscriber retention. The study emphasizes the complexities associated with telecom consolidation in India and underscores the necessity for strategic alignment, effective integration processes, and compliance with regulatory frameworks. The insights derived from this analysis contribute to a broader understanding of merger outcomes in dynamic and capital-intensive sectors.

Introduction

Mergers and acquisitions represent major shifts in corporate strategy, where firms collaborate to enhance value, improve operational efficiencies, and bolster their competitive positions. These intricate deals necessitate meticulous management of financial, operational, and human resources to guarantee effective integration and value generation. The procedure includes extensive assessment before the merger, careful execution throughout the merger, and organized strategies for integration afterward.

The pre-merger stage is vital for the success of merger and acquisition activities. During this critical timeframe, companies perform detailed due diligence by scrutinizing financial records, operational capabilities, organizational culture, and potential synergies. They also need to consider regulatory obligations, evaluate market conditions, and create detailed integration strategies. The post-merger phase focuses on implementing these strategies, aligning operations, consolidating resources, and achieving the anticipated synergies while ensuring business continuity.

The telecommunications sector stands out as one of the most dynamic areas for mergers and acquisitions, propelled by swift technological progress, rising consumer expectations, and changing regulatory landscapes. In recent decades, this industry has undergone considerable consolidation, primarily due to the pursuit of economies of scale, spectrum acquisition, and technological convergence.

Telecom companies function in a setting marked by significant infrastructure investments, rapid technology cycles, and fierce competition for market share. Following deregulation, the telecommunications landscape has evolved from monopolistic national carriers to competitive markets featuring numerous participants.

Several crucial elements influence the mergers and acquisitions landscape in this sector. Firms constantly face the challenge of broadening network coverage, enhancing service quality, and investing in new technologies like 5G infrastructure. These capital-heavy demands often result in consolidation among companies aiming for cost efficiencies and a wider market presence. Furthermore, the conventional distinctions between telecommunications, media, and technology firms are progressively dissolving, creating chances for strategic mergers that harness complementary capabilities and offerings.

Nevertheless, telecommunications mergers must navigate intricate regulatory environments designed to uphold market competition and safeguard consumer interests. A comprehensive understanding of these regulatory limitations is vital for the successful execution of mergers and acquisitions.

In addition, evolving consumer preferences, especially the rising demand for integrated services and digital solutions, shape merger and acquisition strategies as firms strive to broaden their service portfolios and improve customer experiences.

This thorough comprehension of the dynamics of mergers and acquisitions, along with the distinctive traits of the telecom sector, provides critical context for examining specific merger cases and their results. Companies need to carefully evaluate these factors when devising and implementing merger strategies in this swiftly changing industry. Consequently, this study aims to analyze the pre and post-merger performance of Vodafone and Idea in the Indian Telecom market.

Review of Literature

The study of mergers and acquisitions (M&As) in India has evolved significantly over the years, closely aligned with the country's economic reforms. One of the earliest examinations by Kar and Soni (2000) emphasized that M&As emerged as vital strategic tools following liberalization, helping Indian firms grow, improve efficiency, and compete globally. However, the authors also pointed out that while there was an increase in turnover and book value, realizing profitability remained inconsistent.

Building on this, Pawaskar (2001) analyzed the impact of M&As on corporate performance in India and observed that mergers yielded only modest improvements in profitability. These early insights were reinforced by Bansal, Kumar, and Devi (2008), who found that although M&As sometimes led to operational scale benefits, their financial impact remained mixed across industries. The discussion deepened with Kumar (2009), who reported improved post-merger performance in Indian manufacturing firms but highlighted that success varied by sector, reaffirming the complexity of evaluating M&A outcomes.

As the Indian economy matured, Desai (2015) addressed the critical role of regulatory frameworks, suggesting that while consolidation was strategically sound, compliance challenges often delayed synergy realization. Around the same period, Roy and Nair (2017) focused on leadership's role, finding that strategic leadership and well-planned integration were crucial for merger success, especially in the high-stakes telecom sector.

In a more industry-specific context, Bedi (2018) conducted an empirical study of Indian telecom companies and found no significant improvements in profitability, liquidity, or solvency post-merger, highlighting the limitations of M&As as a financial performance booster. The Vodafone-Idea merger, a landmark event in the Indian telecom landscape, drew considerable academic attention. Thakkar (2019) viewed the merger as a strategic response to Reliance Jio's disruptive market entry, emphasizing its aim to improve customer experience and consolidate market share.

Later studies, such as Soni (2021), echoed similar sentiments, noting that while the merger created operational synergies, financial performance remained underwhelming due to high integration costs and market competition. Lalwani et al. (2021), Joshi et al. (2022), and Tripathi (2023) explored both the strategic intent and operational difficulties, noting debt burdens, layoffs, and declining profitability despite spectrum and network optimization.

To add a cross-border and broader organizational perspective, Mitra and Das (2022) evaluated cultural compatibility and strategic alignment as key drivers for post-merger success in Indian firms. Singh and Bansal (2020) contributed by assessing shareholder value creation in telecom M&As and found that these deals rarely led to consistent improvements in shareholder returns.

Recent literature has shifted toward a multidimensional view. Iyer and Ramesh (2023) emphasized the underestimated cost of digital integration in post-merger telecom networks. Bhattacharya and

Singh (2023) advocated incorporating ESG (Environmental, Social, and Governance) metrics into M&A evaluation frameworks, suggesting that traditional financial metrics alone are no longer sufficient.

Finally, comprehensive studies by Mehta et al. (2024), Pradhan and Subhashree (2024), and Sharma et al. (2024) concluded that while the Vodafone-Idea merger may have helped in market consolidation, it did not translate into substantial financial or operational gains. Srivastava (2024) summarized this scholarly evolution by urging future researchers to adopt a holistic approach that includes ecological, technological, and consumer-centric factors in M&A assessments.

Materials and Methods

In the backdrop of a rapidly evolving telecommunications industry, the merger of Vodafone India and Idea Cellular in August 2018 marked a significant consolidation in the Indian market. This strategic alliance led to the formation of Vodafone Idea Limited, which initially emerged as the country's largest telecom operator, boasting over 408 million subscribers and a 35% market share. The primary goal of this merger was to withstand the disruption caused by Reliance Jio's aggressive pricing model, while also fortifying the operational and financial standing of the newly formed entity.

Vodafone contributed a strong presence in urban markets, whereas Idea added a significant rural network presence. Together, the companies aimed to create a nationwide 4G network, with projected annual synergies of ₹14,000 crore, achieved through cost savings, network integration, and effective spectrum usage. Despite these aspirations, the reality post-merger presented substantial challenges. Chief among these was the enormous debt burden, particularly the ₹58,000 crore in adjusted gross revenue (AGR) liabilities ordered by the Supreme Court. The merged entity also faced difficulties with the integration of services and ongoing competitive pressure from competitors like Reliance Jio and Bharti Airtel. Even after rebranding as "Vi" in 2020—an initiative meant to indicate renewal and unify the brand identity—the company continued to experience falling subscriber counts and financial pressure. This merger exemplifies the complex nature of the opportunities and challenges that arise from substantial telecom consolidations in India.

To investigate the outcomes of this merger, the present study adopts a longitudinal approach, examining both the pre-merger and post-merger phases. The analysis spans eight years, covering the period from 2016 to 2018 for pre-merger data and from 2018 to 2024 for post-merger performance. The core objectives of the study are twofold: first, to assess the financial performance of Vodafone Idea before and after the merger, and second, to evaluate the evolution of its market share in the post-merger environment.

Data was obtained from secondary sources, which included the annual reports accessible on the official website of Vodafone Idea and financial information from the Money Control website. Furthermore, various research papers and other websites were referenced to establish the theoretical basis for the study. Financial data was examined through Ratio Analysis, enabling an objective comparison across different periods. The key financial ratios used are shown in **Table 1.1.**

Table 1.1. Description of the variables.

Sr. No.	Variable	Formula
1	Current Ratio	Current Asset / Current Liabilities
2	Net Profit Margin	Net Income / Revenue x 100
3	Debt Equity Ratio	Total Debt / Shareholder's Equity
4	Asset Turnover Ratio	Net Sales / Average Total Asset
5	Earnings Per Share	Net Income / Total No of Outstanding Shares

Source: Author's Compilation

The current ratio assesses a company's capacity to fulfil short-term liabilities with its current assets. A ratio in the range of 1.5 to 3.0 is typically regarded as healthy across various sectors. A lower ratio might suggest liquidity concerns or possible financial troubles. It serves as a crucial measure of a firm's short-term financial well-being.

The net profit margin indicates the amount of profit a company generates from its overall revenue. It represents the effectiveness of cost management and pricing strategies. A higher margin signifies greater profitability and operational control. This metric aids investors in evaluating the financial success of the company.

Debt-to-equity ratio examines the extent to which a company finances its operations through debt compared to shareholders' equity. A lower ratio indicates more conservative financing and reduced risk exposure. Conversely, higher ratios suggest greater financial leverage but can also heighten the risk of insolvency. This ratio varies by industry, reflecting differing capital intensity.

The Asset Turnover ratio measures how effectively a company utilizes its assets to generate revenue. Elevated ratios signify more efficient asset use for sales generation. Industries such as retail and consumer goods often have higher ratios. This ratio is useful for assessing operational efficiency and asset management.

Earnings Per Share gauges the net profit attributed to each outstanding share of stock. A higher EPS symbolizes better profitability and greater shareholder value. It is commonly employed in assessing stock attractiveness via the P/E ratio. Growth in EPS is a vital indicator of a company's financial robustness.

Through these indicators, the study systematically evaluates how the Vodafone-Idea merger influenced the company's financial health and market positioning over time. This methodological

framework provides a structured lens to understand the tangible impact of one of the most prominent telecom mergers in India's history.

Results and Discussions

This section will explore the financial results of Vodafone India and Idea Cellular before their merger, focusing on a two-year timeframe from 2016 to 2018. Following this, it will assess the performance of Vodafone Idea after the merger over six years, from 2018 to 2024.

Pre-Merger Financial Performance

Table 1.2. Financial ratios Pre-merger of Vodafone India and Idea Cellular.

Ratios	Current Ratio			Net Profit Margin		
Company	2016-17	2017-18	% Change	2016-17	2017-18	% Change
Vodafone India	0.92	0.89	-3.26	-3.2	-11.2	-250
Idea Cellular	0.79	0.78	-1.27	-2.8	-15.4	-450
Ratios	Asset Turnover Ratio			Debt Equity Ratio		
Company	2016-17	2017-18	% Change	2016-17	2017-18	% Change
Vodafone India	0.45	0.43	-4.44	1.92	2.1	9.375
Idea Cellular	0.45	0.43	-4.44	1.92	2.4	25

Source: Author's Compilation

In the context of Vodafone India, the current ratio experienced a slight decline from 0.92 in the fiscal year 2016-17 to 0.89 in 2017-18, reflecting a decrease of 3.26%. Similarly, Idea Cellular's ratio declined from 0.79 to 0.78, signifying a decrease of 1.27%. Although these percentage changes may appear minor, they indicate a concerning trend: both entities operated below the ideal threshold of 1.0, implying that their liabilities exceeded their readily available assets. This downward trend suggests an increase in financial pressure. Contributing factors may include rising operational costs, intense competition within the telecommunications sector, and declining revenue per user. These liquidity challenges serve as early indicators of unsustainable financial health, underscoring the urgency for a strategic merger to enhance financial resilience.

Both Vodafone India and Idea Cellular experienced a notable deterioration in this crucial profitability metric. Vodafone India's margin fell from -3.2% in 2016-17 to -11.2% in 2017-18, representing a decline of 250%. Concurrently, Idea Cellular's margin decreased from -2.8% to -15.4%, indicating a decline of 450%. Such significant declines are alarming and suggest a deterioration in financial conditions. These losses were primarily driven by multiple factors: a rapid decline in Average Revenue Per User (ARPU), increasing operational costs, substantial spectrum fees, and fierce competition from Reliance Jio, which disrupted the industry by providing free voice calls and remarkably low data prices. These conditions eroded profit margins for both companies, resulting in severe financial distress. In layman's terms, this situation denotes that both

companies spent considerably more than they earned, an unsustainable circumstance for any business.

For Vodafone India and Idea Cellular, the ratio decreased from 0.45 in 2016-17 to 0.43 in 2017-18, reflecting a drop of 4.44%. While this change may seem modest, it bears significance in light of substantial investments in telecommunications infrastructure. It demonstrates that, despite massive expenditures on infrastructure and technology, the firms were unable to generate proportional revenue from these assets. This inefficiency can be attributed to rising capital expenditures, slow returns on network expansions, and diminished consumer spending. In more straightforward terms, even after investing significantly to enhance their services, the companies could not attract sufficient revenue from customers to warrant the investments, indicative of operational pressures and a compelling case for consolidation.

Vodafone India's debt-equity ratio increased from 1.92 to 2.1, signifying a rise of 9.38%, while Idea Cellular's ratio escalated sharply from 1.92 to 2.4, representing a 25% increase. These rising ratios imply that both companies were incurring additional debt to sustain their operations due to insufficient revenues to meet operational costs. This financial strategy may provide temporary relief; however, it entails long-term risks, especially in the face of declining profits. Elevated debt levels render companies more vulnerable to rising interest rates, repayment pressures, and the potential for bankruptcy. From a layman's perspective, this can be compared to increasing one's debt load while experiencing a decline in income, ultimately, the repayment obligations could become overwhelming.

Post-Merger Financial Performance

Table 1.3. Financial ratios Post-merger of Vodafone India and Idea Cellular.

Ratios	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	% Change
Current Ratio	0.34	0.17	0.21	0.28	0.23	0.24	-29.41
Net Profit Margin	-39.9	-165.11	-105.98	-73.33	-69.47	-73.22	-83.51
Asset Turnover Ratio	16.14	19.81	20.61	0.19	0.21	0.22	-98.64
Debt Equity Ratio	1.82	16.11	-4.12	-3.08	-0.8	-1.99	-209.34

Source: Author's Compilation

Vodafone Idea's current ratio saw a significant decline from 0.34 in the fiscal year 2018-19 to 0.17 in 2019-20, indicating a critical liquidity shortage immediately following the merger. Although a modest recovery to 0.24 was noted by 2023-24, the ratio consistently remained below the threshold of 1, reflecting ongoing challenges in meeting short-term obligations. The period following the merger was marked by high operational costs, expenses related to network integration, and immediate cash-flow difficulties, putting the company in a financially precarious position despite efforts such as cost reductions and asset divestitures.

The net profit margin saw a dramatic drop to -165.11% in 2019-20 from an already negative -39.9% in 2018-19, indicating a significant decline in profitability. Although there was some improvement to -73.22% by 2023–24, the company continued to report substantial losses. This decline was driven by significant Adjusted Gross Revenue (AGR) liabilities, competitive pricing pressures within the telecom sector, and increased integration costs post-merger, highlighting the inadequacy of the merger in achieving the expected financial recovery.

Vodafone Idea's asset turnover ratio fell dramatically from 16.14 in 2018-19 to 0.19 in 2021-22, and it remained low at 0.22 in 2023-24, reflecting a significant decline of 98.64% in asset efficiency. This drop highlights the company's difficulties in generating revenue, despite substantial investments in infrastructure. Several factors contributed to this predicament, including customer loss, delays in 4G and 5G rollout, and underutilization of network capacity, all of which severely limited revenue growth.

The debt-equity ratio escalated from 1.82 in 2018-19 to 16.11 in 2019-20, revealing an unsustainable dependence on debt financing. By 2023–24, this ratio had turned negative at -1.99, signifying that liabilities exceeded equity and effectively diminished the company's net worth. This increase in leverage was driven by rising AGR debts, persistent operational losses, and an inability to secure sufficient equity capital, thereby placing Vodafone Idea in a state of acute financial crisis with limited funding alternatives.

Post-Merger Share Market Performance

This section examines the stock market performance of Vodafone Idea over six years, from 2018 to 2024, following the merger of Vodafone India and Idea Cellular.

Table 1.4. Share Market performance ratio post-merger of Vodafone Idea.

Ratio	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	% Change
Basic EPS	-21.16	-27.26	-15.4	-9.83	-8.43	-6.41	-69.71

Source: Author's Compilation

Vodafone Idea's EPS remained consistently negative throughout the post-merger period, reaching a low of -27.26 in 2019-20 and improving marginally to -6.41 by 2023-24. Despite this slight recovery, the overall trend represents a steep 69.71% decline in shareholder value over six years. Persistently negative EPS indicates the company's continued inability to generate profits, making its stock unattractive to investors. This prolonged unprofitability has significantly weakened investor confidence and hindered Vodafone Idea's ability to secure equity funding. Without substantial improvements in revenue generation and cost efficiency, restoring market trust and financial viability will remain a major challenge.

In summary, an analysis of the financial performance of Vodafone India and Idea Cellular before their merger revealed significant challenges, including declining liquidity, shrinking profit margins, diminished asset efficiency, and increasing levels of debt. These factors underscored the strategic necessity for consolidation. However, the post-merger performance of Vodafone Idea indicates that the expected synergies and financial enhancements did not materialize as anticipated. Liquidity remained constrained, profitability deteriorated markedly, operational efficiency decreased, and the debt load intensified. While the merger was intended to forge a stronger and more competitive telecommunications entity, the combined organization continued to experience severe financial distress, diminished investor confidence, and operational difficulties. Overall, the analysis of both the pre and post-merger periods highlights a persistent state of financial instability, suggesting that inherent structural challenges within the sector, coupled with the company's inability to adapt effectively, undermined the potential advantages of the merger.

Conclusion

The merger between Vodafone India and Idea Cellular constituted a strategic response to the significant disruption instigated by the entry of Reliance Jio in 2016, which initiated a price war that fundamentally altered the Indian telecommunications landscape. Historically characterized by the presence of numerous telecom operators, the market has subsequently consolidated into three principal competitors: Reliance Jio, Bharti Airtel, and Vodafone Idea. In this capital-intensive environment, the exit or absorption of smaller operators has rendered mergers indispensable for survival. For both Vodafone and Idea, which were grappling with declining revenues, escalating losses, and diminishing market share, the merger emerged not merely as a strategic option but rather as a financial imperative.

Notwithstanding the magnitude of the merger and the anticipated synergies, the post-merger performance of Vodafone Idea has been disappointing. The company reported a substantial loss of approximately ₹35,000 crore in the December 2019 quarter alone. Key financial metrics, including earnings per share (EPS), remained negative, compounded by liquidity challenges indicated by a current ratio well below 1. Furthermore, debt levels escalated due to significant liabilities, particularly the adjusted gross revenue (AGR) dues amounting to ₹58,254 crore. As a consequence, public shareholders have yet to experience any tangible returns from the merger, and investor confidence has diminished in the absence of profitability and dividend distributions.

Nonetheless, the merger has not been devoid of operational advantages. There has been a notable improvement in network coverage across urban and semi-urban regions, and the integration has facilitated the expansion of Vodafone Idea's 4G infrastructure while laying the groundwork for future technologies, such as Voice over LTE (VoLTE), digital wallet services, and the Internet of Things (IoT). Management projected total synergy benefits of approximately ₹67,000 crore in cost and capital savings, alongside annual operating expense reductions of ₹11,500 crore by the fourth

year of integration. Additionally, the divestiture of tower assets and other monetization initiatives has contributed to alleviating part of the company's debt burden, albeit insufficiently to restore overall financial health.

Looking ahead, the recovery of Vodafone Idea relies on its capacity to increase its subscriber base, enhance average revenue per user (ARPU), and optimize operational costs. The company must also effectively monetize surplus spectrum and expand its presence in underserved regions. For the Aditya Birla Group, the merger has provided a strategic foothold in the market, with the option to incrementally increase equity. In light of the current market conditions, characterized by complex regulations, substantial capital barriers, and limited competition, it is evident that only well-capitalized or strategically consolidated entities will endure. If Vodafone Idea can successfully implement its strategy, the long-term advantages of the merger may yet be realized, ultimately delivering value to shareholders and ensuring stability for the company.

Acknowledgement

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Hybrid Open Access in Scientometrics: An Impact Analysis using Dimensions AI

Dakshata Zambulkar

College Librarian, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Dakshata Zambulkar (dakshata.z@xavierscollegegoa.ac.in)

ABSTRACT

The study analyses 490 records (2022-2024) from Dimensions AI to identify trends in Scientometrics research, centering on hybrid open access journals of scientometetrics. Findings are produced using the assistance of Biblioshiny, VosViewer, and Microsoft Excel. The results revealed that notable disparities in citation analysis. Lutz Bornmann emerges as the most significant author based on fractionalized research articles. The analysis of collaboration networks expose the strongest co-authorship ties between Márton Demeter, Homero Gil De Zúñiga, and Manuel Goyanes. A co-occurrence map of terms sheds light on important thematic connections within the discipline. This study provides a concise overview of recent scholarly activities and structural aspects in the field of Scientometrics.

Introduction

Alternative metrics serve as substitutes for conventional citation counts, emphasizing the online visibility and influence of academic work. These metrics monitor references in social media, news outlets, and various non-traditional platforms, offering a broader perspective on research impact. Scholars in Library and Information Science (LIS) are progressively utilizing altmetrics to evaluate the distribution and significance of their research, especially in a digital scholarly landscape that continues to evolve.

The study focuses on the recent landscape of scientometrics hybrid open access research publication from Dimensions AI. 490 bibliographic records were retrieved for analysis from 2022-2024. Only two journal tiles in scientometrics were traceable for the mentioned period.

Bibliometric tools like co-authorship analysis and term co-occurrence mapping are used in the study to investigate patterns in authorship, citation trends, social collaboration networks, and thematic concentrations. The analysis seeks to provide a contemporary overview of the field, emphasising its current state and potential future directions.

Review of Literature

(Seyyed Hosseini et al., 2024) the study analyses the increasing incorporation of altmetric awareness and social media skills into academic publishing practices highlights a wider movement towards open and interconnected scholarship. For researchers in medical education, particularly those concentrating on blended learning methods, this shift presents chances to broaden their audience, improve engagement, and ultimately foster more effective knowledge sharing and public discussion.

(Yuen et al., 2022)The research paper examined articles released from 2011 to 2019 across four prominent journals in the areas of neurosurgery and neuroradiology. The results show a decline in the volume of research output related to open neurovascular studies, whereas there has been an increase in the amount of publications focused on endovascular research. Furthermore, citation data indicate that research on endovascular topics is experiencing a rise in citation frequency. Our examination also indicates that open access (OA) publishing is linked to greater impact, as demonstrated by both citation numbers and Altmetric scores, pointing to a distinct advantage for researchers opting for OA publishing. Nevertheless, more time may be required to thoroughly evaluate citation patterns and validate these observations.

(Fares et al., 2024) the research explores top 100 shoulder arthroplasty articles based on the Altmetric Attention Score (AAS) reveals a strong predominance of clinical research from the USA and Europe. This trend reflects the broader influences of infrastructure and funding in Western countries. The leading journals, such as the Journal of Shoulder and Elbow Surgery (JSES) and the Journal of Bone and Joint Surgery (JBJS), published the majority of these high-impact articles. This is likely due to their extensive reach, rigorous editorial standards, and robust social media presence—factors known to enhance AAS. Additionally, both open access status and author conflicts of interest were found to be positively associated with higher AAS. This suggests that increased visibility is achieved through greater accessibility and industry-driven promotion. These findings are consistent with previous orthopedic research but also highlight a significant limitation: the AAS measures attention rather than quality.

(Ayoub et al., 2023) opines altmetrics captures online interactions outside of academia and acknowledging a variety of outputs such as blogs and datasets. In contrast to conventional citations, their significance can differ across various fields. Stronger associations in disciplines like environmental science and history imply that altmetrics could potentially forecast future

citations in areas with high public engagement. However, the weaker relationships observed in biological and social sciences expose their constraints. Exhibit a low correlation with journal prestige (SJR), highlighting that they assess different dimensions of impact. Therefore, they should be seen as a complement to traditional metrics, rather than a replacement, in a well-rounded evaluation of research. An excessive reliance on these metrics could potentially skew research priorities, a concern highlighted by Campbell's Law.

(Arroyo-Machado & Torres-Salinas, 2024) stresses on Altmetric Attention Score (AAS), provide useful information about the online attention that research receives, but they are sensitive to changes in data sources and platform dynamics. This sensitivity emphasises the importance of transparent, historical tracking of mentions to ensure consistency over time. Studies have emphasised the importance of capturing both current and past attention, proposing enhancements such as blockchain-based tracking or the use of tools like Crossref Event Data to log deleted mentions.While altmetrics provide opportunities for improving research evaluation, their fluctuating nature necessitates strong data management practices. Limitations such as discipline-specific focus, limited timeframes, and reliance on a single aggregator highlight the need for larger, multi-source studies to validate findings and improve altmetrics' stability and utility in scholarly assessment.

Research Objectives

1. To analyse a citation trends and altmetrics attention for publications in key hybrid open access journals within Scientometrics (2022-2024).

2. To identify influential Scientometrics authors based on publication counts and fractionalized research papers over a specific time period.

3. To map author's social collaboration networks and reveal co-authorship patterns in recent Scientometrics research.

Methodology

Bibliographic and citation data collected from Dimensions AI for 3 years i.e. 2022, 2023 and 2024. Data sets were refined by using filters for hybrid OA scientometrics journals. Altogether 490 bibliographic records were extracted and downloaded in the excel sheet. Biblioshiny and VosViewer a bibiometrics software were used for analysis. Also certain data were analyzed in the Microsoft Excel.

Limitation

The study is limited to hybrid open access journals in the field of scientometrics, Library and Information Science for three years i.e. 2022, 2023 and 2024.

Data Analysis

The report was prepared after analyzing 490 bibliographic and citation records from Dimensions AI. After refining the data under the 'hybrid open access' received only two journal titles in the field of Scientometrics.

Completeness of metadata -- 490 docs from **Dimensions**

Metadata	Description	Missing Counts	Missing %	Status
DI	DOI	0	0.00	Excellent
DT	Document Type	0	0.00	Excellent
SO	Journal	0	0.00	Excellent
LA	Language	0	0.00	Excellent
PY	Publication Year	0	0.00	Excellent
TI	Title	0	0.00	Excellent
TC	Total Citation	0	0.00	Excellent
AU	Author	1	0.20	Good
CR	Cited References	53	10.82	Acceptable
AB	Abstract	54	11.02	Acceptable
C1	Affiliation	151	30.82	Poor
RP	Corresponding Author	490	100.00	Completely missing
DE	Keywords	490	100.00	Completely missing
ID	Keywords Plus	490	100.00	Completely missing
WC	Science Categories	490	100.00	Completely missing

Figure 1. Completeness of Metadata from Dimensions AI.

The above table show the complete data of 490 bibliographic records with missing count and missing percentage of various considerations.

Citation Trends in altmetrics

Altmetrics provide a more immediate measure of public and societal engagement with research, and are particularly useful for tracking early interest and outreach beyond academia. They capture

the broader attention a research output receives online, including mentions in social media, news articles, blogs, and policy documents.
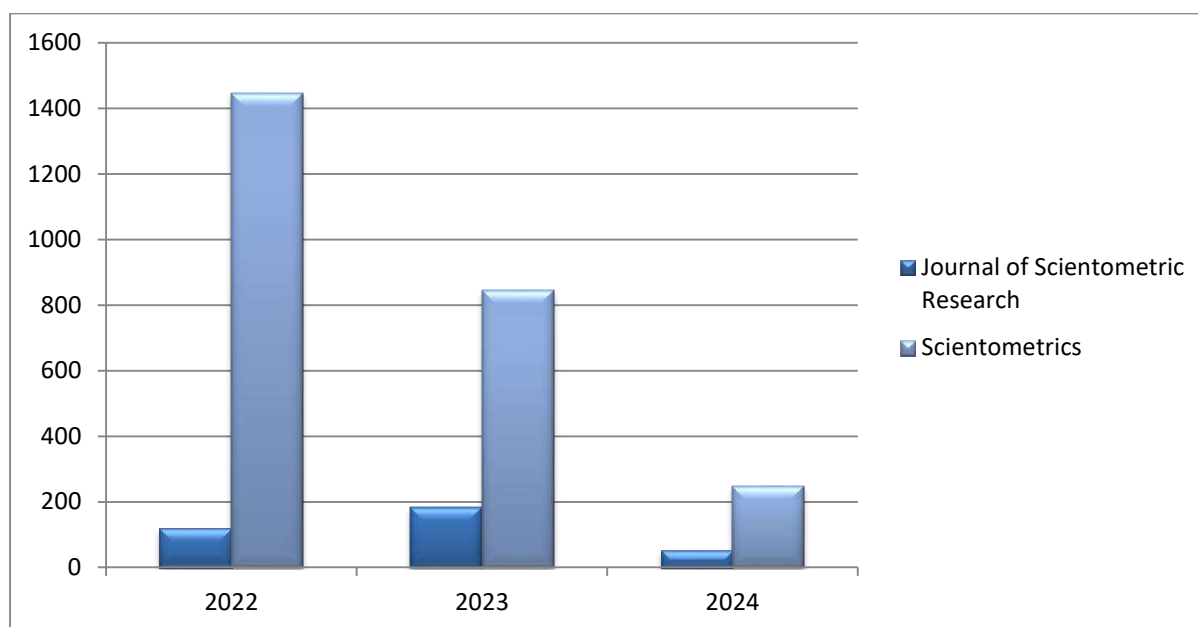
Figure 2. Citation trends in altmetrics of two journal titles for the period 2022-2024.

The bar graph presented illustrates significant disparities in the citation counts for both journals. In 2022, the Journal of Scientometrics Research garnered 120 citations across various social media platforms, while Scientometrics received a total of 1,448 citations. Whereas in the year, 2023, the Journal of Scientometrics Research obtained 184 citations, whereas Scientometrics accumulated 846 citations online. In the most recent year, 2024, the Journal of Scientometrics Research recorded a markedly lower total of 54 citations, while Scientometrics experienced 246 citations. The data indicates a pronounced decline in citation counts as per the above figure. But it has also been observed that the productivity of research papers has increased. The average citations received for both the journals were 155, 166, 169 in 2022, 2023 and 2024 respectively which shows a rising trend in citations.

Productive Author

An author can contribute to number of research articles but recognition of an author depends upon the number of citation received. Citations are external factor that measures the quality of the work produced, which is a undeviating impact on the H Index of the author.

A table portrait that in Dimensions AI Bornmann Lutz published three research papers between 2022 - 2024, with the 1.5 fractionalized rates. While the other three authors produced two research

papers and were rated one. Beside this rest all authors contributed one paper over the course of three years and received one as a fraction or lower.

<p align="center">Table No 1. Most productive author for 2022-2024.</p>

Authors	Research Articles	Research Articles Fractionalized
Bornmann, Lutz	3	1.5
Roszka, Wojciech	2	1
Haunschild, Robin	2	1
Kwiek, Marek	2	1
Ali, Mona Farouk	1	1
Ansorge, Libor	1	1
Barrera-Barrera, Ramón	1	1
Bi, Henry H.	1	1
Chankseliani, Maia	1	1
Cottineau, Clémentine	1	1
Donner, Paul	1	1
Gusenbauer, Michael	1	1
Hückstädt, Malte	1	1
Kuppler, Matthias	1	1

Social Collaboration Network of authors

A network illustrating social collaboration among authors visually depicts academic or professional relationships formed through co-authorship. This networks offer valuable insights into the ways researchers interact, exchange knowledge, and add to their scientific communities.
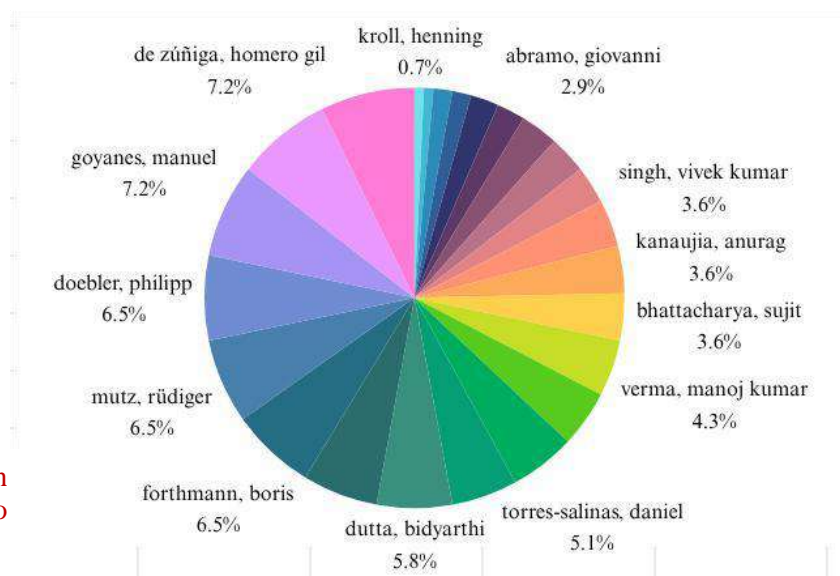
Figure 3. Social collaboration networks among the authors to produce research papers.

The preceding pie chart shows that there are three pair of authors i.e. Demeter, Márton; De Zúñiga, Homero Gil and Goyanes, Manuel who collaborated for 10 research papers with 7.2 % for the period three years which was considered as a highest social network of authors in Dimensions AI. The figure also displays collaborations of authors with 6.5%, 5.8%, 5.1%, 4.3 %, 3.6% and 2.9% respectively. Whereas Kroll, Henning and Neuhäusler, Peter clustered for 01 research paper with 0.7%. As per university affiliation statistics, Max Planck Society produces highest number of research papers in hybrid open access journals in the field of Scientometrics.

Frequency of Term Occurrence

A Terms Co-occurrence Map is a visual tool for investigating and analyzing the relationships between key terms in a collection of documents. In this map, each term is represented by a node, and links between nodes indicate that the terms appear in the same context, such as titles, abstracts, or keywords. The strength of the connection is determined by how frequently the terms appear in the literature, which aids in the discovery of thematic structures, research trends, and conceptual linkages. This method is commonly used in bibliometric and text-mining studies to identify core topics, emerging themes, and the intellectual structure of a research field.

Figure 4. Mapping of frequency of term occurrence.

The above network displays linkages of 151 items, 6680 links, 13723 link strength 4 clustered works of the documents.

Results

1. In citation trends as per figure there are disparities in citation count of both the journals. It also observed the increase in the citation rates in recent years.

2. Bornmann Lutz, Max Planck Society, Germany is the most productive author for mentioned period.

3. Demeter, Márton; De Zúñiga, Homero Gil and Goyanes, Manuel have strong collaboration network by publishing research papers in OA hybrid journals.

4. Mapping of terms occurrence revealed perfect structure of linkages.

Conclusion

By analysing 490 bibliographic and citation records from Dimensions AI to assess the impact of hybrid open access journals in the field of Scientometrics from 2022 to 2024. The findings spotlighted on disparities in citation counts for identified hybrid OA journals titles Scientometrics and Journal of Scientometrics Research. The authorship analysis revealed that Bornmann and Lutz were the most frequently cited and productive authors during this time period. Further, the social collaboration network demonstrated the authors' strong partnerships. The Max Planck Society to be the most active publisher in hybrid open access journals in this domain and term co-occurrence mapping effectively exposed key research themes and trends, offering insights into the intellectual structure of the Scientometrics field.

In general, study highlights the importance of integrating conventional citation metrics with altmetric information and network analysis to achieve a thorough comprehension of research impact, collaboration, and the spread of knowledge in the changing environment of academic publishing.

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Spectrum

RESEARCH ARTICLE

Precision Plant Growing Assistant: An IoT, ML, and Mobile App Integrated System for Smart Plant Care

Edwin D'Souza[a] | Nathan Fernandes[b] | Kyros Echaporia[b] | Prachi Gaonkar[b] | Harrison Amaral[b] | Bijendra Ekka[b] | Esther Gnana[b] | Stephen Lobo[b]

[a] Department of Computer Science, St. Xavier's College, Mapusa, Goa 403507, India.
[b] T.Y.B.Sc. Computer Science, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Edwin D'Souza (edwin.d@xavierscollegegoa.ac.in)

ABSTRACT

Traditional gardening methods often lack the precision needed for optimal plant health, leading to issues like improper watering and nutrient deficiencies. This paper presents the Precision Plant Growing Assistant (PPGA), a smart system designed to enhance gardening through continuous monitoring and AI-powered recommendations. The PPGA integrates IoT sensors (soil moisture, light, temperature/humidity, NPK) with a Raspberry Pi Pico microcontroller for data collection. Data is transmitted wirelessly via Bluetooth to a React Native mobile application, which utilizes Firebase as its backend for data storage and user authentication. Machine learning models, including an Artificial Neural Network (ANN) for health classification and a Convolutional Neural Network (CNN) for disease detection, analyze the sensor data and plant images to provide users with actionable insights and personalized care recommendations. Preliminary testing indicates the system's potential for accurate monitoring and improving plant health outcomes compared to traditional manual practices. The PPGA aims to make gardening more efficient, accessible, and sustainable for users of all experience levels.

1. Introduction

Gardening is a popular hobby, but maintaining healthy plants can be challenging due to the need to effectively manage various environmental and soil conditions. Novice gardeners often struggle with balancing factors like water, nutrients, and sunlight, relying on intuition and general

guidelines that may not ensure consistent care. This can result in problems such as overwatering, nutrient deficiencies, and pest infestations.

To address these challenges, we developed the Precision Plant Growing Assistant (PPGA), a smart system designed to provide users with continuous monitoring and actionable recommendations for maintaining optimal plant health. The PPGA integrates the Internet of Things (IoT), Machine Learning (ML), and a smartphone application to deliver valuable, data-driven information about key environmental factors affecting plant growth. By leveraging Artificial Intelligence (AI), the system seeks to reduce uncertainty in gardening and provide accurate guidance to users, regardless of their experience level.

This paper describes the design, implementation, and preliminary evaluation of the PPGA system. We detail the system's architecture, the components used for hardware and software design, the machine learning models for data analysis and recommendations, and the features of the mobile application. The objective is to demonstrate the feasibility and potential impact of an integrated IoT and AI system for enhancing plant care practices.

2. Literature Review

The field of precision agriculture and smart gardening has seen significant advancements through the application of technologies such as AI, IoT, and ML. These technologies are being explored to optimize plant care and overcome the limitations of traditional, intuition-based methods. Sensor-based systems, in particular, offer the potential for real-time monitoring and feedback to improve plant growth outcomes. This review examines relevant research in automated plant monitoring, agricultural sensor technology, AI-driven plant care recommendations, and a mobile application for gardening.

Numerous studies have investigated the use of sensor networks for monitoring essential plant parameters. Research by Smith et al. (2020) and Zhang and Li (2021) highlighted the importance of moisture sensors in preventing improper watering, demonstrating potential for significant water conservation. Gupta et al. (2019) explored low-cost electrochemical sensors for NPK nutrient measurement, offering a real-time alternative to laboratory analysis. Liu and Wang (2022) emphasized the role of light sensors in optimizing plant exposure. While IoT-based sensor networks are effective for data collection (Rasband, 2020), challenges remain regarding sensor accuracy and reliability under diverse environmental conditions and the need for robust calibration techniques.

Machine learning has been increasingly applied to plant health assessment. Sharma et al. (2021) showed that ANN models, particularly using TensorFlow, can predict optimal care routines based on sensor data. Kim et al. (2020) demonstrated the use of CNNs for detecting plant diseases and nutrient deficiencies from leaf images. AI models can provide personalized care plans (Patel et al.,

2022), potentially reducing fertilizer usage (Silva et al., 2019). However, challenges exist in generalizing these models across different plant species and environments, requiring more diverse datasets.

User-friendly mobile applications are crucial for the adoption of smart gardening systems. Brown and Taylor (2020) found that cross-platform frameworks like React Native enhance user engagement. Ahmed et al. (2021) demonstrated the use of Firebase for secure data storage and retrieval for AI analytics. Silva et al. (2019) noted that community features can enhance user experience. Despite these advancements, limited research exists on the long-term impact of these applications on user behavior and gardening practices.

Based on this review, several research gaps are apparent: the need for improved sensor calibration, expanding AI models for greater plant diversity and environmental contexts, enhancing user interfaces for novice gardeners, and developing real-time alerts and automation features. The PPGA aims to address these gaps by integrating a comprehensive sensor network, versatile AI models, and a user-friendly mobile application to provide a holistic and intelligent plant care solution.

3. Methodology

The Precision Plant Growing Assistant system comprises hardware for data acquisition, software for processing and analysis, and a mobile application for user interaction.

3.1. *Hardware Description*

The core hardware component is the Raspberry Pi Pico microcontroller, which serves as the central hub for collecting data from various sensors. The system integrates the following sensors:

- **BH1750 Light Sensor:** Measures ambient light intensity in lux via an I2C interface.

- **Soil Moisture Sensor:** Detects the moisture level in the soil.

- **DHT11 Temperature and Humidity Sensor:** Measures air temperature and humidity.

- **NPK Sensor:** Measures Nitrogen (N), Phosphorus (P), and Potassium (K) levels in the soil.

- **DS3231 Real Time Clock (RTC) Module:** Provides accurate timekeeping for data logging, even during power loss.

The Raspberry Pi Pico reads data from these sensors at regular intervals (specified as 10 minutes). Wireless communication with the mobile application is facilitated by the HM-10 Bluetooth Low Energy (BLE) module, connected to the Pico. The system is powered by a USB power supply, with the NPK sensor requiring a separate power source.
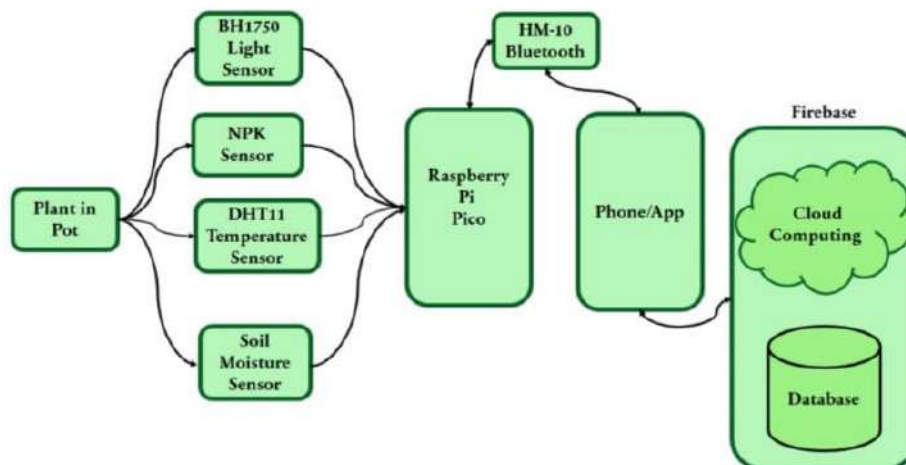
Figure 1. Detailed circuit diagram of the Precision Plant Growing Assistant (PPGA) hardware, showing the interconnections between the Raspberry Pi Pico microcontroller, sensors (soil moisture, light, temperature/humidity, NPK), and the Bluetooth module.

3.2. *Software Description*

The software architecture involves programming the Raspberry Pi Pico, developing the mobile application, and implementing machine learning models.

- **Microcontroller Programming:** The Raspberry Pi Pico is programmed using MicroPython in the Thonny IDE. A Script is developed to collect data from the various sensors and transmit it wirelessly via the HM-10 Bluetooth module.

- **Mobile Application Development:** The user-facing mobile application is built using React Native (specifically with the Expo framework and TypeScript). Visual Studio Code is used as the development environment. The app provides a user interface for displaying real-time sensor data, historical trends (using react-native-gifted-charts), and AI-powered recommendations.

- **Backend and Database:** Firebase is utilized as the cloud-based backend. Firebase Authentication manages user registration and login, while Firebase Firestore is used for storing and retrieving real-time and historical sensor data. Furthermore, Firebase Cloud Storage and Firebase Cloud functions is used for managing the AI models and inferencing from them.

- **Machine Learning and AI:** Machine learning models are developed and trained using Python, leveraging libraries such as Pandas for data preprocessing, TensorFlow for model building and training, and Scikit-Learn for data preparation and model evaluation. Google Colaboratory and Kaggle were used for development and dataset access.

3.3. *Machine Learning Models*

Two primary machine learning models are employed:

- **Artificial Neural Network (ANN):** An ANN is trained to classify overall plant health based on numerical sensor data (soil moisture, temperature, humidity, light, NPK). The model architecture includes input, hidden, and output layers with ReLU and SoftMax activations, batch normalization, and dropout for regularization. Data preprocessing involves handling missing values, encoding categorical variables, and standardizing features. The model is trained using Sparse Categorical Crossentropy loss and the RMSprop optimizer. The trained model is converted to TensorFlow Lite for deployment, enabling real-time health classification and care recommendations (e.g., watering, nutrient adjustments) within the mobile app based on live sensor inputs.

- **Convolutional Neural Network (CNN):** A CNN is used for automated plant disease detection by analyzing images of plant leaves captured via the mobile phone camera. The CNN is trained on a dataset of healthy and diseased leaves to identify visual patterns indicative of infections, deficiencies, or stress. This allows the system to provide diagnostic results and suggest treatments (e.g., nutrient adjustments, pest control).

4. Results

Preliminary testing was conducted to evaluate the functionality and performance of the PPGA system components.

- **Sensor Accuracy:** Individual sensor readings for soil moisture, light intensity (BH1750), temperature/humidity (DHT11), and NPK levels were compared against standard measurement tools to assess their accuracy and reliability under different environmental conditions.

- **Machine Learning Model Evaluation:** The ANN model for plant health classification was evaluated using a split dataset (80% training, 20% testing). Performance metrics such as accuracy, precision, recall, and Mean Absolute Error (MAE) were used to quantify its ability to predict plant health based on sensor data. The CNN model for leaf disease detection was evaluated based on its classification accuracy and ability to identify disease symptoms in leaf images using metrics like confusion matrices and F1-scores. High test accuracy was achieved for the ANN model.

- **Wireless Communication:** Connectivity tests were performed with the HM-10 Bluetooth module at varying distances and in environments with potential interference to evaluate the stability and efficiency of data transmission between the Raspberry Pi Pico and the mobile application.

- **Mobile Application Usability:** UI/UX testing was conducted with users to gather feedback on the app's ease of navigation, clarity of data visualization (charts, health indicators), and the understandability of AI-generated recommendations and push notifications.

- **Real-World Deployment:** The system was deployed in real-world gardening conditions (indoor, outdoor, greenhouse) over a 30-day period to assess its overall effectiveness. Monitoring included sensor accuracy, the practical impact of AI recommendations on plant health (growth rates, leaf condition), and user engagement.

5. Discussion

The preliminary testing of the Precision Plant Growing Assistant demonstrates the potential of integrating IoT, ML, and mobile technology for enhancing plant care. The system's architecture, combining a microcontroller with various sensors and a cloud-connected mobile app, provides a robust platform for real-time plant monitoring.

The use of standard sensors like the BH1750, DHT11, and soil moisture sensors, along with an NPK sensor, allows for comprehensive data collection on key environmental and soil parameters. The Raspberry Pi Pico proves to be a suitable microcontroller for this application, handling data acquisition and initial processing before transmission.

The application of machine learning, specifically ANN for health classification and CNN for disease detection, represents a significant step towards providing intelligent, data-driven recommendations. The reported high test accuracy for the ANN suggests that the model can effectively interpret sensor data to assess plant health. The CNN's ability to analyze leaf images adds a crucial visual diagnostic component.

The mobile application, built with React Native and utilizing Firebase, offers a user-friendly interface for accessing this information. Features like real-time data display, historical charts and health indicators make the system accessible and actionable for users. Firebase provides a scalable and reliable backend for data management and user authentication.

While the preliminary results are promising, the testing section also highlights areas for improvement, such as sensor calibration under diverse conditions and evaluating wireless connectivity range in different environments. The current reliance on Bluetooth may limit the operational range.

The project addresses some of the research gaps identified in the literature, particularly by integrating multiple sensor types and employing AI for personalized recommendations and disease detection. However, further research is needed to validate the system's effectiveness across a wider

variety of plant species and long-term use, as well as to explore more advanced automation features.

6. Conclusion

The Precision Plant Growing Assistant successfully integrates IoT, machine learning, and mobile technology to provide an intelligent and accessible solution for smart plant care. By offering real-time monitoring of essential environmental and soil parameters and providing AI-powered recommendations, the system empowers users to make informed decisions and potentially improve plant health outcomes compared to traditional methods.

The system's architecture, utilizing a Raspberry Pi Pico, multiple sensors, Bluetooth communication, Firebase backend, and a React Native mobile app with integrated ANN and CNN models, demonstrates a feasible approach to smart gardening. Preliminary testing indicates the system's potential for accurate data collection and intelligent analysis.

Future work will focus on expanding the system's capabilities, including integrating Wi-Fi or other long-range communication options, incorporating weather forecasting data, broadening the AI models to support more plant species, integrating visual support for action(especially for old age people) and exploring further automation features. Continued testing and user feedback will be crucial for refining the system and maximizing its impact on promoting efficient, accessible, and sustainable gardening practices. The PPGA lays a foundation for the future of data-driven plant care in domestic and potentially commercial settings.

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RESEARCH ARTICLE

Rehabilitation Systems Related to Substance and Drug Abuse: A Case Study of Kripa Foundation

Elizabeth Bara[a] | Karan Aital[b] | Jovan Mascarenhas[b] | Mielnik De Santana[b] | Jovin Dcosta[b] | Chirag Wargaonkar[b]

[a] Department of Sociology, St. Xavier's College, Mapusa, Goa 403507, India.
[b] T.Y.B.A. Sociology students, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Elizabeth Bara (elizabeth.b@xavierscollegegoa.ac.in)

ABSTRACT

This case study explores the rehabilitation ecosystem for substance abuse in India, focusing on the Kripa Foundation in Goa. Using a mixed-methods approach, the research examines the effectiveness of holistic care, social reintegration, and vocational training in addressing addiction. The study highlights the importance of a multi-disciplinary framework, societal acceptance, and post-treatment support in combating substance abuse. Findings suggest that institutions like Kripa Foundation play a vital role in transforming individual lives and communities impacted by addiction, but challenges such as stigma, relapse risks, and lack of inclusivity persist. The study advocates for public awareness campaigns, inclusive policies, and greater investment in aftercare infrastructure to support rehabilitation efforts.

Introduction

In the Indian context, substance abuse is a growing concern, with an increasing number of individuals falling into addiction due to factors like peer pressure, mental health struggles, socio-economic conditions, and easy access to drugs. Goa, in particular, has gained notoriety for its high prevalence of drug use, largely due to its tourism industry and party culture. According to a report by the Narcotics Control Bureau, Goa is one of the top Indian states facing drug trafficking and substance abuse issues (Times of India, 2023).

Substance and drug abuse represent a critical social and health challenge in India, with Goa emerging as a focal point due to its tourism-fueled nightlife and easy access to narcotics. The widespread availability of drugs like MDMA, cocaine, alcohol, and cannabis has contributed to rising addiction rates, particularly among youth under the age of 25. Rehabilitation centers are increasingly becoming essential in addressing this crisis—not merely as medical facilities, but as institutions fostering psychological recovery, social reintegration, and behavioral change. This article delves into the rehabilitation ecosystem through the lens of the Kripa Foundation, a prominent NGO-run facility in Anjuna, Goa, which offers an integrated and holistic approach to addiction treatment.

To fully grasp the significance of rehabilitation systems, it is important to define addiction from both sociological and psychological perspectives.

Sociological Perspective: From a sociological standpoint, addiction is not just a medical condition but also a social construct. Theories like Deviance Theory suggest that substance abuse often arises due to social labeling—individuals who are labeled as "addicts" may begin to internalize this identity, leading them to continue their drug use (Becker, 1963). Additionally, Strain Theory (Merton, 1938) argues that when individuals face societal pressure without legitimate means to achieve success, they may turn to substance use as an escape

Psychological Perspective: As per American Psychological Association addiction is commonly defined as a compulsive dependence on a substance, characterized by an inability to control its use despite harmful consequences It is often linked to changes in brain chemistry, where substances interfere with neurotransmitters, leading to cravings and withdrawal symptoms. The reward system in the brain, particularly the release of dopamine, plays a key role in reinforcing drug-seeking behavior.(n.d)

These perspectives help us understand why people fall into addiction and why rehabilitation is not just about physical detoxification but also about addressing social, psychological, and environmental factors. Although both of them present distinct views, we discover a connection between both, on one hand each explain stimulating factor to substance abuse and on the other hand one of them, particularly the sociological perspective brings in the deep insights on the root cause of the problem, as it upholds the idea of societal structures shaping and influencing individuals towards unhealthy practices.

Methodology

This case study employed a mixed-methods research design. Primary data was collected via structured interviews with residents undergoing rehabilitation at Kripa Foundation, as well as consultations with counselors and administrative staff. A total of 14 patient case histories were analyzed, capturing both qualitative narratives and personal recovery journeys. Secondary data

included literature reviews of national and international rehabilitation programs, comparative studies, and theoretical frameworks rooted in sociology and psychology—such as the 12-Step Model, Cognitive Behavioral Therapy (CBT), and theories of deviance and social strain. The study aimed to gain a comprehensive understanding of addiction, treatment methods, and the socio-environmental factors influencing recovery.

Findings

The research unearthed a wealth of insights into both the strengths and limitations of the current rehabilitation system, with Kripa Foundation serving as a representative model.

Comprehensive and Holistic Care: Kripa Foundation's treatment model includes medically supervised detoxification, individual and group counseling, yoga, meditation, vocational training, and relapse prevention strategies. The integration of spiritual and therapeutic practices underscores their belief in healing the individual as a whole.

Patient Demographics and Addiction Patterns: The interviewed clients ranged in age from their early 20s to late 50s, coming from various professional backgrounds—fishermen, police officers, hospitality workers, and former criminals. Many began substance use in their teens or early adulthood, often triggered by occupational stress, peer influence, or emotional trauma. Substances of choice included alcohol, cocaine, heroin, and cannabis.

Personal Narratives of Recovery: Several patients demonstrated remarkable resilience and motivation to rebuild their lives, with some, like counselor Isidore Correia, returning to the center in a mentoring role after their own recovery. Others struggled with repeated relapses and motivation, highlighting the complexity of addiction and the individualized nature of recovery.

Challenges in Social Reintegration: Many clients voiced concerns about societal stigma and future employment prospects. Some feared being labeled "addicts" and expressed doubt about being accepted by family, employers, and communities. Despite progress in therapy, these social barriers continue to hinder full reintegration.

Comparison with Broader Research: When juxtaposed with other case studies from Haryana, Punjab, and Kenya, similar themes emerged: the effectiveness of holistic care, the critical role of family support, and the pressing need for vocational training and post-treatment support. In contrast, some regions showed poorer outcomes due to inadequate staffing, limited infrastructure, and lack of follow-up services.

Gender Gap and Lack of Inclusivity: All clients interviewed were male, reflecting a broader gender gap in access or willingness to seek rehabilitation. Cultural norms, stigma, and lack of female-specific facilities may be contributing factors, indicating a need for more inclusive rehabilitation policies.

Conclusion

The case study of Kripa Foundation illustrates that effective rehabilitation requires more than just detoxification—it demands a structured, multi-disciplinary framework that addresses mental health, social dynamics, and long-term life planning. The foundation's holistic philosophy, which blends medical care with psychological therapy, vocational training, and spiritual healing, provides a blueprint for sustainable recovery. However, challenges such as societal stigma, lack of post-treatment support, and relapse risks persist.

To combat substance abuse more effectively, rehabilitation efforts must be complemented by public awareness campaigns, inclusive policies, and greater investment in aftercare infrastructure. Rehabilitation should not be viewed in isolation but as a continuous process that includes healing, societal acceptance, and empowerment. In this light, institutions like Kripa Foundation play a vital, though still evolving, role in transforming individual lives and communities impacted by addiction.

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RESEARCH ARTICLE

A Simple and Convenient Method for the Synthesis of Chalcones: A Green Chemistry Approach

K. C. Pinto | A. Shetye | A. Polshet | A. Khan | J. Mendonca | S. Parab | S. Raul | T. Mandrekar | K. Gad

Departments of Chemistry, St. Xavier's College, Mapusa, Goa, 403507, India.

Correspondence: K. C. Pinto (Kathleen.P@xavierscollege.ac.in)

ABSTRACT

Chalcones, a class of flavonoids, have garnered significant attention in recent years due to their diverse pharmacological properties, including antimicrobial, anti-inflammatory, and anticancer activities. However, traditional methods for synthesizing chalcones often involve hazardous chemicals, harsh reaction conditions, and generate substantial waste. This highlights the need for a more sustainable and environmentally friendly approach. This study aims to develop a green method for synthesizing chalcones using eco-friendly catalysts, solvents, and reaction conditions. By leveraging principles of green chemistry, we seek to minimize waste, reduce the use of toxic substances, and promote a more sustainable synthesis protocol. The successful development of this green methodology will not only contribute to the field of organic synthesis but also provide a more environmentally responsible approach to accessing these valuable compounds.

Introduction

[1]In recent years, the principles of green chemistry have gained considerable importance in the field of organic synthesis due to growing environmental concerns and the need for sustainable development. The push towards environmentally benign and resource-efficient chemical processes has led to the adoption of green methodologies that minimize the use and generation of hazardous substances. Among the numerous targets of organic synthesis, chalcones have attracted significant attention due to their structural versatility and broad spectrum of biological activities.

[2] Chalcones, characterized by the presence of an α, β-unsaturated carbonyl system, are important intermediates in the synthesis of various flavonoids and exhibit notable pharmacological properties such as anti-inflammatory, antimicrobial, antioxidant, antitumor, and antimalarial activities.These compounds are also valuable building blocks in medicinal and materials chemistry.

However, conventional methods for the synthesis of chalcones often rely on the use of volatile organic solvents, strong acids or bases, and elevated temperatures, resulting in low atom economy, poor selectivity, and environmentally harmful by-products. These drawbacks highlight the urgent need for more sustainable synthetic strategies.

Green chemistry offers promising solutions through alternative reaction media, non-toxic reagents, and energy-efficient techniques. [3]Techniques such as microwave irradiation, ultrasonic activation, and mechanochemical (grinding) methods have emerged as powerful tools for enhancing reaction efficiency and selectivity. Moreover, the use of ionic liquids, deep eutectic solvents, solid acid catalysts, and bio-catalysts aligns with the goals of green chemistry by providing recyclable and less hazardous alternatives to traditional reagents and solvents. Additionally, solvent-free protocols and aqueous-phase reactions have demonstrated remarkable success in reducing environmental impact and operational hazards.

The development of green synthetic approaches for chalcones not only addresses environmental and safety concerns but also contributes to the advancement of sustainable pharmaceutical manufacturing. These methodologies are crucial for reducing energy consumption, improving reaction efficiency, and adhering to regulatory frameworks aimed at protecting human health and the environment. As such, the exploration and implementation of green chemistry techniques in the synthesis of these bioactive molecules represent a significant and ongoing advancement in modern organic chemistry.

Chalcones are a class of organic compounds with a characteristic ∝, β-unsaturated carbonyl structure consisting of two aromatic rings connected by a three carbon bridge. They are naturally occurring in many plants and serve as key intermediates in flavonoid biosynthesis. They are commonly synthesized by Claisen –Schmidt Condensation. Reaction between an aromatic Aldehyde and a Ketone in the presence of a base or acid catalyst. These compounds exhibit a wide range of biological activities including Antimicrobial, Anticancer, Anti-inflammatory and antioxidant properties. Due to this versatile chemical structure chalcones are widely used in pharmaceuticals, agrochemicals and cosmetics. Researchers continue to explore their potential in drug development and material science applications

Materials and Methods

All melting points are measured in open capillary. Products were characterized by IR spectra. All reagents are purchased from Loba and used without further purification.

General procedure for the synthesis of Chalcone

A mixture of the appropriate methyl ketones (5 mmol), aromatic aldehyde (5 mmol), and sodium hydroxide (7 mmol) were thoroughly ground with a pestle in an open mortar at room temperature for 2–3 min until the mixture turned into a melt. The initial syrupy reaction mixture solidified within 3–5 min. Grinding continued for 5–10 min more, and the reaction was monitored by TLC. The solid was washed with cold water to remove the sodium hydroxide and recrystallized from the appropriate solvent to give the corresponding chalcone derivatives.
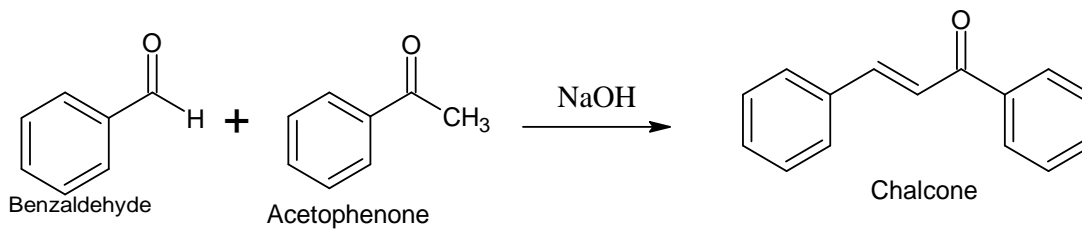
General Reaction

Five chalcones were successfully synthesized using this method using acetophenone and substituted aromatic aldehydes. The reaction was monitored by TLC. The products were characterized by their M. P and IR spectroscopy.

Table 1.Synthesis of Chalcones, M.P and yield.

Entry	Name of the Compound	Yield	Melting point
1	Benzylideneacetophenone	60 %	52 °C
2	3-(4-methylphenyl)-1-phenylprop-2-en-1-one	33.22 %	80 °C
3	3-(4-cyanophenyl)-1-phenylprop-2-en-1-one	47.63 %	150 °C
4	3-(4-fluorophenyl)-1-phenylprop-2-en-1-one	87.66 %	58 °C
5	3-(4-chlorophenyl)-1-phenylprop-2-en-1-one	85 %	115 °C

Antimicrobial Study

Antimicrobial studies refer to the research and experiments conducted to investigate the ability of various substances, such as drugs, chemicals, or natural compounds, to prevent the growth of or kill microorganisms like bacteria, fungi, viruses, and parasites. [6]These studies are crucial in identifying new antimicrobial agents, evaluating their effectiveness, and understanding how they work to combat infections.

Antimicrobial studies aim to discover new treatments, understand how they function, and evaluate their effectiveness and safety in preventing or treating infections. These studies are essential for developing therapies, especially in an era where antimicrobial resistance is becoming a serious global health threat.

Chalcones have emerged as a potential solution due to their ability to target various microbial strains, including those resistant to conventional antibiotics. Their antimicrobial action is attributed to several mechanisms, such as interference with microbial cell wall synthesis, disruption of cellular membranes, inhibition of enzymes, and alteration of nucleic acid synthesis.

[7]The antimicrobial properties of chalcones have been extensively studied in vitro, with several studies demonstrating their activity against a wide range of bacteria, fungi, and viruses. Research has shown that certain chalcone derivatives exhibit significant activity against Gram-positive and Gram-negative bacteria, including *Staphylococcus aureus* and *Escherichia coli*, as well as fungi like *Candida albicans*. Additionally, chalcones have been explored for their antiviral potential, showing inhibitory effects against viruses like the herpes simplex virus (HSV) and influenza.

This increasing interest in chalcones as antimicrobial agents highlights the importance of exploring their structure-activity relationships (SAR), which can help in the design of more potent and selective antimicrobial compounds. [8]The development of chalcone-based drugs could be a valuable addition to the current arsenal of antimicrobial therapies, especially in combating resistant strains.

The antimicrobial studies of chalcones reflect their potential as a rich source of novel agents that can address the pressing need for new treatments against infectious diseases, particularly in the era of rising antimicrobial resistance.

Method of Microbial study

Solution of test compound was prepared by dissolving 0.1mg each in 1ml organic solvent. Measured volume of test organism was spread over the agar plate each and were allowed to dry, wells were then made in the sterile petri plates and inoculated with one compound solution each prepared prior and placed inside the incubator at 37°C for 24 hours and after 24 hours zone of inhibition was measured.

Antimicrobial studies for the synthesized (2E)-1,3-Diphenylprop-2-en-1-one

Table 2. Microbial effect of synthesized compounds.

Sr. No.	Name of the Compounds	Zone of Inhibition	
		E. Coli	S. aureus
1	benzylideneacetophenone	6 mm	0 mm
2	3-(4-methylphenyl)-1-phenylprop-2-en-1-one	0 mm	0 mm
3	3-(4-cyanophenyl)-1-phenylprop-2-en-1-one	0 mm	6 mm
4	3-(4-fluorophenyl)-1-phenylprop-2-en-1-one	0 mm	0 mm
5	3-(4-chlorophenyl)-1-phenylprop-2-en-1-one	0 mm	0 mm

Results and Discussion

The reaction was accomplished by Claisen Schmidt reaction without the use of solvents. It is prepared by grinding which is an ecofriendly method compared to the conventional method which require long hours of stirring along with the use of solvent. The structures were confirmed by comparing their M.P and spectral data with literature data. It is observed that the yields are moderate with electron withdrawing groups like Chloro and Fluoro increasing the yield. In the antimicrobial studies it was found that compound 1 shows activity against E. coli and compound 3 shows activity against S. aureus.

Conclusion

This is a convenient method for the synthesis of chalcones: a greener approach as it does not use solvents and the reaction time is 2-3 minutes. The workup is easy and yields are also good. Two of these compounds showed activity against E. Coli and S. aureus. More derivatives can be synthesized and their activity explored. In vivo studies can also be carried out.

Acknowledgement

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RESEARCH ARTICLE

Körper: A Phenomenological Perspective on the Sacred Relics of St. Francis Xavier

Elizabeth Bara

Department of Sociology, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Elizabeth Bara (elizabeth.b@xavierscollegegoa.ac.in)

ABSTRACT

This paper is a collection of thoughts that have emerged in the course of doing my Ph.D. The central idea of my thesis revolves around the theme of 'Body,' which I attempt to understand through a phenomenological enquiry while also delving into the sociological path. In this paper, I take the body to the world by interrogating the power situated in the sacred corpse of St. Francis Xavier, and what this does to a place like Goa. While isolating the idea of the spiritual power associated with the sacred relics, the paper navigates through the perspective of Leib and Körper to explicate the nuances of the 'Body.'

During the international conference themed "Pan Asian Heritage of St. Francis Xavier: Between Memory & Contemporary Appropriations" held at Old Goa last year, a SYBA Sociology student from St. Xavier's College, Mapusa, asked the panellists a hypothetical question about the non-existence of the Holy Saint's corpse. Interestingly, what-if questions always spark interest, and so it did in this case, too. Around what idea of the Holy Saint do thousands of people gather here in Old Goa? Is Goa like all those other places that St. Francis Xavier had visited? Or, does the presence of the body make this place unique? The inevitability of the answer was made evident during the decennial exposition of the sacred relics of St. Francis Xavier—also affectionately addressed as Goencho Saib and Periyar Padre in Konkani and Tamil, respectively—held between 21 November 2024 and 5 January 2025. The event served as a reminder of our faith in the Saint. Devotees from all over the world flocked to Goa to pay their reverence to the sacred relics.

The state of Goa, otherwise very popular as a tourist destination, now had another reason to be visited: the exposition, held once every 10 years, currently in its 18th edition. My interest in the subject began during the international conference held during the exposition from 14 to 17

December 2024. St. Xavier's College was in charge of organising the event, and we were a part of it. The conference invited scholars and researchers from the world over to speak on the Saint, and this gave a unique flavour to the exposition, making it an intellectual endeavour rather than just a spiritual one. Given that our institution is named after the Saint, the role of the college at this event was also significant in a manner of maintaining a spirit of enlightenment among the masses, especially within the academic community. The paper presenters presented the perspectives from various places that St. Francis Xavier himself had visited and lived in. Goa became the epicentre of common interests and shared knowledge. Such power of the sacred relics was a testimony to the materiality of the body, but not just any body, but one surrounded by religious reverence, a figure that is the epitome of marvel and sacredness.

One of the panellists' responses to the absence of body threw in fresh perspectives on the theory of absences, which, at least for many youngsters in the audience at the conference, may have been a novel idea. However, the study of absences is a poststructuralist subject which has been studied by several theorists, particularly Lacan, Foucault, and Derrida. One potential area of enquiry may be to look at sacred relics through absence theory. For now, the focus is only on a small fraction of the Körper, which is equated with the sacred relics and opposes the idea of the Lived Body or Lieb as associated with power. This is because, according to Slatman, Leib refers to the body as it is experienced (2019). However, the sacred relics also holds the history of Francis Xavier's past experiences. These experiences, although absent today, are retained in the realm of absences, which could be more powerful than what is visible and present. The sociology of absences is an important area of study that can shed light on the path for future observations.

Isolating the aspect of sacredness, although challenging, can offer some room to look at the relics outside the "natural attitude." The silver lining is in getting back "to things themselves" (Aho and Aho, 2008), as Husserl suggests. Here, the aim is "not explaining [them] or analysing [them] in terms of causal principles, or even common sense, but describing [them] in the richest and the most faithful way as possible (Merleau-Ponty, 1962, viii). Following my interest in phenomenology, I use this theoretical framework as a lens to present the body in two senses: one as the "Leib," the Lived Body, and the other as the "Körper," the physical body. "In philosophy, the conceptual distinction between Körper and Leib has been developed notably in the beginning of the twentieth century by German philosophers such as Edmund Husserl (1859–1938)" (Slatman, 2019) and subsequently by others. The body that is referred to in the case of the sacred relics is of substance and mass, an aspect of the Körper. According to Nancy (2008), "The body as mass is the body of a mass grave; it is the body as cadaver; it is the body that does not sense anymore— the body as substance or self-coinciding mass."

Having waited in line for two hours, finally came the moment when we walked around the silver casket placed at the Se Cathedral. I recall it was 24 November 2024. The incorruptible body of the Holy Saint, clothed in an alb, lay peacefully. The only exposed portions were the hands, feet, face, and head. In this article, I intend to raise questions about the power of the body that is lifeless, yet

still powerful. The first step towards understanding the relics is demystifying it by focusing on its corporeal nature. Defying "laws" is an essential feature of sacredness:

> To say that certain things are supernatural, it is necessary to have the sentiment that a natural order of things exists, that is to say, that the phenomena of the universe are bound together by necessary relations, called laws. When this principle has once been admitted, all that is contrary to these laws must necessarily appear to be outside of nature, and consequently, of reason; for what is natural in this sense of the word is also rational. (Durkheim, 2015, 37)

The sacred relics is not to be understood in the context of the supernatural. However, taking "laws" as a starting point, I wish to argue that the sacred relics, in a way, defy the law that humankind is deemed to face—returning to dust upon death. This separateness is a realm of sacredness, as opposed to the profanity of man. According to Durkheim, religion is defined as "sacred things - that is to say, things set apart and forbidden" (Durkheim, 2015, 8). Considering the things "set apart" discussed in his seminal work The Elementary Forms of Religious Life, Durkheim, in one way, also talks about it as taboo. However, here, the sacred relics is not taboo, yet is set apart because it is extraordinary—the Körper that defies laws is extraordinary on account of its materiality. Does the material body encompass power, or is it the Saint who does? One way to understand this is by acknowledging the Körper, its materiality, but not without its separateness from humanity—that is, its characteristic feature, the incorruptibility of the Körper. Hypothetically raising yet another question: What would the absence of the sacred relics from Goa do to this site? A panellist at the conference retorted to this query by stating the possibility of another idea bringing the people together, if not for the relics. Another shared that absences may be significant. In other words, when something we care about is absent, it can feel like a part of us is missing. This emptiness shows us how much that thing or person mattered to us. A lot can be debated on this front, but for now, we return to the actuality of the sacred corpse.

> Some bow, Others halt in their tracks. But every person in the queue reaches out, palm open, to touch the glass-panelled casket, supplicating before the body and spirit of St Francis Xavier. Reverence for departed religious figures is not uncommon. What is unusual is that the body of St. Francis Xavier is 472 years old. (The Economist, 2025)

Much reverence is visible for the sacred corpse, which delineates corporeal power. To understand this, one must consider the flip side by examining how this power transcends the perception held by people. This perception, which exists beyond the individual, is reflected onto the sacred relics. This power is invested by a group in one single body, thereby animating the relics. One might also speak of the invisible force, the societal force, that idolises an object akin to this, is the role of a totem. Further, sociologists also speak of the idea of social construction as given by Peter Berger and Thomas Luckmann and, along these lines, it is safer to see how this power perpetuates implicitly within the society but manifests itself on to the sacred relics, known to be "the objective body with physical characteristics" (Slatman, 2019). It is a way of looking at a body without life as having an intrinsic power, an ability to draw crowds, and the potential of sustaining faith within

people. The holy corpse, in that sense, becomes a symbol of faith. It stands for the trust and belief that people retain in it as a protector and saviour, thus bearing the colloquial name Goencho Saib, which again has an emotional bond to language, intertwining the Saint entirely with the place, where he presently rests peacefully in the silver casket atop a rostrum in Bom Jesus, in Old Goa.

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Influence of Green Marketing on Consumer Buying Behavior Relating to FMCG Sector

Siya Suryakant Karapurkar[a]| Soham Dattatray Wadaye[a] | Pritam Ram Lamani[a] | Remediana D'Souza[a] | Arikta Fondu Naik[a] | Claude Savio C. Braganza[a] | Glen Diago Da Silva[a] | Muskan Khatun[a] | Enajia Fernandes[b]

[a]Student, Department of Commerce, St. Xavier's College, Mapusa, Goa – 403507, India.
[b]Department of Commerce, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Enajia Fernandes (enajiafdes204@gmail.com)

ABSTRACT

This study investigates the impact of green marketing on consumer buying behaviour within the FMCG sector. It explores how awareness, perception, trust, and willingness to pay a premium affect decision-making. Using a structured questionnaire administered to 152 respondents in Goa, the study analyses various demographic, psychological, and economic factors influencing green product adoption. Findings reveal that while awareness of green marketing is high, skepticism toward brand authenticity affects purchase intent. The results emphasize the importance of trust, quality, and transparency in fostering consumer loyalty and encouraging eco-conscious consumption.

Introduction

The rapid depletion of natural resources and growing environmental awareness have driven both consumers and companies to adopt eco-friendly practices. Green marketing—developing, promoting, and distributing products that minimize environmental harm—has become a vital strategy in the FMCG sector. This study focuses on consumer attitudes toward green initiatives in FMCG and how these initiatives influence buying behaviour.

Green marketing, also known as environmental or eco-marketing, involves promoting products, services, or brands that are environmentally friendly or have a positive impact on the environment.

This approach integrates sustainable practices, eco-friendly materials, renewable energy sources, and socially responsible manufacturing processes into marketing strategies (Malviya, Soni, & Chhabra, 2024). The primary goal is to appeal to environmentally conscious consumers and meet their demand for sustainable products or services. By highlighting eco-friendly features, showcasing commitments to sustainability, and educating consumers about environmental benefits, businesses can enhance their brand image and drive sales (Malviya, Soni, & Chhabra, 2024).

In India, the Fast-Moving Consumer Goods (FMCG) sector, the fourth largest in the economy, has witnessed significant growth, with revenues reaching \$110 billion in 2020 and projections indicating a rise to \$220 billion by 2025 (TeamLease Services, 2024). This growth is driven by increasing urbanization, rising disposable incomes, and changing consumer preferences. As environmental concerns become more prominent, consumers are paying greater attention to green consumerism, influenced by factors such as the oil crisis and the adverse effects of rapid population growth and excessive consumption on the Earth's ecosystem (Reddy, Chandu, Srilakshmi, Thagaram, Sahyaja, & Osei, 2023).

However, the FMCG sector faces challenges in implementing green marketing strategies, including balancing sustainability with cost-efficiency, overcoming consumer scepticism, and ensuring regulatory compliance (Malviya, Soni, & Chhabra, 2024). Despite these challenges, the rising demand for eco-friendly products presents opportunities for businesses to innovate and align their practices with environmental sustainability goals.

Review of Literature

Green marketing has emerged as a strategic approach for companies aiming to align with growing environmental awareness and evolving consumer expectations, especially in the Fast-Moving Consumer Goods (FMCG) sector. A number of scholars have examined its implications from various perspectives.

According to [Morel and Kwakye (2012)], consumer attitudes and purchase intentions toward eco-friendly FMCG products are significantly shaped by marketing mix elements, customer satisfaction, and word-of-mouth. Their quantitative study of 174 respondents demonstrated that positive consumer perceptions of green products strongly influence purchasing behaviour, highlighting the importance of aligning marketing strategies with consumer values.

[Dangelico and Vocalelli (2017)] presented a systematic review of green marketing strategies and definitions. Their research emphasized that consumer willingness to pay for green products is linked not only to environmental responsibility but also to product functionality. They highlighted

the strategic relevance of green brand positioning and identified critical components like reverse logistics and closed-loop supply chains.

[Hassan and Valenzuela (2016)] explored consumer perception of green advertising in the FMCG sector in Australia. Their qualitative study revealed mixed levels of trust in green advertisements, with scepticism often arising from misleading environmental claims. The authors stressed the need for transparency and authenticity to build consumer trust and drive purchase intent.

In an Indian context, [Sharma and Mahlawat (2021)] analyzed green marketing initiatives using secondary data. Their study found that companies are adopting eco-friendly practices such as rainwater harvesting, renewable energy, and sustainable packaging. However, they also reported challenges including high implementation costs and consumer doubt, indicating the need for effective communication and a balance between sustainability and profitability.

[Ghoshal (2011)] offered a conceptual understanding of green marketing, discussing its importance, challenges, and implications for management. The paper argued that companies adopt green marketing not only to contribute to environmental well-being but also to gain a competitive edge. Challenges identified included high costs and resistance from consumers unfamiliar with green products.

[Saini (2013)] investigated the impact of green marketing on consumer buying behaviour in Delhi. The study found that while eco-friendly practices attract consumer interest, price and quality remain dominant decision-making factors. The author emphasized the necessity of making green products both affordable and high in quality, coupled with strong communication strategies to encourage sustainable consumption.

These studies collectively underline the multifaceted nature of green marketing. They demonstrate that while consumers are increasingly environmentally conscious, factors such as trust, affordability, and perceived value continue to play a crucial role in shaping their buying decisions.

Materials and Methods

A quantitative research method was used. Primary data were collected through structured questionnaires from 152 respondents in Goa. The data included demographic variables, consumer perceptions, and behavioural trends toward green marketing in FMCG. Secondary data were sourced from academic articles, reports, and credible websites.

Results and Discussions

The findings reveal a high level of consumer awareness regarding green marketing, with 88.2% of respondents indicating familiarity with the concept. Social media emerged as the leading source

of information, cited by 84.9% of those aware. Among the brands associated with green marketing, Himalaya topped the list with 71.1%, followed by Unilever (39.5%) and Patanjali (33.6%).

In terms of perception and skepticism, nearly half of the respondents (48.7%) expressed doubts about the authenticity of green marketing claims. While 50% held a somewhat positive view of green-branded companies, only 17.1% reported a very positive perception. Despite these reservations, green marketing appears to influence consumer behavior significantly, with 75% of respondents having purchased products based on green marketing claims.

The factors influencing such purchases included product quality (71.7%), health benefits (55.9%), environmental impact (53.9%), and price (48.7%). Trust emerged as a critical element, with 53.3% of respondents stating that it is very important in their decision-making process. Trust was found to be influenced primarily by the company's reputation (44.7%), followed by positive reviews (42.1%) and transparency (29.6%).

However, when it comes to premium pricing, consumer willingness appears limited. Only 9.2% were definitely willing to pay more for green products, while 48% indicated they were sometimes willing, suggesting that while green values are important, affordability remains a key concern.
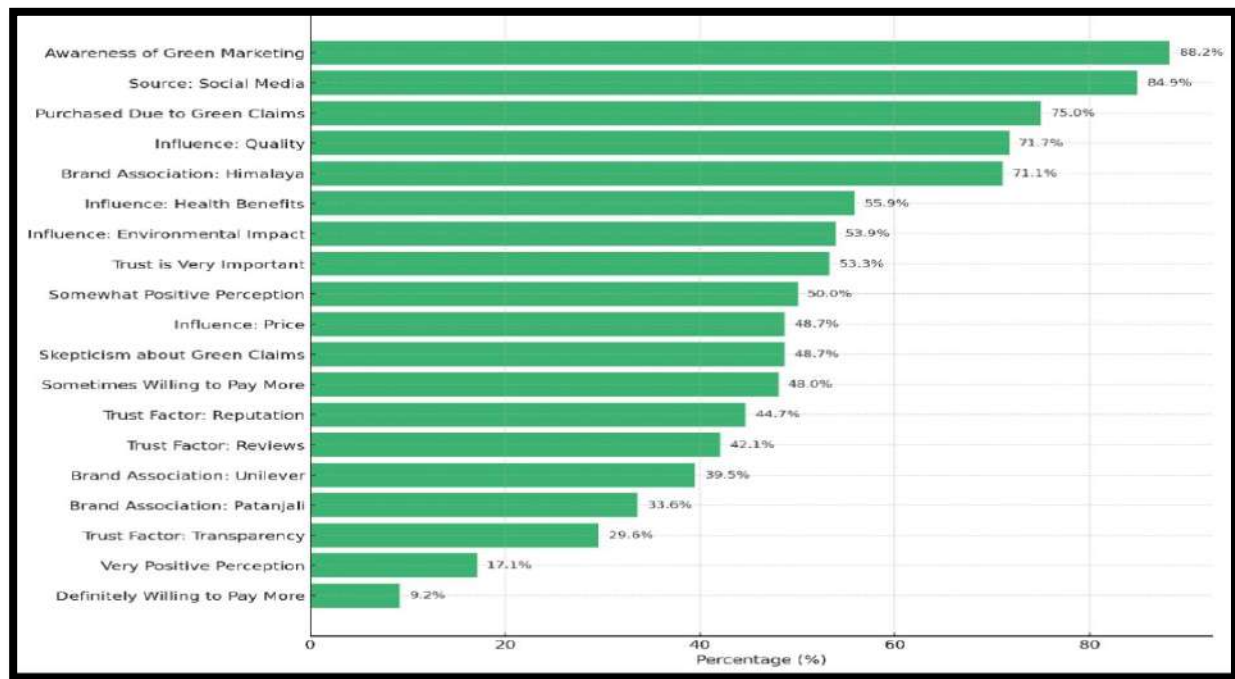

Table I.

The graphic presents a horizontal bar chart summarizing key insights from the study on green marketing in the FMCG sector. It shows that **consumer awareness is high (88.2%)**, with **social**

media (**84.9%**) being the main source of information. **Himalaya (71.1%)** is the brand most associated with green marketing, followed by **Unilever (39.5%)** and **Patanjali (33.6%)**.

Despite this awareness, **48.7% of respondents are skeptical** about green claims, and only **17.1% have a very positive perception**, though **75% have made purchases** based on green marketing. The most influential purchase factors are **quality (71.7%)**, **health benefits (55.9%)**, and **environmental impact (53.9%)**, with **price (48.7%)** also playing a role.

Trust is vital (53.3%), shaped by **company reputation (44.7%)**, **reviews (42.1%)**, and **transparency (29.6%)**. However, willingness to pay more is low—**only 9.2% are definitely willing**, and **48% are sometimes willing**, indicating that affordability remains a concern. The chart visually emphasizes these priorities and concerns shaping consumer behavior in the green FMCG space.

Conclusion

The study reveals a growing interest in green products among FMCG consumers, yet doubts about authenticity hinder full trust. Trust, transparency, and product quality must be emphasized by companies to enhance green marketing success. Eco-friendly branding works best when supported by genuine initiatives, competitive pricing, and third-party certifications.

Green marketing in the FMCG sector is gaining momentum due to rising consumer awareness, regulatory pressures, and corporate responsibility. Most consumers are aware of green marketing, primarily through social media, and associate it with brands like Himalaya, Unilever, and Patanjali. However, skepticism about the authenticity of green claims persists.

While consumers value eco-friendly products, price sensitivity remains a barrier. Key purchase drivers include product quality, health benefits, and environmental impact. Trust—shaped by brand reputation, reviews, and transparency—is crucial in green purchase decisions.

Though green packaging appeals to many, it is not yet a top priority for most buyers. Companies face challenges in balancing sustainability with cost, but those that genuinely commit to environmental practices and communicate transparently will build stronger consumer trust and loyalty.

The future of green marketing lies in innovation and authentic sustainability efforts. Brands that align green initiatives with consumer expectations and business strategy will gain a lasting competitive edge.

Suggestion

FMCG companies can strengthen green marketing by focusing on transparency, digital engagement, and sustainable innovation. Gaining third-party certifications, using clear eco-labels, and publishing sustainability reports build trust and combat greenwashing. Leveraging social media, influencer partnerships, and user content aligns with how consumers learn about green initiatives.

Companies should invest in eco-friendly materials and lifecycle assessments to improve product performance and highlight health benefits. Educating consumers through webinars and online content empowers informed choices, while regular feedback helps refine strategies.

To address price sensitivity, loyalty programs, promotions, and eco-incentives can add value without raising costs. Collaborating with NGOs, other brands, and government bodies can expand impact. A well-rounded approach enhances trust, loyalty, and long-term success in a growing green market.

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▌RESEARCH ARTICLE

The Forerunner of the Village Panchayat System: The Parochial Assembly (*Junta da Parochia/Junta Local*) in Colonial Goa

Sharmila Pais

Department of History, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Sharmila Pais (shamipais1000@gmail.com)

ABSTRACT

This study investigates the much-understudied Parochial Assembly (Junta da Parochia or Junta Local), the local representative body established in 1822 during the constitutional regime in colonial Goa. Many political scientists criticize the use of democracy in a colonial setting arguing that democratic principles of liberty, equality and representation are incompatible within colonial rule. But sprouts of democratic ideals can be traced in the Parochial Assembly of Goa. Today, Goan villages are well-served by the panchayat system, but not much is known that the Junta da Parochia served as the forerunner to the elected panchayats of Goa after 1961. This paper also problematizes the correlation between the Junta Local and the village Comunidade, the two local institutions of Goa and offers an interpretation to the extent the Junta da Parochia was able to fulfill the needs of the village within the colonial structure of Goa. Information on this theme is rather fragmentary and remains scattered in government bulletins, and contemporary newspapers of the 19th and 20th centuries. This investigation highlights its establishment, basic structure, functions, and relevance to contemporary times.

Introduction

The *Junta da Parochia*, established in the 19th century laid the foundations of a local representative body, within the colonial framework of colonial Goa. While limited in scope and autonomy, it marked a shift towards local participation in civic and parish affairs under Portuguese rule. In this light, borrowing from the perspective of political theorist Charles M. Andrews, who believes democracy did not exist in the colonies, but the seeds of democracy were planted there, *Junta da*

Parochial can be seen as a seed of democracy in colonial Goa.[1] While true democracy was absent, the foundational structure of participatory governance was visible in this body.

Village Functioning in Colonial Goa

Traditionally, the village or *gão* served as the lowest unit in administration. Like the rest of the country, every village was a self-sufficient unit. The Portuguese captured Goa in phases. During the 16th century, the office of the *Tanadar* oversaw local administration.[2] At the provincial level the Chief *Tanadar* in Tiswadi and the military captains supervised the village administration exercising administrative, judicial, and policing powers.[3] Any conflicting issues between the state and the village were settled through his office.[4] Government taxes or *foro* were paid through the *gauncari* system. The Portuguese found the existing system of local administration convenient, and therefore, retained the *gauncari* structure to suit their administrative convenience.[5] The existing usages and customs of the village are documented in the Foral of 1526 by Afonso Mexis based on the oral testimonies from the local Brahmins of Goa.[6]

Junta da Parochia: The Beginnings

As mentioned above, since antiquity, all administrative responsibilities of villages were looked after by village *gauncari.* The term 'gauncari' was lusitansied to 'comunidade' or 'gauncaria' under Portuguese rule. In 1822, there was a significant departure in the traditional functioning of the village administration. The Parochial Assembly was a representative body, whose members were voted to power by an electoral process. The *comunidade* on the other hand, was a private, autonomous body that carried out most aspects of village administration. There were now two local bodies in colonial Goa. Although the village *comunidades* and the parochial bodies were markedly distinct from each other in their composition and responsibilities, the parochial assembly remained largely at the periphery for a greater period of its existence under the colonial regime.[7] One parochial assembly was assigned to almost 1000 households, encompassing two or three villages, whose representatives were elected directly by the 'qualified voters.' [8]

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[1] Lokken, R. N. The Concept of Democracy in Colonial Political Thought. *William Mary Q.* 1959, *16* (4), 568.

[2] Xavier, F. N. Bosquejo Historico das Communidades das Aldeas dos Concelhos das Ilhas Salsette e Bardez; Tipografia Rangel: Bastorá, 1907; Vol. I, p 167.

[3] De Souza, Teotonio. Medieval Goa; Concept Publishing Company: New Delhi, 1979, p. 70.

[4] D'Costa, Anthony. The Christianization of the Goa Islands; The India Printing Works, Bombay, 1965, p.21.

[5] Xavier, Filipe Nery. Opcit. pp.167-68; See also Rivara Cunha J. H. da. "Foral de Usos e Costumes dos Gauncares e Lavradores desta Ilhas de Goa" in *Archivo Portuguez Oriental*, Fasc. 5. Parte I, Asian Educational Services, New Delhi 1992, 118.

[6] Ibid., pp. 118-133

[7] Codigos Administrartivos de 1836, 1842, 1878, 1886, 1895, e 1896.

[8] Instruções de 12 de Agosto de 1847. Bol. Gov. Estado Índia 1847, *No.* 43 (Oct 16); See also *Código Administrativo Portuguez*, 1836, Art. 11, p 6.

Number of Elected Representatives

Elections were conducted through a secret ballot. The number of elected representatives in the assembly was proportional to the population in the locality, with three elected representatives for a population of one thousand inhabitants, or five representatives if the number of inhabitants exceeded this number.[9] The parochial elections were held every two years with the same significance as the municipal elections.[10]

Eligibility

A person was eligible to be a member of the Parochial Board if he enjoyed his civil and political rights and satisfied the following criteria:1. Having an annual income of 100$000 *rèis* (currency) from property, commerce, industry, employment 2. Having attained an age of majority, which was 25 years of age. 3. Paid the required taxes to the state.

The President of the Assembly and His Responsibilities

The Parochial Assembly was led by the President or occasionally by the parish priest or in his absence by the senior most member nominated by the government.

Sessions

Generally, the sessions of the assembly commenced at the beginning of the New Year.[11] Its members were required to swear fidelity to the Monarch, the Constitution and its regulations.[12] The assembly was required to hold its ordinary sessions every fifteen days, and an extraordinary session, as needed.[13] It operated with a treasurer and a secretary to manage its functions. Meetings were attended by the *regidor,* the village magistrate, a government official who oversaw the assembly's deliberations.[14] While elected representatives could convene in the church sacristy or other suitable locations, meetings were strictly prohibited inside the church itself.

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[9] Código Administrativo Portuguez; Imprensa da Rua de S. Julião: Lisboa, 1837; Art. 9, p 5; See also Coelho, T. Manual Politico do Cidadão Portuguez, 2nd ed.; Typographia A. VAP Da Empresa Literaria E Typografica: Porto, 1908; p 557.
[10] Codigo Administrativo Portuguez de 1842, Art. 297.
[11] Codigo Administrativo de 1842, Art. 333, see also the Decree of November 1851.
[12] Portaria Provincial de 12 de Julho de 1842 e de 27 de Março de 1843, in Sousa, A. A. Manual de Direito; p 8.
[13] Ibid., Art. 183.
[14] Lencastre, Fransisco de, Indice Remissivo da LegislaçãoNovissima de Portugal Osannos de 1833 até 1865. p.162

The Sessions of the Parochial Assembly were conducted openly, unless circumstances required confidentiality. All decisions (*Actas*) were recorded in a special book, with entries numbered and initialed (*rubricado*) by the *regidor* (magistrate), and signed by all members present. If a member refused to sign, they were required to state their reasons and the context behind their decision. For any resolution to be approved, a majority vote of those present was necessary. For instance, in an assembly of five members, at least three members had to be present, with two forming the majority; in an assembly of three, two members constituted a majority. The president of the assembly was included in this count, as holding the presidency did not exclude them from membership.[15]

An issue of priority taken up for deliberations by the assembly was the administration of the *fabrica* (church body). In certain exceptional cases, it also looked after some church properties and other activities beneficial to the parish.[16]

Dissolution of the Assembly

The *Junta da Parochia* could be dissolved by the decree of the governor-general of Goa, but a new election had to be conducted within one month after the dissolution of the assembly.[17]

Illegality in Elections

Any voter could appeal against the illegality of the elections of the parochial boards.[18] The reclamations could be made either orally or written out, on the procedures of voting within a period of seven days. These appeals were addressed to the governor general, who in turn sought an inquiry against the complaint received from the Administrator of the District in this matter. The latter had to examine the complaint within two days, calling the members of the electoral board to deliberate upon the issue. The elections could be nullified if any violation of procedures had occurred in the electoral circle. [19]

Parochial Assemblies: Victims of Circumstances

A deeper analysis of parochial assemblies reveals that they did not rise as premier units of local administration in Portuguese Goa. Excessive political interference from executive authorities, their

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[15] Codigo Administrativo de 1842, Art. 333.

[16] The *Fabrica da Igreja* referred to the church rents used for the sacristy and repairs of the church. Earlier, these functions functions were looked after by parish authorities under the direction of the parish priest and the supervision of the Bishop.

[17] The provisional assembly had to continue till a new assbly was constituted. Even if for some unforeseen circumstances, it had exceeded its tenure of one month.

[18] Boletim Do Governo do Estado da India. No.16, April 1849, p. 113. There were instances of such illegalities in the villages of Salvador do Mundo, Mapuça and Revora in 1849.

[19] Codigo Administrativo de 4 de Maio de 1895, Art. 220-228

attitude of apathy, as well as the presence of the *comunidade* system in Goa, hindered the growth of the parochial body. Similar bodies in other parts of the Portuguese Empire also experienced a similar fate.

From the mid-1850s, the metropolitan government in Portugal recognized the need to improve the effectiveness of local administrative bodies. During the parliamentary session on 14 June 1856, it was noted that parochial assemblies were becoming increasingly subordinate to municipal authorities. In response, the parliament passed a resolution granting parochial assemblies greater autonomy, specifically allowing them more freedom in the construction and management of cemeteries within their respective parishes.[20]

The Code of 1870 favoured decentralisation of parochial bodies, but its provisions were not executed.[21]The functions and responsibilities of the parochial assemblies did not alter much despite several parliament debates concerning their welfare. A section of the intelligentsia in Portuguese Goa also lamented that the parochial assemblies had not risen to their potential. The strongly rooted antecedents of local governance through the institutions of *gauncarias* or *comunidades* were viewed as a hindrance to parochial bodies.

The effectiveness of the parochial assembly must be assessed within the broader framework of the functioning of the *comunidade* system in Goa which shaped local governance, land management and communal decision-making. The overbearing presence of the *comunidades*, affected the functioning of local parochial assemblies during the 19th and 20th centuries. It was common knowledge that the local administration in rural Goa was managed by *gauncarias*. The colonial regime often depended upon the *communidades* for funds to relieve the government of its financial burden. The Governor-General, Baron Vila Nova de Ourém, acknowledged in 1851 that *comunidades* not only paid taxes to the government but also sustained other responsibilities of public administration.[22] Some c*omunidades* even took upon themselves the responsibility of constructing cemeteries in parishes.

From the mid-19th century, there was an intensive debate centered on the conflict between parochial assemblies and *comunidades*. The debate reflected divisions among the Goan intelligentsia on local administration. One group favoured the empowerment of parochial assemblies over *comunidades*.[23] This group argued that the parochial assemblies should be allowed space to bloom without a competitor. On the other hand, its contenders favoured the continuation of the *comunidade* system in Portuguese Goa. In 1847, Filipe Nery Xavier, the renowned author

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[20]Diário da Câmara dos Senhores Deputados, no.1, 14 June 1856.
[21]*Código Administrativo, approvado por Decreto de 21 de junlho de 1870*; Imprensa de Universidade, Coimbra, 1870, p. 5.
[22] Correia Afonso, R. A evolução do municipalismo. In *A Índia Portugueza*; Imprensa Nacional: Nova Goa, 1923; p 438.The responsibilities pertained to sustenance of divine cult, agriculture, repair of public structures within its jurisdiction, maintenance of village streets, health and various other functions.

[23]Furtado, A. *As Communidades*; Tipografia Rangel: Bastorá, 1944; pp 36–37.

of *Bosquejo Histórico das Communidades Agricolas de Goa* was involved in drafting reforms for the *comunidades* and defended their growth. This matter caught the attention of the government, which issued the circular of 26 April 1849 and allowed a discussion on the contentious matter among its stakeholders.[24] Accordingly, the significance of the *comunidades* and parochial assemblies came to be debated at various fora. These debates were attended by the governor, district administrators and the intelligentsia. By 1854, the rhetoric on this subject reached feverish heights.[25] It polarized the disputants into groups and little progress was registered in resolving this row. One group advocated empowerment of the parochial assemblies.[26] advocated that parochial bodies should be entrusted with certain public responsibilities like transportation, health and so on.[27] The views of A. B. de Bragança Pereira were not approved by his opponents, who found the recommendations impractical, given the financial constraints of its administration. It was said that the municipalities themselves suffered from a paucity of funds and could not attend to all the financial requirements of the municipal jurisdiction.[28] It was noted that the parochial assemblies depended upon the municipality of their respective province for financial assistance. In 1849, Governor Pestana announced that the parochial assemblies were not empowered to exceed an expenditure of 25 *Xerafins*.[29] Similarly, the parochial assembly had to receive approval from the municipality for undertaking works of repair and other tasks within their jurisdiction.[30] When income exceeded the stipulated amount of 25 *Xerafin*s, the parish council had to defray the cost from income generated from its properties.

Parochial Assembly in the 20th Century

The circumstances and fortunes of the parochial assemblies did not alter much during the 20th century. In 1913, the *Junta da Paróchia* was called the *Junta Local* or *Commissão da Paróchia*.[31] Sadly, there were many parishes in Portuguese Goa that did not have parochial assemblies for want of sufficient voters or qualified representatives or both. This was more so in the New Conquests where the tradition of representative institutions had not taken firm roots.

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[24] Xavier, F. N. *Bosquejo Histórico das Communidades*; Tipografia Rangel: Bastorá, 1907; p 138.
[25] This debate echoed in the Portuguese *Cortes* (Parliament). Caetano mourão Garcêz Palha and Bernardo da Costa had heated arguments on this issue in the parliament.
[26] Furtado, A. *As Comunidades*, p. 36. The group supporting the *comunidades* with certain modifications was led by Francisco Luis Gomes, Joaquim Heliodoro da Cunha Rivara, Filipe Nery Xavier, Ismael Gracias, António Floriano de Noronha, and others. The second group which opposed the continuation of the *Comunidades* included Constâncio Roque da Costa, Joaquim Catão da Costa, Bernardo Francisco da Costa, Bruto da Costa, and others.
[27] Ibid.,p. 293.
[28] Ibid.,p. 442.
[29] Pronouncement of Governor Pestana in February 1849 from the governor's palace in *BDG,* 1849. In the event of an urgent necessity, they had to take the approval of the municipalities by presenting their requirements.
[30] Ibid.
[31] Decreto No. 186, 24 de Outubro de 1913. In Legislação Relativa ao Estado da Índia; Imprensa Nacional: Nova Goa, 1928; Vol. XXVII, p 41.

In 1911, the Republican Constitution promoted decentralisation of local administrative bodies in the overseas provinces, according to laws specific to each territory. The above legislation allowed certain concessions to parochial bodies. For example, a primary school teacher could constitute a parochial assembly along with two elected members.[32]

Parochial assemblies became a subject of discussion in the Provincial Congresses convened in Portuguese Goa from 1915.[33] Their deliberations help to infer the diminutive role played by these parochial bodies during the republican period. To begin with, the First Provincial Congress held in 1915 strongly grieved the despicable state of the parochial bodies and led some members to suggest that they be amalgamated with *comunidades*.[34] The Second Provincial Congress also engaged itself in this subject and observed that much was left to be desired from the parochial assembly. It recommended a greater role to parochial bodies on issues of local importance such as policing, education, credit system, vigilance on emigration, organisation, revision of land records and other functions.[35] Recognising the immense contribution rendered by *comunidades* to the local administration of Portuguese Goa, it was expressed that parochial assemblies also had to carry out their administrative responsibilities because the two institutions were entrusted with distinct tasks.[36] It was also observed that many parishes did not have local assemblies during the 20th century and therefore the benefits of decentralisation were not enjoyed by all parishes of Goa. Similarly, the third provincial council recognised the advantage of allowing parochial bodies to arbitrate upon contentious issues within their jurisdiction, as they best understood local problems of the village. This council also voted for a local tribunal made up of a judicial officer and a *regedor* to arbitrate upon matters of local importance.[37]

Judging from the above discussions, the working of parochial bodies of Portuguese India appeared to be far from satisfactory. The well-known political activist and journalist of the 20th century, J. I. Candido de Loyola observed that parochial assemblies could have been valid instruments of progress during the 20th century, but, except for a few examples, 'they were in a vegetative state for God to give'.[38] Loyola was also critical of the governor-general of India who had not realised

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[32] Decreto No. 186 24 de Outubro de 1913. In Legislação Relativo ao Estado da Índia 1914, p.1; Leis Orgânicas da Administração Civil e Financeira das Províncias Ultramarinas. Base 42-45, p. 22. Their responsibilities, as per this legislation involved establishing and maintaining nursing homes, looking after village markets and other local responsibilities.
[33] The Provincial Council was inaugurated on 15 December 1915, with its inaugural session commencing on 2 April 1916. These councils were summoned to discuss issues of regional interest related to Portuguese India.
[34] Congresso Provincial da Índia Portuguesa, Subsídios para sua História, Vol. I; Cunha, A. M. da, Ed.; Casa Luso Francesa, 1924. R. Correia Afonso, Teodore da Miranda, Luis de Menezes Bragança, António Maria da Cunha and Leandro Pereira supported this view; António Maria da Cunha ed. Congresso Provincial da Índia Portuguesa, Subsidios, para sua história, (1° e 2° Congressos), vol. I.
[35] 2° Congresso Provincial, Secção II. Discurso do Leonardo Manuel Condorcet Pereira; pp 67–70.
[36] Ibid.
[37] Correia Afonso, R. in "A Evolucao do Municipalismo", pp. 454-455.
[38] A Índia Portugueza, No. 11, October 1926.

the significance of these bodies and metaphorically commented that they functioned without "without feet nor head" ('*sem pés nem cabeça'*). [39]

The working of the *Junta da Paróchia* from 1926 to 1961 had not altered much.[40] This can be perceived from the assertions of T. B. da Cunha in 1946. Cunha declared that parochial bodies in villages had been 'abolished' after having worked for a few years without even possessing definite rules and consequently, the villages were left to their fate. Subsequent legislation enacted during the regime of Salazar only reiterated the administrative functions of the *Junta Locais*. In 1955, they came to be called *Juntas Locais Aldeanas*.[41]

The integration of the territory of Goa into the Indian Union in 1961 marked an important watershed in its history. Indian sovereignty was upheld in the territory and efforts began to replace the vestiges of Portuguese administration in Goa.[42] Thus, the period after 1962 saw the Union Territory of Goa, Daman and Diu adapting to issues about its civil administration.[43] The first panchayat elections were held in Goa in 1962, as per the directives of the President of India. The *Lei de Panchayats Aldeanos de Goa Damão e Dio de 1962*, no. 9, was promulgated by order of the President of India and executed by Lieutenant Governor, Tumkur Shivshankar replaced the Parochial Assembly with the Panchayat system.[44] Its members were elected and were designated as 'panch'. The president of the panchayat was called the *Sarpanch* and the vice-president was the Deputy *Sarpanch*. An eligible representative was required to be 25 years of age, while every Indian citizen who completed 21 years of age and whose name was included in the voters' census could vote.[45] It also provided reservation of a seat for one female member. If no woman came forward to contest the election, it was decreed that elected members would appoint a lady member to be part of the local body. The new legislation was based on universal franchise. It marked the beginning of parliamentary democracy in Goa, Daman and Diu.

Conclusion

It may conclusively be summarized that *Junta da Parochia* operated within the limitations and regulations of Portuguese colonial authority. The introduction of the elected representation, secret ballots and participation of voters, though limited in their numbers laid the foundation of the fundamental democratic process in colonial Goa. Portugal scored better than their neighbouring

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[39]Ibid.
[40]Anuário do Estado da Índia; Imprensa Nacional, Nova Goa; 1929, p. 170.
[41]Decreto No. 40216, Março de 1955, pp. 313-343.
[42]Government Gazette, Series I, No. 22, 1962. This order was effective retrospectively from 29December1961, though it was made public in May 1962.
[43]Government Gazette, Series I, No. 27, 1961, p. 121. The Removal of Difficulties Order, 1962 was issued to facilitate the civil administration in the Union Territory of Goa, Daman and Diu.
[44]Government Gazette, Series I, No. 33, 3 October 1962. A group of villages could also be grouped to constitute a village panchayat.
[45]Government Gazette, Series I, No. 33, 28 September 1963.

counterparts, the British or the French in the field of initiating representative institutions in its colonies. Despite the predominantly colonial and exclusive nature of Portuguese policies in the *Estado da India*, a notable shift occurred with the introduction of an electoral system and representative institutions since the 19th century. This change marked a departure from the established political norm of absolute monarchy and brought about reforms in both the political landscape and public administration. Since then, a segment of qualified Goans was permitted to participate in the electoral process and share political space in spheres of public administration; parliamentary, municipal, parochial, legislative or governing council, colonial council and the presidential elections of Portuguese dominion during the republican period. This body served as a precursor to the village panchayat system introduced in Goa after 1961 by laying the foundational structural of local self-governance. Its structure, decision-making process anticipated the responsibilities later formulated under the Panchayati Raj framework.

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Feminist Epistemology: A Brief Overview

Shefali Kale

Department of Philosophy, St. Xavier's College, Mapusa, Goa 403507, India.

Correspondence: Shefali Kale (Shefali.K@xavierscollegegoa.ac.in)

ABSTRACT

Feminist epistemologists argue there is a relation between gender and knowledge. They believe traditionally women have been kept out of knowledge production as they were believed to be less rational than men. Traditional epistemologists posited a neutral observer who could experience reality in its purest form. Contrarily, feminist epistemologists argue knowledge being social in nature is influenced by one's positioning in the social hierarchy. The knowledge generated at the margins is vastly different from that at the center. Traditionally men have been knowledge generators hence women's perspectives have either been ignored or omitted. Feminist epistemology attempts to highlight the epistemological outlook of women.

1. Gender and Knowledge: An Introduction

Feminists contend gender affects the way knowledge is perceived. Traditional epistemology kept women outside the circle of knowledge. When philosophers talk of rationality they implicitly mean 'ideals of manhood.' This gendering of 'reason' as 'male' and 'emotions' as 'female' is historical dating back to Aristotle who understood women to be as 'lesser men.' Lesser, as, they lack soul, hence not possessing rationality, which finds its fullest expression in males. Women are better than animals as the latter are not at all rational.

2. Androcentrism in Knowledge

Androcentrism in epistemology is manifest either in the content of the theories or in the interests of research areas. One way is which androcentrism is manifested in theories is to make the male as the standard measure and to treat the woman as a deviant. For instance, psychologists and biologists for a long wanted to know, 'Why a woman is different from a man?' Rather the question could have been why are boys less responsive, more pushy, more conceited, less synthetic minded than girls? Secondly, describing phenomena from the point of view of men or men's lives without

paying any attention to women's lives. For instance, economist and political scientists have traditionally studies class and socioeconomic status from a man's perspective and ignored the economic status of the full-time home-maker.

Impersonal and theoretical knowledge is coded as masculine and personal as involving the knower's identity, biography, personal experiences as feminine (Anderson, 2014). Theoretical knowledge is perceived to be objective as it claimed to be based on objectivity, free from emotions, particularity, interests, and values. Natural sciences are 'harder' likened to the masculine body and social sciences and humanities are 'softer' being affected by emotionality and subjectivity. It is therefore more prestigious to do science than social science or humanity. Mathematics is treated as masculine. In the sciences physics is the most prestigious of all as it used mathematics. Other sciences which are quantitative and experimental are ranked higher than the qualitative. Values are designated as feminine so any discipline which is normative is viewed lower than those that are based on observation. Biology is replete with examples in which gender symbolism is ingrained in the content of the theories. Evelyn Keller studied how evolutionary theory uses gender symbolism. Reason was seen as male and females came to be associated with intuition. Lloyd says if females have been seen as 'less rational' than the males' the reason is the conceptualization of rationality does not include any reference to qualities assigned as feminine. 'Female intuition' is more a pejorative term than complimentary says Lloyd.

Traditional epistemology did not concern itself and/or ignored completely the influence of gender on knowledge. Till the reason is obvious, it was males who engaged in philosophy. Contrarily feminists, on the other hand purport that knowledge has been viewed as gendered and theorization of knowledge has been influenced by gender. "Gender symbolism appears on at least two levels of our knowledge practices: in the construction of a hierarchy of prestige and authority among kinds and fields and in the content of theoretical inquiry itself" (Anderson, 2014, p. 196). Feminist epistemologists observe that masculine/feminine conceptual dichotomy is used as a model for basing multitude of conceptual frameworks as mind/body, culture/nature, reason/emotion, objective/subjective, tough-minded/soft-hearted, and so on.

Traditional epistemology concerned itself with existence of the external world, other minds, reliability of perception and memory etc. Feminist epistemology asks the questions: Why is the existence of other minds so problematic? Why do theories of knowledge presuppose an isolated knower? Does this isolated knower not have a body which was birthed and nourished by others? Does this knower not have a language learnt from society? Why are women not thought to have knowledge?

3. Feminist Critique of Traditional Epistemology

Feminist philosophers criticize the presumptions of traditional epistemology as being neutral and universalizing cognitive norms and standards (Mills, 1988). Feminist epistemologists argue, historically, knowledge producers have generally been men. This leads them to introduce

androcentric biases into knowledge claims. It is instantiated by use of words as 'man,' 'mankind' (masculine words) when referring to all humanity. When knowledge is perceived from the perspective of sex/gender perspective there is a Gestalt switch. Feminists believe sex and gender influence knowledge, "…gender" is not just another factor to be included in analysis as it stands. Its "inclusion" fundamentally changes analysis…." (Friedman & Wilks, 1987, p. 61)

According to Friedman & Wilks (1987), women could be either excluded or included in the field of knowledge. Their exclusion is manifest by non-usage of feminine pronouns and/or gender-neutral terms when referring to mankind. Where women are included, writings on women are coloured by androcentrism, by viewing them private or public sphere exclusively. Either perspective does her no justice. Regarding her solely from domestic sphere is to reinforce the traditional androcentric perspective. If she is perceived only from as public sphere, that too is incomplete, as for her, public is dependent upon the domestic. Standards or norms set for evaluation are such which favour men than women. This often leads to devaluing women in terms of either their body or capacity.

Lorraine Code in her article, "Taking Subjectivity into Account," critiques the approach of traditional epistemology (knowledge claims in the form *S*-know-that-*p*) on the grounds that it neglects the social and individual dimension of knowledge. Traditional epistemology she says claims to offer a 'view from nowhere,' meaning making a knowledge claim from a place of ideal observation, which could be from anywhere and everywhere (Code, 1993). A claim which derives from pure reason, transcending particularity, and contingency. "The ideals presuppose a universal, homogeneous, and essential "human nature" that allows knowers to be substitutable for one another" (Code, 1993, p. 16). She uses the phrase 'surrogate knower[1], standing for a knower, 'who are able to put themselves in anyone else's place and know his or her circumstances and interests in just the same as he or she would know them' (Code, 1993). Such a claim is untouched by any individual emotions, circumstances, or interests. The claim being, "if one cannot transcend subjectivity and the particularities of its "location," then there is no knowledge worth analysing.

Feminist epistemologists question the following presuppositions of mainstream epistemology, subject of knowledge is an individual, this individual share the epistemic ability with others hence can stand for others, object of knowledge is a natural object, the logical form of knowledge is 'S knows p' and objective knowledge is impartial and value free. Feminists approach knowledge from the following perspective, treating the knower as situated in a context, knower is an embodied member of the community, knowledge includes knowledge of persons as well as natural objects, acknowledges the role of feeling and doing in the acquisition of knowledge, believe that "objectivity is strengthened by the contextualization of the practices of knowledge and its norms of justification" (Schott, 2003, p. 56).

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[1]A term Code borrows from Naomi Scheman

Feminist epistemology being a supplement to social epistemology purport that knowledge must incorporate questions on nature of social community, power, and desire. Some answers it seeks in this regard as are to the questions; Who is the subject of knowledge? How does the social position of the subject affect the production of knowledge? Does the sex of the knower affect the acquisition of knowledge? Can all knowledge be expressed in the propositional form "S knows p"? Does the notion of situatedness strengthen the notion of objectivity? Can the knowledge claims of the oppressed be treated as epistemically privileged? How does gender affect science?

Feminist epistemology inquires what impact gender biases have had on the women students and researchers, how it has impacted the growth of knowledge. There is evidence pointing out that findings of women scientists are not given the same credibility as their male counterparts. The gender of the researcher also makes a difference to the responses of surveys.

4. Understanding Feminist Epistemology

Feminist epistemology is branch of social epistemology. "Feminist epistemology can be regarded as the branch of social epistemology that investigates the influence of *socially constructed conceptions and norms of gender and gender-specific interests and experiences* on the production of knowledge." (Anderson, 2014, p. 190). Knowers are polarized into two, one the privileged male, who has been traditionally at the center of knowledge production, the marginalized that include men who have lesser privileged, subdued by race, caste, class, and women. The argument is the privileged male's account of what constitutes knowledge excluded the view of the marginalized, rendering it biased and partial.

The problem Anderson deems for a feminist philosopher is that 'experience' used by theists traditionally refers to a "radically privileged, formally male-neutral ideas[2], impressions, perceptions, sensations, sense-data, evidences, or non-inferential beliefs" (Anderson, 1998). The lived experiences of the privileged male and the marginalized vastly differ. Knowledge being social in nature, a knower's situatedness affects hers/his cognitive abilities. Understood simply, feminist epistemology studies the interplay between gender and knowledge. It concerns itself with how androcentrism has disadvantaged women in the enterprise of knowledge seeking, by denying them a rightful place in discourse, by suppressing their voices, ignoring their perspectives, holding inferior and biased views about women.

Linda Alcoff and Elizabeth Potter, titled their book as 'Feminist Epistemologies' instead of singular 'Feminist Epistemology,' as they believe, "...the term does not have a single referent and….it may never" (Alcoff & Potter, 1993). Feminists contend that a universal or generalized

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[2] Anderson explains male-neutral as, "…whatever primary stuff of phenomenal world, broadly constructed as experience, when gathered by philosophers it has been male but under the pretense of sex/gender neutrality" (Anderson, 1998, p. 13)

account of knowledge (as held by traditional epistemology) is questionable as it ignores the social aspect of the knower.

Code says for positivists, observation is the most accurate source of knowledge. Knowers are neutral and observe the objects in a detached manner. One knower can be substituted by another knower. The goal of knowledge is to predict, manipulate and control the objects of knowledge. Value-neutrality and pure objectivity are the two prized features of traditional knowledge claims. Code says in such a setup there is no place for subjectivity. On the contrary says Code, epistemologists should also study the location of 'S' (the subject of knowledge) as much as to '*p.*' Code calls her view as 'variable construction hypothesis'

Schott defends feminist epistemology against two common misconceptions (Schott, 2003), firstly, 'women's logic' is special faculty possessed by women. She clarifies the commonly used phrase 'women's ways of knowing' is meant to indicate the situatedness of women in deliberating about epistemological problems and to expose the male bias of present theory of knowledge. Secondly, feminist theorization on natural science and social science does not indicate 'collapse' of these fields and rejection of concepts as 'rationality,' 'objectivity' and 'truth.' Contrary to this, feminists seek to reinterpret the terms considering the women's situatedness.

5. Conclusion

Feminist epistemology seeks to present the social dimension of knowledge, hitherto ignored by traditional philosophy. It contradicts the notion of an ideal observer who possesses true knowledge of the world and situates the knower in a context. The knowledge gained by such a knower is embodied and varies for each knower. By stressing upon the social context of knowledge has opened new vistas of research for the fields of religion, politics, social studies, psychology, to name a few.

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▋RESEARCH ARTICLE

प्रकृतींतल्यान संस्कृती कडेन

प्रा. धर्मा चोडणकार

कोंकणी विभाग, सेंट झेवियर्स महाविद्यालय, म्हापशें - गोंय.

Correspondence : Dharma.C@xavierscollegegoa.ac.in

सारांश :

आयच्या काळांत प्रकृतीचो जाल्लो विनाश जाका लागून आमच्या सैमांत जो बदल आमी पळयतात ताचें कारण सैमा कडेन जाल्ली आमची आडनदर. मनीस आपल्या स्वार्थाक लागून सैमाचें प्रदुशण आनी विनाश करपाक लागला. तो पळयत जाल्यार येता त्या काळार मनशाचो विनाश निश्चीत आसा. आयज जर मनीस सैमा कडेन आपलें नातें घट करिना, ताचे कडेन संबंद जोडिना, आपले जिणेंत ताका म्हत्व दिना जाल्यार प्रकृतीचो कोप जातलो. आमची संस्कृती सुद्दां सैमा कडेन नातें जोडुनूच निर्माण जाल्ली आसा आनी अश्यो खुपश्यो विधी आदीं पर्यंत आमी करीत आसात ज्यो सैमाचें संरक्षण करपाक आमकां प्रवृत्त करतात. ताचो विसर आमकां आयज पडला तो परतून याद करून दिवप हेंच ध्येय आसा.

सारभूत उतरां : सैम | प्रकृती | उत्सव | संवर्धन | संस्कृताय | सण-परब

सैमीक सोबीतकायेन आनी रसरशीतपणान श्रृंगारिल्लें आमचें गोंय सगळ्या संवसारांत फामाद. उत्तरेक महाराष्ट्र, दक्षिणेक कर्नाटक तर अस्तंतेक अरबी समुद्र आनी उदेंतेक सह्याद्री पर्वत गोंयाक हेरां पासून वेगळें करता. हांगासल्लो पाचवोचार सैम सदांच सगळ्यांक भुल्लसून उडयता. ह्याच सैमाच्या आलाशिन्याक गोंयकारांची जीण पसवल्ली आसा.

अशें म्हणटात की समाजाचीं, संस्कृतायेचीं पाळां-मुळां ताच्या लोकवेदांत दिश्टी पडटात. गोंयच्या लोकमनांत कितल्योश्योच संस्कृतायो भरशिल्ल्यो दिसतात. तांणी कितलेशेच आचार-विचार पचयल्यात. सुरवेक हांगां ऑस्ट्रीक आनी द्रावीड कुळयेंतल्या आचार-विचारांची बुन्याद दिश्टी पडटा. ताणेंच शेतां करून पिकां काडलीं. कांय झाडां जशें केळी, नाल्ल, हळद हांची लागवण केली, जी मनशाक सदांच उपयोगी पडटाली. ह्या द्रावीड कुळयेंतल्या लोकांनी दक्षिणे कडली संस्कृती

हांगासल्ल्या ऑस्ट्रीक लोकां कडेन भरसून आपणायली आनी हांगां एके नवे संस्कृतीचो जल्म जालो. जातूंत देव पुजप, फुलां देवाक ओंपप, देवाक नैवेद्य दाखोवप, धर्तरी, निसर्गाची पुजा करप, हें आमी मानपाक लागले. ब्रम्हांडांतल्या पंच महाभुता कडेन मनांत उपकाराची भावना दवरून तांचो आशिर्वादूच घेवन आमी मुखार वचूं येता, हें सत्य आमकां कळूच चुकिल्लें, जो पर्यंत तांचो आशिर्वाद वा तांचें निसुवार्थी देणें आमकां मेळटलें तेन्नाच मनशाचें जिवीत सुदृढ जातलें.

त्या नंतर आर्यांची संस्कृताय हांगां रिगली. जातूंत वेदीक संस्कृतायेंतल्यान आयिल्ल्या देवळांचे संस्कृतीची भर पडली. तातूंतल्यानूच लोक देव-देवता वांगडा वेदीक देवतांचे पुजेची भर पडली. तातूंतल्यान मनीस सैमा बरोबर एक जालोय आनी व्हड पुरुशार्थांचीं चरित्रां ताच्या मनांत घर करून बसलीं. त्या नंतर गोंयचें 'गोमंतक', ह्या नांवा वयरसून 'गोरवांनी भरिल्लो देस', असो अर्थ घेतलो जाल्यार गोंयांत कृषी संस्कृताय हांगां सुरवात पासून आशिल्ल्याचो संदर्भ आमकां मेळटा. अशे तरेन मौर्य, कदंब, यादव, मुसलमान, विजयनगर, बदामनी आनी शेवटाक पुर्तुगेजांच्या सरमिसळ संस्कृतायेंतल्यान गोंयची संस्कृताय आकाराक आयली.

खंयचीच संस्कृती सैमाक पयस दवरून निर्माण जाल्ली ना. मनशाच्या जिवितांत निसर्ग वा सैम वेगळो काडूंक शकना. तांचे मदीं संबंद इतले जोडिल्ले आसात की मनीस तांच्या शिवाय आपली जिणूच जगूंक शकना. त्या खेरीज गोंयचें भुगोलीक क्षेत्र पळयत जाल्यार सैमाच्या साबार देण्यांनी गोंय नटलां आनी ताणेंच गोंयची जीण बळिश्ट केल्या. अशें म्हणूं येता की गोंयचो पिंड सैमाच्या वाऱ्यार पोसला. गोंयकारांचें सैमा कडेन जीण ते मरण मेरेन नातें जोडिल्लें आसा. सैमांतलीं झाडां-पेडां, दर्या, दोंगर, न्हंयो, दर एक पशू-पक्षी, जनावरां, शेतां, भाटां, कुळगरां, चंद्र, सूर्य, तारे, वादळ, वारें, पावस, कंद-मुळां, फुलां, फळां, उदक, वायू, अग्नी, आकाश, पाताळ, पृथ्वी, ह्या सगळ्यां शिवाय आमी जगूंक शकना. तांच्या भरवंशारच आमची जीण निंबून आसा आनी ताकाच लागून तांचें संरक्षण करप, सांबाळ करप, तांचे बद्दल आदर दाखोवप ही मनशाची लागणूक जावन आसा.

गोंयकारांनी हे सैमीक शक्तीक खोशी करपा खातीर कांय विधी केल्यो. तांकांच आमी सण, परब आनी उत्सव अशें म्हणूं येता. ह्यो चडश्यो विधी धर्तरेच्या ऋतु-चक्रा कडेन संबंदीत आशिल्ल्यान तिची कृपा-दृश्टी आमचेर आसल्यारूच आमची जीण सुखाची जावं येता. हें मनशाक जाणवलें आनी तिची कृपा मेळोवपाक लागून तो तिका होरावपाक लागलो. गोंयांत तर चवथ, मकर-संक्रांत, दिवाळी, धालो, दसरो, चिकल-कालो, कणसांचें फेस्त, तवशांचें फेस्त, मातयेचें फेस्त, वडाची पुनव, तुळशी लग्न, नाग पंचम, श्रावणी आयतार आदी सण-परबो मनयताना दिश्टी पडटात.

सैमा वांगडा साबार सुकणीं-सवणीं वा मोनजात हांचे कडेन संबंद दवरून मनशाचे जिणे खातीर ह्या मोनजातींचें विश्व सांबाळप, ताचे मदीं उदरनिर्वाहाची सांखळ आसा, हें समजून येतकूच सरभोंवतण टिकून दवरप हें ताका कळ्ळें. तातूंतल्यान मानग्या-थांपणी, नागपंचम, चवथ, पाडवो ह्या सारकिले

उत्सव मनोवपाक लागले. हे सण फक्त हिंदूच न्हय तर सगळे धर्म आप-आपले परीन वेगळ्या वेगळ्या रुपांनी सैमाक आर्गां ओपताना दिश्टी पडटा.

गोंयकारांचे संस्कृतायेंत चंद्र, सूर्य, तारे, नवग्रह तशेंच फुलां (दशीण, कमळ, अनंत, शंकर, ब्रम्हकमळ, सूर्यफूल, मोगरीं, जायो-जुयो, रुई-फुलां) आदी फुलां देव-देवतांक अर्पण करपाची चाल आमचे मदीं आसा. ताका लागून ह्या फुलांची लागवण करप जाता. फळां मदीं नाल्ल, केळीं, पणस, सुपारी वा खंयचींय पांच फळां देव-देवतांक नैवेद्याच्या रुपान अर्पण करपाची प्रथा आमचे मदीं रुजल्या. ताका लागून नारळी पुनव, घडांची जात्रा, केळ्यांचें फेस्त, आमचे मदीं फामाद आसा. गोंयांत रुजपी कांय धान्यां ह्या पुजा-अर्चेच्या वेळार वापरिल्लीं दिसतात जशें की तांदूळ, हुडीद, गोंव, सांसवां, फोंव, तशेंच कांय द्रव्यांच्योय वापर जाता. अशे तरेन आमच्या ह्या सैमीक घटकांचो सातत्यान उपयोग आनी वापर जाल्ल्यान तांकां सांबाळून दवरप, तांचें पीक काडप जाता. कांय झाडां तर जशें की वड, माड, आंबो, पिंपळ, रुमड, जीं वर्सासकी प्राणवाय दितात आनी आमचो स्वास नितळ दवरपाक आमकां मदत करतात. अश्या झाडांची पुजा करून तांकां सांबाळून दवरपाची संवय आमच्या मदीं जावन पडिल्ली आसा.

ताकाच लागून सण, परब, उत्सव मनयताना मनशाचे भोंवतणचो, सैमाचो, प्राण-श्रृश्टीचो तशेंच वनस्पतीचो विचार केल्लो दिश्टी पडटा. हें करपा खातीर पाप-पुण्य, बरें-वायट, तशेंच देव-धर्म ह्या सारकिल्यो संकल्पना तयार करून मनशाक तांचे बद्दल आदर आनी सहानुभुती निर्माण जावची असो हावेस आसा आनी तातूंतल्यानूच आमचे संस्कृतींतली सामाजीक आनी धार्मीक जीण तयार जाल्ली आसा.

मनीस जल्माक आयल्या उपरांत मरण मेरेन सैमाच्या सांगातानूच जगता. सैमाक आनी मनशान दोशी करपाक जायना. सैमा विणें मनीस अपूर्ण उरता. सैमाक लागून मनीस तंदुरस्त उरता. सैमान केल्ले साबार उपकार आटोवपा खातीर मनशान सण-परबांच्या वा उत्सवांच्या निमतान सैमाक पुजपाक सुरवात केली. मनीस आनी वनस्पत हांचे मदलो पवित्र संबंद सांबाळून दवरप, जैविविधतायेची राखण करप, झाडां सांबाळप आनी पर्यावरणाचो समतोल इबाडूंक ना दिवप हीं सण-उत्सव मनोवपा फाटलीं मुख्य कारणां आसात. तशेंच दोंगर, न्हंयो, शेतां-भाटां, उदक, वारें, माती हांचेर जावपी अतिक्रमण आनी प्रदुशण, सैमाची जावपी नाशाडी हो संवसारीक हुस्को आमकां कळचो ही भावना ताचे फाटल्यान आसा. सैमाचें संवर्धन करचें, सैमा बद्दल जागृताय निर्माण करची, कृषी संस्कृताय सांबाळून जिवावळीचें रक्षण करप, धर्तरे कडेन संबंद जोडून मनशाचे सुरक्षेचो विचार ह्या उत्सावांच्या अंतर्गत जावन ह्या उत्सवांतल्यान पर्यावरणाची राखण जावची आनी झाडां-पेडां लावपाची भावना वाडीक लागची.

आमी जे सण मनयतात ताचे फाटलो खरो उद्देश म्हणल्यार प्रकृतीची राखण करप. जे मातयेंतल्यान मनशाचो जल्म जाला तेच मातये कडेन संबंद जोडचो, ते मातयेची जतनाय आमी घेवची पूण आयच्या काळार सैमाक सांबाळचे बदला ताचेर हानी जावपाच्यो कृती आमचे कडल्यान जायत आसात, सैमाची नाशाडी जायत आसा. एक कारोभार, एक वेवसाय वा एक भोगावळ म्हणून ते मनोवचे बदला ताचे फाटलो हेतू वा उद्देश समजून घेवप आयच्या काळाची गरज आसा. सैमीक वस्तूंचो वापर करप तरी आमच्या हातांत आसा, कांय जाण ह्या सैमाक वाटोवपा खातीर सातत्यान प्रयत्न करीत आसात. आमचोय ह्या कार्याक थोडो भोव हातभार लागलो जाल्यार मनशाचें भविश्य सुरक्षीत जावं येता, हातूंत मात्त्य दुबाव ना. ताका लागून आमी सैमाचे भक्त जावचे ही इत्सा. ह्या प्रकृतींतल्यानूच आमची संस्कृती निर्माण जाल्ली आसा आनी ही संस्कृती जपतलो जाल्यार सैमाक वेंग मारून वावुरपाची गरज आसा.

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■ RESEARCH ARTICLE

भारतीय सामाजिक संरचना में मुस्लिम दलित

प्रा. सलीम गड़ेद,

सहायक प्राध्यापक, हिंदी विभाग, सेंट झेवियर्स महाविद्यालय म्हापसा-गोवा,403507

शोधार्थी, हिंदी अनुसन्धान केंद्र, साखळी एवं केपें-गोवा .

Correspondence: SALIM.M@xavierscollegegoa.ac.in

सारांश :

भारत में जातिगत संदर्भों की चर्चा प्रायः केवल हिंदू समाज तक सीमित रहती है, जबकि मुस्लिम समाज में भी जाति और उपजातियों की एक जटिल संरचना विद्यमान है। मुस्लिम समुदाय में 'अशराफ', अजलाफ' और अर्जल' वर्गों के अंतर्गत अनेक उपजातियाँ शामिल हैं–जैसे उच्च जातियों में पठान, रिज़वी, शेख़, ख़ान आदि, जबकि निम्न सामाजिक वर्गों में अंसारी, चिकवा, इदरीसी, नाई, खुरैशी, फकीर, धोबी, रंकी, जोगी और मोची जैसी जातियाँ आती हैं, जिन्हें अक्सर सामाजिक उपेक्षा, भेदभाव और पीड़ा का सामना करना पड़ता है। प्रस्तुत शोध में उपन्यासों के माध्यम से इन वंचित जातियों के जीवन की त्रासदी और संघर्ष को उजागर करने का प्रयास किया गया है, ताकि उनके सामाजिक उत्थान और विकास की दिशा में एक सार्थक संवाद स्थापित किया जा सके।

मुख्य शब्द

मुस्लिम | दलित मुस्लिम | पसमांदा | सामाजिक भेदभाव | पीड़ा | संघर्ष ।

मूल आलेख

भारतीय समाज का गठन विभिन्न धर्म एवं जातियों के मेल से हुआ है । दूसरे शब्दों में भारतीय समाज धार्मिक मार्ग से होते हुए सामाजिक संरचना की वैचारिक पृष्ठभूमि को पूर्ण करता रहा, जहां जातीय व्यवस्था के आधार पर सामाजिक आर्थिक परिवेश के व्यावहारिक नियम बनाए गए

जिसके फलस्वरूप शनै-शनै सांस्कृतिक परम्पराएँ बनी जो इस मिट्टी से जुड़ गयी । इसीलिए भारतीय सामाजिक संरचना में जाति की अपनी अहम भूमिका रही है ।

जाति का विकास क्यों हुआ ? यह एक बहस का मुद्दा है । लेकिन किस हद तक सामाजिक भेदभाव का कारण बना यह सोचनीय है । दरअसल भारतीय सामाजिक ढांचा जाति के आधार पर ही चलता रहा है । भारतीय समाज में वर्ण व्यवस्था का प्रचालन रहा जिसे कर्म के आधार पर विभाजित किया गया था किन्तु कालांतर में यह एक विकृति बन गई जिससे मनुष्य के अस्तित्व पर प्रश्न खड़े होते दिखाई दिए । भारतीय समाज एवं वड्मय जातीय व्याख्या के समय एकपक्षीय दिखाई देता है । जाति पर विचार के साथ ही सभी की नज़रे हिन्दू जाति पर आकर ठहर जाती है । लेकिन मुस्लिम समाज इस प्रश्न को नज़रअंदाज़ करता दिखाई देता है । नज़रअंदाज़ करने के पीछे का तर्क है कि इस्लाम धर्म एकता और समानता के भाव पर चलता है इसीलिए असमानता का कोई प्रश्न ही खड़ा नहीं होता । यदि ऐसा है तो फिर वर्तमान में मुसलमानों के बीच जातिगत असमानता के कारण हो रहे विभिन्न आंदोलन तथा आरक्षण की मांग का क्या औचित्य है ? दरअसल गहराई से देखा जाए तो हिन्दू जाति की तरह ही मुसलमानों में भी जातिगत वैमनस्य दृष्टिगोचर होता है , जिसे छिपाने का षड्यंत्र यह समाज सदियों से करता आया है । वर्तमान मुस्लिम समाज में ऐसी कई जातियाँ है जिसे पसमांदा तथा दलित मुस्लिम के नाम से जाना जाता रहा है । जो सदियों से समाज के अनैतिक व्यवहार से पीड़ित एवं प्रताड़ित रही । यह जातिगत विषमता मुसलमानों में कोई नया आविष्कार नहीं है, बल्कि भारतीय परिवेश का हिस्सा मात्र है । यहाँ यह स्पष्ट करना अनिवार्य है कि इस्लाम धर्म में मौजूद यह जातिगत श्रेणियाँ धर्म की उपज न होकर इतिहास में सामाजिक-आर्थिक स्थिति की उपज है ।

मध्यकालीन समय में धर्म परिवर्तन अपने उफान पर रहा । इस समय तक इस्लाम धर्म की जड़े भारत में फैल चुकी थी ; तथा इनकी एकता एवं समानता की भावना से वर्ण व्यवस्था के भीतर अंतज्य, शूद्र , अछूत , चांडाल आदि नामों से अपमानित जातियों ने इसकी एकता के वैचारिक आधार तथा सामाजिक एवं आर्थिक उन्नति हेतु इस्लाम को मसावात के लिए स्वीकारा । इससे उनके धर्म एवं नाम बदल गए किन्तु सामाजिक स्तर पर कोई विशेष परिवर्तन नहीं हुआ । प्रत्येक जाति का चलन इस ओर भी ज्यों का त्यों होने लगा । और यहीं से मुसलमानों में जातिगत श्रेणियों का विभाजन दिखाई देता है । मुसलमानों में सामाजिक स्तर पर इन जातीय श्रेणियों का चलन प्रमुख तीन कारणों हुआ ।

1) मूल मुसलमानों में अपने सामाजिक स्तर की चिंता बनी रही तथा धर्मांतरित समाज की स्वीकृति का प्रश्न बरकरार रहा । जिसके वजह से इस्लाम धर्म से हटकर इन्होंने जातिगत श्रेणियों को ज्यों का त्यों निर्वाह पर ज़ोर दिया । ताकि मूल मुसलमानों को परिवर्तित मुसलमानों से अलग देखा जाए ।

2) भारतीय समाज में जाति को रूढ़ तथा इसे परंपरा के साथ जोड़कर देखा जाता रहा इसीलिए हम देख सकते हैं कि धर्मांतरण के बावजूद यह समाज अपनी जाति से जुड़े रहे । वे उन्हीं रीति और कार्य को अपनाने लगे जिसके भागकर मसावात को अपनाया था । ताकि समाज में उनके अस्तित्व पर कोई प्रश्न न उठा सके ।

3) जातिवाद के चलन में आर्थिक विपन्नता का अपना विशेष महत्व रहा है । जिससे जातिगत व्यवसाय धर्मांतरित मुसलमानों में बरकरार रहा; तथा इसमें कोई विशेष परिवर्तन नहीं लाया गया क्योंकि तब तक जातिगत श्रेणियाँ मुसलमानों में फैल चुकी थी ।

इन कारणों से मुसलमानों में मुख्य तीन श्रेणियाँ बनी जो भारतीय सामाजिक संरचना का हिस्सा बन गई । इन जातियों को अशराफ़ , अजलाफ़ और अर्जल नाम से जाना जाने लगा ।

अशराफ़ मूल मुसलमान कहलाए जिनका संबंध बलोच, अफ़गान तुर्क आदि से था । जिसमें शेख़, सैयद, पठान आदि जाति आती हैं । मूल मुसलमान होने के कारण ये उच्च जाति के कहलाए ।

अजलाफ़ उन्हें कहा गया जो मूल मुस्लिम न होकर धर्मांतरण के माध्यम इस्लाम धर्म से जुड़ गए, इन्हें द्वितीय श्रेणी का हिस्सा मान लिया गया ।

अर्जल मुसलमान उन्हें कहा गया जो भारतीय समाज के वर्ण व्यवस्था से प्रताड़ित रहे तथा समानता की भावना के कारण इस्लाम धर्म से जुड़ गए । कालांतर में अजलाफ़ और अर्जल जाति में कई विकृतियों आई जिसके कारण इनमें ये समाज मुख्य पंक्ति से कटा और सामाजिक स्तर पर धर्मांतरण के कारण प्रताड़ित रहा । इन जातियों में बंजारा, बढ़ई, भाँट, फ़कीर, गड्डी, धोबी, दर्जी, मोची, हलालखोर, तेली, भंगी, पमारिया आदि शामिल है । वर्तमान में इन्हीं जाति को दलित मुस्लिम अथवा पसमांदा नाम से संबोधित किया जाता है जो मुख्य समाज तथा मुस्लिम समाज के अनदेखे नज़रिये के कारण बेरोज़गारी, गरीबी, जातिगत असमानता , राजनीतिक समस्या आदि से पीड़ित रह गए हैं । आज़ादी के बाद मोमिन कमीशन ने इनके सामाजिक विकास पर चर्चा कि किन्तु वर्तमान में भी यह जाति अपना विकास नहीं कर पाई है । सामाजिक- आर्थिक स्तर पर आज भी इनके साथ अछूतों सा व्यवहार किया जाता है, जिसके कारण ये गरीबी की ज़िंदगी जी रहे हैं । इस समाज का सामाजिक सौन्दर्य भारतीय परिवेश के आधार पर ही बना दिखाई देता है जहां दलित मुस्लिमों के घर की कतारें आज भी गाँव के पिछले हिस्से से शुरू होती है । गाँव में बिजली तथा सड़कों का प्रावधान वर्तमान में भी प्रश्नों से घिरा हुआ है । घरों की स्थिति इतनी जर्जर है कि छत और आसमान का फर्क खत्म सा हो गया है । मुस्लिम दलितों में मौजूद पिछड़ेपन के कई कारण है जिनमें प्रमुख अशिक्षा रही है ।

दलित मुस्लिम को शिक्षा से वंचित रखा जाता रहा है । ताकि विकास की दरे जातीयता की संरचना में कोई परिवर्तन जैसी बाधा न उपस्थित कर पाए । अधिकतर मुस्लिम दलित अथवा पसमांदा समाज, मुख्य तथा मुस्लिम समाज द्वारा थोपे गए नियमों तक सीमित रह गए हैं । उन्हें अधिकार से अनभिज्ञ रखा गया जिससे वे अपनी गरीबी को ही भाग्य समझकर स्वीकार करते दिखाई देते

हैं । गरीबी एवं अशिक्षा ने इनकी क्षमता को दायरे में लाकर खड़ा कर दिया है । मुसलमानों के बीच होने के बावजूद यह समाज जलसों में पीछे पंक्ति का हिस्सा बने रहे । यह सच्चाई है कि आज तक दलित या पसमांदा मुसलमान मौलवी नहीं बन पाया । बने भी तो इनके मस्जिद अलग हो गए । अशिक्षा के कारण उनका व्यवसाय भी कथित जातियों तक सीमित रह गया । जैसे हेला जाति का काम माल मूत्र साफ करना मात्र था ।

गौरतलब है कि दलित मुस्लिम तथा पसमांदा के साथ होते जातिगत अमानवीय घटनाओं के बावजूद उच्च वर्ग के मुसलमानों पर इसका कोई असर पड़ता नहीं नज़र आता है । वे तो अब भी दलित मुस्लिम को मुसलमान कहने से बचते तथा इन जातियों को नज़रअंदाज़ करते दिखाई देते हैं । इन जातिगत असमानता के भाव को हिन्दी के प्रगतिशील रचनाकारों ने अपने उपन्यास के माध्यम से व्यक्त करने का प्रयत्न किया है । प्रपत्र को आधार देने हेतु उपन्यास के कुछ घटना तथा उद्धरण का उल्लेख किया गया है । इस संदर्भ में आधा गाँव उपन्यास का उद्धरण प्रस्तुत है ।

"मियां शब्द उच्च वर्ग मुसलमानों के लिए किया जाता । यह जुलाहे, कुँजड़ा, धुनिया के लिए नहीं होता । उसी तरह 'बी' सम्बोधन उच्च जाति की महिलाओं के लिए था । जबकि बौ कुजड़न, लतीफ़ मनिहारन, मदारन बौ, जुलहीन बौ आदि पसमांदा जाति की औरतों के लिए था ।"[1]

जातीय असमानता का यही रूप 'कुठाँव' उपन्यास में देखा जा सकता है ।

"हिन्दुस्तानी समाज में जितनी जातियाँ हिंदू समाज में है लगभग उतनी ही जातियाँ मुस्लिम समाज में भी हैं । मुसलमानों में कुड़े हैं, जुलाहे हैं, धुनिया है, चुड़िहार है, मनिहार है, कसाई हैं। और तो और हेला भी हैं - यानि पाखाना साफ़ करने वाले, जिन्हें पहले मेहतर कहा जाता था और बाद में 'हलालखोर' कहा जाने लगा।"[2]

इस सामाजिक असमानता से भागता हुआ मुस्लिम समाज अपनी शान ओ शौकत बरकरार रखना चाहता है । उपन्यास पात्र नईम शिक्षित होने के बावजूद दलित मुस्लिम जैसे शब्द से परहेज करता है । किन्तु मुस्लिम होटल में नौकर द्वारा अपनी जाति धोबी बताने पर होटल मालिक पर बिगड़ जाता है ।

"आप क्या समझेंगे? आपके लिए तो सब धान बाईस पसेरी ! यह बात क्या आप भूल गए है कि ये लोग छतीस जातो के गंदे कपड़े साफ करते हैं । यहाँ तक कि जच्चा के नापाक कपड़े भी । नजिस-से-नजिस। हमारे गाँव में तो इनका दिया पान भी कोई नहीं खाता।"[3]

इन उद्धरण से यह स्पष्ट होता है कि भारतीय समाज के दलित मुसलमानों में अपनी अलग जातिगत पीड़ा बनी रही है जिसे मुख्य पंक्ति तथा उच्च वर्ग अशराफ़ जानते हुए भी इनके प्रति संवेदनहीन वृत्ति को अपनाएं हुए हैं ।

इस तरह दलित मुस्लिम समाज पर होते अनैतिक व्यवहार का कारण भारतीय सामाजिक संरचना भी है जहां एक ओर दलित को संवैधानिक आधार मिलता है तो वहीं मुस्लिम दलित इससे अछूता

रह जाता है। 1936 में अर्जल से संबन्धित जाति को एस.सी श्रेणी में रखा गया किन्तु उनके अधिकार पर प्रतिबंध लगा दिए गए । 1950 के राष्ट्रपति आदेश के साथ इन्हें दी गई मान्यताओं पर भी प्रतिबंध लगा दिया जिससे इनके अधिकार की आवाज़ राजनीतिक षड्यंत्र के चलते दबा दी गई । आज़ादी के बाद करीब 40 वर्ष तक इनके राजनीतिक हक़ पर किसी न किसी तरह से रोक लगाया जाता रहा । पिछड़े मुस्लिम समुदाय को संवैधानिक अधिकार दिलाने के लिए गैर सरकारी संस्थाओं ने पहल की जिसमें अली अनवर की पसमांदा मुस्लिम महज़ तथा एजाज अली द्वारा स्थापित आल इंडिया बैकवर्ड मुस्लिम मोर्चा तथा 2006 के सच्चर समिति से आवाज़ मिली । जिन्होंने पसमांदा एवं दलित मुस्लिम के आरक्षण पर ज़ोर दिया । किन्तु समय के साथ आरक्षण के मुद्दे ने उन्हें दोघली राजनीति का शिकार बना दिया ।

आरक्षण के तले वे राजनीतिक वोट बैंक बनकर रह गए । पत्रकार रवीश कुमार द्वारा 2014 के साहारनपुर जिले की रिपोर्ट यह बयान करती है कि पसमांदा अर्थात पिछड़ा मुस्लिम समुदाय आरक्षण बनाम विकास के जद्दोजहद में जी रहा है । चुनाव के समय तुष्टीकरण की राजनीति दलित मुस्लिमों की भावना से खिलवाड़ करती रही है । सामाजिक समानता, राजनीतिक मजबूती और धार्मिक असमानता का विरोध आदि के बल पर इनका वोट लिया जाता है किन्तु अंत में उन्हें उनके हालत पर छोड़ दिया जाता है । अचानक राजनीति का मुद्दा बनने के पीछे इन राजनीतिक पार्टियों का स्वार्थ ही है । एक न्यूज़ रिपोर्ट के अनुसार भारत में पसमांदा मुस्लिम समाज की संख्या 80 फीसदी है । और इनका वोट बैंक किसी भी पार्टी के लिए जीत का कारण बन सकता है । एक ओर मुस्लिम सियासत तो दूसरी ओर पसमांदा के प्रति संवेदना कहीं न कहीं षड्यंत्र का हिस्सा मात्र है । इसीलिए इनकी मूल समस्या खत्म करने की बजाय राजनीतिक पार्टियां तुष्टीकरण की राजनीति खेलती दिखाई देती है ।

पिछड़े मुस्लिम के अति संवेदनशील स्थिति के पीछे कहीं न कहीं वे स्वयं जिम्मेदार दिखाई देते हैं । पिछड़े समाज से शैक्षिक लोगों का समाज के प्रति उदासीन रवैया भी एक कारण रहा है जिसके वजह से यह समाज आज भी विकास के दरों से कोसों दूर दिखाई रह रहा है । यह कहना गलत नहीं होगा कि समाज के भीतर फैली जातिगत समस्या के खिलाफ इनमें एकता का अभाव नज़र आता है । इस पिछड़ेपन का दूसरा कारण स्वार्थ भी दिखाई देता है, जहां इस समाज के कुछ लोग आरक्षण का लाभ उठाने के लिए जातिगत असमानता को बरकरार रखना चाहते हैं । जिससे पसमांदा तथा दलित मुस्लिम की रेखा न खिंची जा सके।

निष्कर्ष

मुस्लिम समाज के भीतर फैली जाति सम्बंधित धारणाएं इनके विकास के गति को रोकती दिखाई देती है । इसीलिए इन्हें चाहिए कि वे जातिगत विषमताओं से ऊपर उठकर सामाजिक विकास और

शिक्षा पर अधिक बल दें, ताकि वे देश की मुख्यधारा में सक्रिय भागीदारी निभा सकें। जब वे एकजुट होकर अपने अधिकारों की संगठित और सजग माँग करेंगे, तभी वे अपनी आंतरिक जातिगत समस्याओं का समाधान खोज पाएंगे। अन्यथा, वर्तमान सामाजिक असमानताओं और बिखराव के बीच वे मात्र एक कठपुतली बनकर रह जाएंगे, जिसका संचालन बाहरी शक्तियाँ करती रहेंगी ।

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गीतांजलि श्री कृत 'अनुगूँज' कहानी संग्रह में स्त्री

डॉ. मैग्डालीन डिसूजा

सहयोगी प्राध्यापक, हिन्दी विभाग, सेंट झेवियर्स महाविद्यालय म्हापसा-गोवा ।

Correspondence : Madaline.D@xavierscollegegoa.ac.in

सारांश :

गीतांजलि श्री हिंदी साहित्य की जानी-मानी कथाकार है । हिंदी कथा करो में वह अपना एक विशिष्ट स्थान रखती है। गीतांजलि श्री उत्तर आधुनिक काल की प्रसिद्ध कथाकार हैं। उनका कथा साहित्य उत्तर आधुनिक लेखन की विशेषताओं को दर्शाता है, जिसमें स्त्री विमर्श भाषा प्रयोग और पारंपरिक तथा संरचनाओं से हटकर नए प्रयोग भी शामिल है ।

बीज शब्द :

स्त्री | आधुनिकीकरण | जाति | धर्म | अकेलापन।

आलेख

गीतांजलि के लेखन में स्त्री की सामाजिक राजनीतिक और सांस्कृतिक पक्ष को उजागर किया गया है। उनकी कहानी केवल स्त्री जीवन तक ही सीमित नहीं है, बल्कि वे सामाजिक, संरचनाओं, मान्यताओं और बदलते मूल्यों को भी दर्शाते हैं ।उनका पहला कहानी संग्रह 'अनुगूंज' कथा संग्रह में उनकी पहचान स्थापित करने वाला महत्वपूर्ण संग्रह है पूर्ण विराम इस संग्रह में कल 10 कहानी शामिल है; प्राइवेट लाइफ, बेल पत्र, पीला सूरज, सफेद गुड़हल,, तिनके कसक, दरार, दूसरा, हाशिए पर, अनुगूंज आदि ।

इस कहानी संग्रह में जो संवेदना, विद्रोह और प्रतिरोध परिलक्षित होता है, वह स्वयं को उजागर करते समय पत्रों की कमजोर होते स्वाभिमान को अनदेखा नहीं करती है। लेकिन इशारों और नींबू के सहारे चिंतन करने वाला शिल्प और शिक्षित वर्ग की आधुनिक मानसिकता को दर्शाता है। आधुनिक नगरीय जीवन के विविध में पहलुओं स्त्री-पुरुष संबंध, स्त्री की आर्थिक स्वतंत्रता, परंपरा और संस्कृति, हर स्थिति, हर संबंध, हर संघर्ष में व्याप्त रहते हैं। यह कहानी केवल एक निजी संबंध तक सीमित नहीं है; बल्कि समाज में व्याप्त और असमानताओं और पितृ सट्टा की संरचनाओं पर सवाल उठाते हैं ।

'अनुगूंज' कहानी संग्रह में स्त्री के विभिन्न पक्षों को लेकर कहानियों का मूल्यांकन हुआ है। जैसे आर्थिक स्थिति, परिवेश, शिक्षा का प्रभाव, अंतर धर्मीय विवाह, स्त्री पुरुष संबंध, विवाहेतर संबंध स्त्री का आत्म संघर्ष, अकेलापन आदि।

आर्थिक दृष्टि से देखा जाए तो स्त्री आधुनिक काल में संपन्न नजर आती है। यही स्त्री पहले चार दीवारों की दुनिया को अपनी दुनिया समझती थी। उसे अपनी मांगे पूरी करने के लिए कोई हक नहीं था। वह पढ़ी-लिखी न होने के कारण जीवन के बारे में कुछ नहीं जानती थी। वह केवल एक भोग्या तक ही सीमित थी। लेकिन आधुनिक काल में जो परिवर्तन आया वह स्त्री के लिए बहुत ही उपयोगी रहा। आज के योग में स्त्री शिक्षित होने के कारण बड़े हों पर आना स्थान ले रही है। लेखिका ने 'अनुगूंज' कहानी संग्रह में यह दिखाया है कि स्त्रियां आर्थिक रूप से पुरुषों पर निर्भर है, जिससे उसके फैसलों की स्वतंत्रता सीमित हो जाती है। कुछ कहानी उन स्त्रियों के संघर्ष को उकेरती हैं, जो नौकरी या व्यवसाय के जरिए आत्मनिर्भर होना चाहती है; जिससे वह आगे बढ़ाने के बा जय जहां थी वहीं रह जाती है। 'अनुगूंज ' कहानी इसी का जीता जागता उदाहरण है। जहां मुनिया का पति के उठना है **" मैथिली बैठने को नहीं कह रहा। तुम जानती हो, मैं वैसा नहीं हूं। पर क्या घर के बाहर काम किया जा सकता है? इंसबीती का इस्तेमाल क्यों नहीं करती?, इतना आराम इतना वक्त मिल रहा है। यह क्या संपन्न औरतों का मर्ज पाल रही हो की बोरियत होती है? तुम पढ़ो, मैं किताबें ला दूंगा, लिखो, जो चाहे बताता रहूंगा।"[1]**

किस प्रकार से स्त्रियों पर दबाव डालकर रखा जाता है। पुरुषों को किस प्रकार का डर रहता है? इसे तो सभी जानते हैं।

हर किसी के जीवन में परिवेश विशेष भूमिका निभाता है। लेखक भी परिवेशजन्य होता है। वह अपने आप को परिवेश से अलग नहीं कर पाता है। हर व्यक्ति परिवेश में ही जन्मता है, वही बड़ा होता है। इसी कारण उसे परिवेश का प्रभाव हावी होता है। गीतांजलि श्री की कहानी पढ़ते समय यह ज्ञात होता है कि उनके विचारों की जड़े ग्रामीण -कस्बाई परिवेश में ही है। कहीं पत्र कहानी तो कहीं संकेत रूप में कस्बा विद्यमान है। साथ यह भी साबित हो जाता है कि समाज में धीरे-

धीरे जो परिवर्तन शिक्षा आदि तमाम विकसित स्थितियों के माध्यम से हुआ है उनका यथार्थ आईना उनकी कहानियों में पेश हुआ है । कस्बाई परिवेश में लेखिका ने प्रगतिशील परिवर्तन की भी दिशाएं दिखाई है। 'प्राइवेट लाइफ' के चाचा पुराने ख्यालों के हैं। इसी कारण वे अपने किराएदार से कह उठते हैं **"यह जरूरी होता है। हमारे समाज में लड़की हमेशा किसी की निगरानी में रहती है। पहले बाप, फिर पिता, फिर भाई, फिर बेटा उसकी देखभाल करता है।"[2]** लेकिन वह लड़की कुछ नहीं सुनती उसको जो करना होता है वह वही करती है। वह कहती है कि वह उसकी प्राइवेट लाइफ है।

वर्तमान युग में शिक्षा का प्रचार प्रसार बहुत जोरों से हुआ है। इसी शिक्षा के कारण वह अपने सोच विचार को विकसित कर पाई है। इसी शिक्षा के कारण हर एक स्त्री आत्मनिर्भर बनी है। वह अपने पैरों पर खड़ी है। मानसिक रूप से भी उसका विकास हुआ है। हर क्षेत्र में चाहे वह पायलट हो, या फिर पुलिस बनी हो, यह एक करारा जवाब है। उन समाज के लोगों को जो प्राचीन समय से नारी को भोग्य के रूप में देख रहे हैं। आज हम कह सकते हैं कि कुछ नारियां स्वतंत्र हुई है। अपने बंदों से मुक्त वह मुंह तोड़ जवाब दे सकती है। अब वह उन चार दिवारों में गुटकर सांस नहीं ले रही है।

गीतांजलि श्री कि 'तिनके' कहानी की चंदा इसका श्रेष्ठ उदाहरण है। वह एक शिक्षित महिला है अध्यापिका है, वह अपने जीवन में बहुत असंतुष्ट है। घर के लोग उसे ताना मारते हैं रहते हैं दीदी रहती है **" तुम्हारी टीचिंग तो मटर गश्ती है। कभी 2 घंटे में हो गई, कभी तीन में, और वापस घर आकर पसर जाओ।"[3]**

 जाति व्यवस्था हमारे देश में युगो से चलती चली आ रही परंपरा है। भारत में ही क्यों पूरे विश्व में जाति, भारत में ही क्यों पूरे विश्व में जाती, धर्म, रंग, रेस आदि की समस्या चलती चली आ रही है हम अपने को आधुनिक मानते हैं, लेकिन हम आधुनिक बात कहां हो पाए हैं। मनोवैज्ञानिक रूप से भी कभी-कभी बात खटकने लगती है। आज अंतर्जाति विवाह, अंतर धार्मिक विवाह, आदि हो रहे हैं। लेकिन हमारे मां-बाप इस बात को अभी तक नहीं समझ पाए हैं। जमाना बदल गया है फिर भी हम बहुत संकुचित रूप से सोचते हैं। इन समस्याओं में भी ज्यादातर महिलाएं ही दोषित ठरहती है। क्योंकि हमारा समाज पितृसत्तात्मक है। जब तक यहां नीति नहीं जाएगी तब तक महिला उद्धार नहीं हो सकता है। 'अनुगूँज' कहानी संग्रह में हमें इस समस्या का चित्रण मिलता है। जहां एक गहरी सामाजिक और सांस्कृतिक टिप्पणी प्राप्त होती है।

'बेलपत्र' नामक कहानी में दोनों पति-पत्नी अलग-अलग धर्म के हैं। ओम हिंदू धर्म का है और फातिमा मुस्लिम धर्म की है। दोनों भाग कर शादी करते हैं। दोनों अलग-अलग धर्म के होने के कारण समाज उन्हें स्वीकृति नहीं देता। कुछ दिनों में ओम भी बदल जाता है। वह फातिमा को

अपने धर्म का पालन नहीं करने देता। वह जब नमाज पढ़ती है तो ओम उसे डांटता है **" यह क्या कर रही हो? अब यही कसर बाकी है ?"[4]**

इस प्रकार की समस्याएं हमारी महिलाएं सहती रहती है। इतनी पढ़ लिख गई है, लेकिन वह अपनी आवाज नहीं उठा पाती है। परिवेश और संस्कार बहुत ही अहम भूमिका निभाता है । पति पत्नी संबंधों के कई ऐसे मुद्दे हैं जो तलाक की सिद्धि तक चढ़ जाते हैं**" रुचि वैमनस्य एवं व्यक्तित्व विकास की पूर्ति का असंतोष वैचारिक समानता के अभाव में गृहस्ती रूपी गाड़ी सुचारू रूप से चल नहीं पाती है। कभी-कभी रुचि वैषम्य की नौबत तलाक तक आ जाती है। "[5]**

'अनुगूँज' कहानी संग्रह की स्त्रियां तलाक तक नहीं पहुंचती है। वे सब कुछ सहने को तैयार है विरोध नहीं करना चाहती है। गीतांजलि श्री का यह कहानी संग्रह जिस समय छाप कर आया उसे समय स्त्रियों का विकास हो रहा था। और शायद वे कस्बाई और नगरी स्त्रियों तक सीमित रह गई थी। कुछ कहानियां महानगरीय परिवेश पर आधारित है लेकिन ज्यादातर स्त्रियां कस्बों और नगरों की है। इसी कारण उनकी महिलाएं बहुत सहमी सी नजर आती है। उनकी स्त्रियां सभी शिक्षित है।

लेखिका के इस कहानी संग्रह में स्त्रियां अपने भीतर के द्वंद, असमंजस और आत्म मूल्य को लेकर संघर्ष करती है, लेकिन समाज का दबाव उन्हें हमेशा रोकना हुआ नजर आता है। इसी संघर्ष में वह अपनी पहचान, स्वतंत्रता और सम्मान की तलाश करती है। जबकि उन्हें अपनी पारंपरिक भूमिका निभाने की उम्मीदें भी होती है। इस बीच में अपनी आंतरिक आवाज और बाहरी जिम्मेदारियां के बीच संतुलन बनाने की कोशिश करती है। 'प्राइवेट लाइफ' और 'सफेद गुड़हल' आदि कहानियां में इस प्रकार की परिस्थितियां प्राप्त होती है।

औद्योगिकरण के आगमन से समाज में बहुत अंतर आ गया है। आज दोनों स्त्री पुरुष कमाने लगे हैं। अपनी अहमियत को जानते हैं। आपसी प्रतिस्पर्धा, निरर्थक जीवन बोध से व्यक्ति आज अपने को अकेला महसूस करने लगा है। समाज में देखा जाए तो किसी के पास दूसरों के लिए समय नहीं रह गया है। निर्मल वर्मा के अनुसार **" पश्चिमी संस्कृति का प्रादुर्भाव एक ऐसी खंडित चेतना में हुआ है, जहां मनुष्य अपने को प्रकृति, विश्व और दूसरे मनुष्य में बिल्कुल अलग पता है और उसे अनुभव होता है कि इस अलगाव और विभाजन ऑन को सहज धार्मिक आस्था और परंपरा द्वारा नहीं पटा जा सकता है। "[6]** जीवन और समाज में बढ़ती विसंगतियों के कारण आज अकेलेपन की समस्याएं बढ़ती जा रही है। यह केवल भारत की स्थिति नहीं है बल्कि पूरे विश्व में इसकी समस्या बढ़ती जा रही है।

'पीला सूरज' नामक कहानी की नायिका भावनात्मक रूप से समाज से कटा हुआ महसूस करती है। वह अपनों से ही जूझती है। इस कहानी में समाज की बढ़ती आत्म केंद्रीयता और रिश्तो में संवाद की कमी भी इस अकेलेपन को और गहरा कर देती है। नायिका की भावनाओं, उनके अंतर्द्वंद समझने वाला कोई नहीं मिलता जिसके कारण वह खुद को और अधिक अकेला महसूस करती है।

निष्कर्ष

अंततः हम कह सकते हैं कि गीतांजलि श्री की कहानियों में यथार्थ जीवन का प्रभावशाली चित्रण मिलता है। वे समाज में स्त्रियों की स्थिति, उनकी इच्छाओं, संघर्षों और उनके अस्तित्व की पहचान को बड़े ही संवेदनशीलता के साथ उकेरती है। लेखिका की भाषा संवेदनशील तीखी और बिंबात्मक है। जो सामाजिक अन्याय के विरुद्ध एक प्रभावी हथियार का काम करती है। मैं किसी समस्या का सीधा समाधान नहीं देती, बल्कि पाठकों को सोने के लिए छोड़ती है। उनके लेखन में स्त्री जीवन, समाज की सच्चाइयां और मानवीय संबंधों की विविधता देखने को मिलती है। जिसमें व्यंग्य, तर्क और बौद्धिकता की विशिष्ट धार मौजूद रहती है ।

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5) डॉ. रणभिकर संदीप, आधुनिकता बोध और उषा प्रियंवदा , पृष्ठ सं- 95
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'जागोर' लोकनाट्यातल्यान तत्कालीन समाजीक आनी राजकीय परिस्थितीचें पडबिंब

प्रा. सिल्वेस्टर वाज

कोंकणी विभाग, सेंट झेवियर्स महाविद्यालय, म्हापशें-गोंय

Correspondence : silvester.v@xavierscollegegoa.ac.in

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सारांश :

लोकनाट्यां हीं गोंयच्या लोकसंस्कृतायेचो म्हत्वाचो भाग. जागोर, कालो, खेळ, भरणूल, रणमालें ह्या सारक्या लोकजमातीतल्या लोकनाट्यांचो तातूंत आसपाव जाता. गोंयच्या गावडा आनी पेरणी जमाती मदीं वर्सुकी विधी कशें जागोर हें लोकनाट्य सादर करपाची परंपरा आसा. जागोर नाट्यातले विधी वांगडा तातूंतले नाट्यात्मकतेक लागून काळांतरान तें विधीनाट्य उरनासतना ताका लोकनाट्याचें रूप फावो जालां आनी कळत - नकळत तातूंतल्यान समाज पडबिंबीत जाला. प्रस्तूत अभ्यासातल्यान जागोर ह्या लोकनाट्याचो सादरीकरणाचे नदरेन विचार करून काळा प्रमाण समाजप्रबोधनाच्या उद्देशान तातूंत तत्कालीन समाजीक आनी राजकीय परिस्थिती पडबिंबीत कशी जाल्या हाचो अभ्यास करपाचो यत्न केला. प्रस्तूत अभ्यासा खातीर प्राथमीक तशेंच दुय्यम स्त्रोतांचो आदार घेतिल्लो आसा.

सारभूत उतरां :

नाट्य | विधीनाट्य | लोकनाट्य | लोकजमाती | समाजीक | राजकीय परिस्थिती | *पडबिंब*

विशयाची वळख :

नाट्य ही एक कला. ह्या नाट्य कलेचो लोकजिणे कडेन खूब लागींचो संबंद आसा. ताचें मूळ आदीम मनशाच्या जिणे कडेन लेगीत जोडूंक येता. आदीम काळावेलो मनीस यातुशक्तीक मानतालो. हे यातुशक्तीची उपासना विधी करून जाताली. यातुशक्तीच्या उपासनेत यातुविधीचो भाग म्हण

नाट्य सादरीकरणूय जातालें. ताका 'यातुनाट्य' म्हणटात. काळांतरान विधीक नाट्याचें रुप फावो जाल्ल्यान विधी, भक्ती आनी नाट्य ह्यो तिनूय गजाली तातूंत आसपाविल्ल्यान त्या नाट्याक 'विधीनाट्य' म्हणपाक लागले. विधीनाट्यातली विधी फाटीं पडून तें विधीमुक्त जाल्ल्यान विधीनाट्याक लोकनाट्याचें रूप आयलें. यातुनाट्य, नाट्यात्मविधी, विधीनाट्य आनी लोकनाट्य असो हो नाट्य विकासाच्या आवस्थेचो प्रवास म्हणपाक येता.

नाट्यकलेच्या उगमा संदर्भात लोकअभ्यासक तारा भवाळकर हिणें "संवसारातल्या सगल्या देशांतल्या नाट्यकलेचो उगम धर्मीकतेतल्यान जाला" अशें मत मांडलां. तिच्या ह्या मताचो आदार घेवन भारतीय नाट्यकलेच्या उगमाचो विचार केल्ल्यार भारतीय संस्कृतायेंत लेगीत विधीक धरून नाट्य आयलां. लोकजिणेंत एकाद्या विधीचें आचरण म्हण लोकशैलीतल्यान नाट्य सादरीकरण जाता. भारतातल्या भवाई, थेय्यम्, तेरूकूतु, गोंधळ, दशावतार, आदी सारक्या विधीनाट्यां वांगडा गोंयांत जागोर, कालो, रणमालें, भरणूल सारक्या विधीनाट्यांच्याचें सादरीकरण गोंयच्या लोकजमातीकडल्यान जाता.

प्रस्तूत अभ्यासात कोंकणी लोकरंगमाचयेर देवी उपासनेची विधी म्हण सादर जावपी 'जागोर' ह्या लोकनाट्यात तत्कालीन समाजीक आनी राजकीय परिस्थितीचें पडबिंब पडलां कांय ना हाचो अभ्यास जातलो.

जागोर : लोकनाट्य

जागरा कडेन संबंदीत विधींचें आनी जागराचें सादरीकरण रातचें सुरवात जावन फांतोडेर ताची सांगता जाल्ल्यान त्या निमतान रातभर जागरण जाता. तो पळोवपा खातीर रातभर जागरण केल्ल्यान ताका 'जागोर' म्हणनात पूण "थळाव्या देवतांनी वर्सभर गावचे राखणे खातीर जागृत रावचें म्हण तांकां जागोवणेची केल्ली ही विधी आशिल्ल्यान तिका 'जागोर' म्हणटात" (खेडेकार 197). थळाव्या देवतांक जागोवपाच्या उद्देशान जागोर ह्या लोकनाट्याचो जल्म जाल्लो आसूं येता (सुखठणकर 44) अशें ज. स. सुखठणकरूय 'गोमंतकाचे नाट्यस्वरूप: रुपडीं' पुस्तकात आपलें मत उक्तायतात. गोंयांत शिवोले गांवांत जावपी 'शिवोलच्या जागरात' तर 'जागरयो' ह्या थळाव्या राखणदाराचें एक सवंग करपी सोंग जागरात नाचता तर्शेंच हो जागोर गांवचो राखणदार मानिल्ल्या 'जागरयान' गांवांक वर्सभरा खातीर राखण दिवची म्हण सादर करतात अशी लोकधारणा आसा. वर्सावळीचया जागोर सादरीकरणा फाटल्या उद्देशाची ही एक देख म्हण पळोवंक येता.

परंपरेन थारायिल्ल्या दिसा गांवकार मांडार एकठांय जावन दिवली पेटोवन, नाल्ल दवरून आनी देवाक गाराणें घालून मर्दीं दवरिल्ले दिवलेक नमस्कार करून जागराक सुरवात करतात. जागराची सुरवात नमनान जाता. वनदेवतेक, भुंयदेवतेक, मांडा गुरूक, जाग्यादेव, वाठारो आनी सरभोंवतणच्या सगल्या देवतांक सभेर आपोवपा खातीर होरायतात. होरावणी जाल्ल्या उपरांत सगलीं देवतां मांडार अवतरल्यांत अशें मानून तांकां नमस्कार करून जागराक सुरवात करतात.

जागरातल्या दैवी पात्रांक सोंगा आनी हेर मानवी पात्रांक धोंगा म्हणटात. सरस्वती, माळणी ही दैवी रुपांतलीं सोंगा वांगडा निखणदार, पारपती, इत्रूमेंत, फुलकार, आंकवार चेडूं, देमान्दीस्त, गावडो - गावडी, म्हार - म्हारीण, कुंपार, फिरंगी राजा, दोको मोडो, आंकवार चेडूं, कलवंत, शेट, आदीं साबार धोंगा जागरात नाचोवपाची रीत ह्या लोकजमातींत आसा. हातूंत वेगवेगळ्या वेवसायांचें प्रतिनिधित्व करपी, प्रासंगीक काळांतली, समाजाल्यो वेगवेगळ्यो वृत्ती - प्रवृत्तींचें दर्शन घडोवपी हीं धोंगा आसतात. ह्या सोंगा आनी धोंगाचें बाबतींत म्हत्वाची गजल म्हणल्यार जागरात वांटो घेवपी हीं पात्रां परंपरे प्रमाण जागरात आपल्यो भुमिका करतात. जाल्यार काळा प्रमाण कांय नव्या धोंगाचोय आसपाव जागरात करतात. समाजातलीं हिंदू, क्रिस्तांव, मुस्लीम ह्या तिन्ूय धर्मातलीं धोंगा जागरात आसतात. हातूंतल्यान आशिल्लो धर्मीक एकचार दिसता आनी जागोर समाजातल्या सगल्यांक आपलो दिसूंक लागता.

'जागोर' सादर करपी लोकजमाती :

गावडा, कुणबी आनी वेळीप हांकां गोंयचे मूळ वसणुकदार मानतात. हातूंतली कुणबी ही लोकजमात सगळ्यांत आदीम म्हण वळखतात. गोंयचे लोकअभ्यासक डॉ. विनायक खेडेकार 'गावडा' ही लोकजमात लेगीत ह्याच कुणबी जमातीची पोटजात मानतात. मूळ कुणबी पूण गांव वसोवपी म्हण हेरांनी तांकां 'गावडे' हें नांव दवरलें अशें तें म्हणटात (खेडेकार 23). वंश, प्रकृती आनी संस्कृती ह्या बाबतींत मूळ एकूच पूण स्वताक वेगळें मानपी चार वेगवेगळ्यो लोकजमाती म्हण गोंयांत जांकां वळखतात त्यो म्हणल्यार कुणबी, गावडे / कोंकणे गावडे, कुणबी गावडे/ क्रिस्तांव गावडे आनी नवहिंदू गावडे (खेडेकार 254). ह्यो चारूय जमाती आयज्ूय आपली हे तरेन वेगळी वळख दिल्ल्यान डॉ. खेडेकारान सांगिल्ली ही गजाल पटपा सारकी आसा.

पुर्तुगेज राजवटकेच्या समुहीक धर्मांतरणाक लागून कुणबी वा गावड्या जमातीतल्या लोकांचें क्रिस्तीकरण जाल्ल्यान तांकां 'कुणबी गावडे' म्हण वळखुपाक लागले जाल्यार धर्मांतरणा उपरांतच्या कांय काळा उपरांत क्रिस्तांव धर्मातल्यान परत हिंदू धर्मात आपलें धर्मांतरण करून घेतलें ते 'नवहिंदू गावडे'. हातूंतले कुणबी गावडे / क्रिस्तांव गावडे (स्वताक ते 'गावडे' म्हण मानतात), नवहिंदू गावडे आनी देवदासी समाजातली 'पेरणी' ही जमात एक नृत्य - नाट्य प्रकार आपल्या गांवांत वर्सांतल्यान एक फावट उपासनेचो विधी म्हण सादर करता. ह्या लोकजमातींनी लोकशैलींत सादर जावपी नृत्यनाट्य प्रकाराक 'जागोर' म्हणटात.

'जागोर' हें विधीनाटय कशें वयर उल्लेख केल्ल्या लोकजमातींनी सादर जाता तरीय दर एके जमाती आनी वाठारा प्रमाण ताच्या सादरीकरणाची तरा बदलता. अभ्यासाचे नदरेन तांच्या वेगळेपणाचो अभ्यास करपाक सोयिचें जावचें ह्या नदरेन लोकअभ्यासक तांकां वेगवेगळ्या नांवांनी वळखतात. जशें पेरणी जमतीचो तो 'पेरणी जागोर', गावडा (नवहिंदू गावड्यांचो) जमातीचो तो 'गावडा जागोर', कुणबी गावडे वा क्रिस्तांव गावडे सादर करतात तो 'क्रिस्तांव गावड्यांचो जागोर' आनी शिवोले

गांवचे हिंदू आनी क्रिस्तांव हे दोन्य समाज एकठांय येवन करतात तो 'शिवोलचो जागोर'. म्हत्वाचें म्हणल्यार ह्या जमाती प्रमाण सादर जावपी जागराच्या सादरीकरणातल्या थोड्या भोव वेगळेपणा वांगडा सादरीकरणाचें थळ, उद्देश, आनी काळूय वेगवेगळो आसता.

लोकजिणेंत थळाव्या लोकदैवतांच्या वर्सुकी जागवणेचो विधी म्हण गोंयच्या गावडा समाजाच्या 'नवहिंदू' मदीं परंपरेन सादर जावपी जागरात तत्कालीन समाजीक आनी राजकीय परिस्थिती कशी पडबिंबीत जाता हाचो अभ्यास करपाचो ह्या अभ्यसा फाटलो उद्देश आसा. फोंडें म्हालातल्या वेलींग, घोटण, कुर्टी. तिसवाडी म्हलातल्या शिरदोना, चिंबेल सारक्या वाठारांनी गावड्या लोकजमातीची वस्ती आशिल्ल्यान थळाव्या दैवतांचे जागोवणेची वर्सावळीची विधी कशी ही लोकजमात जागराचें सादरीकरण करता.

जागरात समाजीक आनी राजकीय परिस्थितीचें पडबिंब :

विधी म्हण लोक निर्मितीतल्यान आकाराक आयिल्ल्या जागोर ह्या लोकनाट्याचो उगम केन्ना जालो हें सांगप अशक्य. वर्सुकी विधी म्हण जागराचें सादरीकरण जातालें आनी आयज लेगीत तें जायत आसलें तरी ह्या लोकनाट्याच्या सादरीकरणाचेर नदर मारल्यार विधी वांगडा समाजप्रबोधन, मनोरंजनाचें कार्य तातुंतल्यान जाल्लें दिसता. ह्या खातीर जागराच्या आरंभाक दैवतांची होरावणी, दैवी सोंगाचें आगमन आनी शेवटाक सभेर आयिल्ल्या दैवतांक धिनवासून मांड थंडावपाचो भाग वेगळायलो जाल्यार दैवी सोंगाच्या आगमना उपरांत येवपी चडशीं धोंगा हीं मानवी आनी काल्पनेतलीं आसतात. हांगाच समाजीक जिणेतलीं, राजकी मळावेलीं धोंगा आपल्या परंपरीक भेसा सयत माचयेर येतात. तांकां माचयेर हाडपा फाटल्यान समाज जिणेंत आशिल्ल्यो वृत्ती - प्रवृत्ती उक्तेपणान जाल्यार केन्ना विडंबनात्मक पद्दतीन चिमटे काडीत सगल्यां मुखार उक्त्यो करपाचो यत्न अभिनय आनी काव्यात्मक संवादातल्यान जागरात जाता. हातूंत दादल्यांची अस्तुरे कडेन पळोवपाची नदर (वासनेची तशेंच दुबावी), अस्तुरेची असुरक्षीतताय, अस्तुरेचो जाल्लो घुस्मट तेन भायर मनशा भितरली देमान्दीस्त, आपस्वार्थी, नागोवणी, फटींगपणाची वृत्ती -प्रवृत्ती, मानसिकता दाखोवपाच्या उद्देशान समाजतल्याच कांय प्रतिनिधीक स्वरुपातल्या व्यक्तीरेखा जागरातल्यान मुखार हाडटात. ह्या सगल्या सांगाता घाडी, कलवंत, शेट, आदी सारकीं धोंगा जागराचे माचयेर हाडून लोकजिणेतलें ताचें अस्तित्व दाखोवपातल्यान तत्कालीन समाजीक जीण प्रत्यक्ष आनी अप्रत्यक्षपणान पडबिंबीत जाता.

समाजीक जिणे वांगडा जागरात राजकीय परिस्थितीचें पडबिंब दिश्टी पडटा. जागरातलीं दैवी पात्रां वांगडा निखणदार, पार्पती, इत्रूमेंत ह्या पात्रांचो मुखेलपणान आसपाव आसताच जाल्यार हेर धोंगांनी काळा प्रमाण बदल घडटा. जागरात इत्रूमेंत हें धोंग पायांक दांडलां बांदून नाचता. "गांवान गावचो पारपती, वसूल करता चूलपटीन" अशें तें गायता. एका काळार दर एका कुटुंबा फाटल्यान (म्हणल्यार दर एके चूली प्रमाण) कर एकठांय करपी पारपत्याची खबर हांगां सांगिल्ली आसा. फिरंग्याचो भेस

केल्लें फिरंगी राजाचेंय धोंग जागरात नाचता. फिरंगी राजा देशी राजाक ओर्द दिता आनी ताच्या ओर्दीक मान दिवन देशी राजा ताच्या ओर्दी प्रमाण वागता आनी वांगडाच फिरंगी राज्याच्य हांयसाक्मूय भुलता तें दाखोवन तत्कालीन फिरंगी राजवटकेच्या काळाची परिस्थितीचें चित्र मुखार हाडटा.

निश्कर्श :

लोकतत्त्वबीय अभ्यासाचे नदरेन संस्कृतीचो अभ्यास केल्यार एक गजाल स्पश्ट जाता ती म्हणल्यार जें गरजेचें आसा तें सांबाळून उरता आनी जें गरजेचें ना तें काळाचे व्हांवतेंत शेणून वता. 'जागोर' हो लेगीत लोकसंस्कृतीचो एक भाग आनी लोकतत्वाची एक देख. शेंकड्यांनी वर्सांची परंपरा आशिल्लो जागोर आयज लेगीत तितल्याच श्रध्देचे भावनेतल्यान लोकजमातींत सादर जाता. ताच्या फाटलें कारण म्हणल्यार त्या लोकजमातीक तो आपलो दिसता आनी ताच्या सादरीकरणा फाटल्यान आशिल्ले श्रध्देन आपली मुळां ह्या मातयेंत रोमून दवरल्यांत.

आयच्यावरीं भौशीक अभिव्यक्तीचीं माध्यमां आदीं नाशिल्ल्यान शासनाविशींची नाखोशी, समाजाल्या वेगवेगळ्या वृत्ती - प्रवृत्ती भौशीकपणान टिका करपाचें जागोर हें तो सादर करपी लोकजमाती खातीर प्रभावी, उपेगी माध्यम लेगीत दिसलां जावंक जाय. जागोर सादरीकरणा फाटल्यान आशिल्ली श्रध्देची भावना आनी अभिव्यक्त करपाचे आशिल्ले तांकितल्यान आनी समाजीक जाणविकायेतल्यान जागरात समाजीक आनी राजकीय संदर्भ येवन तो तत्कालीन काळ पडबिंबीत करता अशें म्हणपाक येता.

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'राजन गवस यांच्या कादंबरीतील समाजचित्रण'

डॉ. प्राची जोशी

सहायक प्राध्यापक मराठी सेंट झेवियर्स महाविद्यालय म्हापसा

Correspondence: Prachi.j@xavierscollegegoa.ac.in

सारांश :

राजन गवस हे मराठीतील साहित्य अकादमी पुरस्कार प्राप्त लेखक. मराठी साहित्याच्या इतिहासातील १९८० नंतरच्या कालखंडात आपल्या साहित्य निर्मितीने मौलिक भर घालणाऱ्या या लेखकाने त्यांच्या वैशिट्यपूर्ण साहित्यकृतींमुळे मराठी साहित्याच्या क्षेत्रात स्वतःची स्वतंत्र नाममुद्रा उमटवली आहे. प्रस्तुत शोधनिबंधात त्यांच्या कादंबऱ्यांमधील विविधांगी समाजचित्रणाचा अभ्यास केला आहे.

विषयकेंद्री शब्द :

कादंबरी | राजन गवस | साहित्य | समाज | परस्परसंबंध | समाजचित्रण.

राजन गवसांच्या व्यक्तीमत्वाची जडण घडण :

राजन गवस यांचा जन्म १ जुन १९५९ मध्ये कोल्हापूर जिल्ह्यातील गडहिंग्लज तालुक्यातील 'अत्याळ' या मामाच्या गावी झाला. त्यांचे मूळ गाव 'करंबळी' आहे. शेतकरी कुटुंबातील त्यांचा जन्म असल्याने साहजिकच त्यांची आर्थिक परिस्थिती जमिनीच्या उत्पादनावर अवलंबून होती. त्यांचे घराणे कडक शिस्तीचे असे ते सांगतात. कुटुंब प्रमुख आजोबाच्या आदेशानुसार घर चालले पाहिजे. आजोबांच्या विरोधात जाण्याचा एखाद्याने प्रयत्न केला तर प्रसंगी त्या व्यक्तीला घराबाहेर काढायला ते कचरत नसत एवढा वचक त्यांच्या घरात होता, त्यामुळे गवसांच्या घरात खेळी-मेळीचे वातावरण कधीच नव्हते, त्यात त्यांचे वडील व्यसनी असल्यामुळे आजोबांचे व त्यांचे पटत नसे, ते एकमेकांच्या समोरही येत नसत, त्यांच्या वडिलांना व्यसन मुक्त करण्याचा आजोबांनी अनेकप्रकारे प्रयत्न केला पण व्यर्थ!

राजन गवस यांच्या घरात शिक्षणाला फारसे महत्त्व नव्हते त्यामुळे त्यांच्या शिक्षणाला फारसे कोणी महत्त्व दिले नाही ; परंतु शेतकरी कुटुंबामध्ये जन्मलेल्या गवसांना मात्र शिक्षणाची प्रचंड आवड

होती, पण ते मिळवण्यासाठी मात्र दुर्दैवाने त्यांना संघर्ष करावा लागला. त्याकाळी शासनाने गावोगावी मोफत शिक्षण सुरु केले होते त्याचा फायदा त्यांना झाला. मित्रांपेक्षा निसर्गाच्या सान्निध्यात त्यांचे बालपण गेले. एक दिवस त्यांचे मामा अचानकपणे त्यांच्या हरी आले व त्यांना घेऊन गेले व तेव्हापासून राजन गवस यांच्या जीवनाला एक वेगळी कलाटणी लाभली. त्यांचे पुढील शिक्षण मामांच्या गावी झाली. हायस्कूलपर्यंतचे शिक्षण घेतल्यानंतर उच्च शिक्षणासाठी त्यांना 'गडहिंग्लज' जावे लागले. तिथे 'शिवराज महाविद्यालयामध्ये विठ्ठल बन्ने यांच्या मार्गदर्शनाखाली त्यांनी पदवीपर्यंतचे शिक्षण पूर्ण केले. पुढे त्यांनी मराठी व राज्यशास्त्र अशा दोन्ही विषयांत पदव्युत्तर शिक्षणही घेतले, गो.म.पवार यांच्या मार्गदर्शनाखाली अभ्यास करून भाऊ पाध्ये यांच्या साहित्यावर प्रबंध सादर करून पी.एच.डी ची पदवी मिळवली.

एक उत्तम कार्यकर्ता, वक्ता, पत्रकार, प्राध्यपक आणि मार्गदर्शक यासारख्या भूमिका त्यांनी समर्थपणे पेलल्या व विशेष म्हणजे या सर्वात त्यांच्यामधील सर्जनशीलतेला त्यांनी कुठेही बद्ध येऊ दिली नाही. 'अभिधानंतर' या त्रैमासिकाच्या विशेषांकातील मुलाखतीत राजन गवस म्हणतात "मी काही धंदेवाईक वक्ता नाही, मार्गदर्शक म्हणून काही विद्यार्थी जवळ केले आहेत, समीक्षा लिहिली असली तरी मला आवडणारा तो प्रकार नाही , त्या त्या काळात त्या त्या गोष्टी प्रामाणिकपणे करत गेलो आणि त्यामुळे जगण्याला बळ मिळाले. एवढे खरे की आपण जे कै करीत असतो त्याची जाणीव मनाला पक्की माहित असली की कसलीच गफलत होत नाही. राजन गवस नोकरी करत असतानाही आपली समाजदृष्टी व साहित्यदृष्टी त्यामधून प्रकट करतात, सामाजिक दृष्टिकोनातून समाजातील वास्तवता चित्रित करणे हीच त्यांच्या साहित्य लेखनामागील प्रेरणा असल्याचे दिसते.

साहित्य आणि समाज यांचा परस्परसंबंध :

साहित्य म्हणजे काय? साहित्य हे मानव्यसापेक्ष आहे. माणूस हा साहित्याचा केंद्रबिंदू आहे. माणसाची कृती-उक्ती, त्याचा स्वभाव, त्याचे अनुभव, त्याच्या संवेदना, जाणिवा इ.ची अभिव्यक्ती साहित्याद्वारे होते. मानवी व्यक्तिमत्व, मानवी स्वभाव, मानवी वर्तन मानवी अनुभव हे साहित्याचे विषय आहेत. साहित्याची निर्णायक व्याख्या करता येत नाही. "रेमण्ड विल्यम" यांच्यामते "it is common to see literature defined as full, central, immediate human experience usually with an associated references to minute particulars".[१] साहित्य म्हणजे काय याचे नेमके आणि निर्णायक उत्तर देणे कठीण आहे. साहित्यनिर्मिती हा मानवाच्या जीवनाचा एक सांस्कृतिक उपक्रम आहे. सर्वसामान्यपणे असे म्हणता येते की साहित्य म्हणजे असा लेखनविष्कार ज्यामध्ये अर्थाविष्कार व भाषाविष्कार याबरोबरीनेच त्याला सौंदर्यविष्काराचाही स्पर्श झालेला असतो. साहित्य आणि समाजशास्त्र यांच्यातील संबंध स्पष्ट करण्याची एक शास्त्रीय पद्धत हिप्पोलेत तेन या फ्रेंच तत्त्वज्ञानकाने सर्वप्रथम अस्तित्वात आणल्याचे दिसते. याचा अर्थ साहित्य आणि समाज यांचा संबंध असतो असे मानणारा 'तेन' हा काही पहिलाच तत्त्वज्ञ नाही तर त्यापूर्वी भारतीय नाट्यशास्त्रात येणारा लोकधर्मीचा उल्लेख किंवा पाश्चात्य साहित्य शास्त्रातील प्लेटोच्या

विचारातही साहित्य आणि समाज यांचा सबंध गृहीत धरला गेला आहे, परंतु तेनपूर्वीच्या काळात या संबंधी कोणी विशिष्ट पद्धतीने शास्त्रीय विश्लेषण कोणी केले नव्हते. तेनने "हिस्टरी ऑफ इंग्लिश लिटरेचर" या ग्रंथाच्या प्रस्तावनेत साहित्य आणि समाज यांच्या संबंधाबाबत एक सिद्धांत मांडला तो म्हणजे "साहित्य" हे वंश, युगप्रवृती आणि परिस्थिती या तीन घटकाच्या परिणामातून निर्माण होत असते.[२]

तेनप्रणीत पध्दती प्राधान्याने आत्मिक व्यवस्थेला महत्व देऊन साहित्यातील सामाजिकतेचा शोध घेणारी पध्दती आहे. साहित्यातील सामाजिकतेचा शोध घेणारी दुसरी पध्दती म्हणजे मार्क्सवादी पध्दती होय. मार्क्सवादी भूमिकेनुसार समाजातील उत्पादन संबंध हा कोणत्याही समाज रचनेचा पाया असतो आणि त्याला पूरक अशी नैतिक, धार्मिक, राजकीयविचारप्रणालीची अतिरचना उभी राहत असते. साहित्य हे या अतिरचनेचाच एक भाग आहे. त्यामुळे साहित्यातील सामाजिकतेचा शोध घेताना उत्पादनसंबंधाचे स्वरूप आणि लेखकाची वर्गीय लक्षणा यांना मार्क्सवादी पध्दतीत महत्व प्राप्त होते.[३]   उदा. १९व्या शतकात मराठी समाजात घडलेले स्थित्यंतर व आधुनिक मराठी साहित्याचा उगम. तसेच समाजातील एखादया वर्गाचे समाजातील स्थान, त्यात होणारे बदल आणि साहित्यातून व्यक्त होणारा जीवनाशय यांचे नाते या पध्दतीने जुळवता येते. साहित्यिकांच्या साहित्यविषयक भूमिकांच्याद्वारे साहित्याची सामाजिकता कशी प्रक्षेपित होते याचाही शोध या पध्दतीद्वारे घेता येतो.

ल्युसिअन गोल्डमन : "Genetic structuralism"[४]   :   तेनप्रणीत पध्दती व मार्क्सवादी पद्धती या दोन्ही पध्दती साहित्याकृतीपेक्षा साहित्यनिर्मितीमागे असणाऱ्या बाह्य घटकांना प्राधान्य देणाऱ्या पद्धती आहेत. अलीकडील काळात साहित्य कृतीवर लक्ष केंद्रित करून साहित्य व समाज यांचा सबंध जोडणारी आणखी एक पध्दती ल्युसिअन गोल्डमनने विकसित केली आहे. या पद्धतीत साहित्यकृतीचे संरचनात्मक विश्लेषण आणि ऐतिहासिक द्वाद्त्मक भौतिकवाद या दोहोंचा वापर केला जातो. आपल्या पध्दतीला गोल्डमनने 'genetic structuralism' असे म्हंटले आहे. या पध्दतीनुसार प्रथम विशिष्ट साहित्यकृतीतील विशिष्ट संरचना निश्चित केल्या जातात आणि नंतर त्या संरचनेचे प्रत्यक्ष ऐतिहासिक व सामाजिक परिस्थितीशी म्हणजे लेखकाशी सबंधित असणारा वाचक वर्ग व त्या वर्गाचे वैश्विक भान यांच्याशी असणारे नाते स्पष्ट केले जाते. हे सर्व करत असताना साहित्यकृती ही एक संपूर्ण वस्तू आहे आणि इतिहास आहे ही एक प्रक्रिया आहे आणि याचे भान या पद्धतीत सतत राखले जाते. साहित्यकृतीच्या आंतरिक एकात्मतेवर भर देण्याच्या वृत्तीमुळे गोल्डमनची ही पध्दती महत्वाची ठरते.

राजन गवस यांच्या कादंबऱ्यांचे सामाजिक दृष्टिकोनातून मूल्यमापन करत असताना कोणत्याही कादंबरीच्या सामाजिकतेच्या संकल्पनेसंदर्भात प्रमोद मुनघाटे यांनी मांडलेले मत लक्षात घेण्यासारखे आहे. सामाजिकतेच्या संकल्पनेसंदर्भात ते म्हणतात "कादंबरीतील सामाजिक आशय हा विशाल असावा, एखादया समस्येचा पाठपुरावा तिच्या विविध संदर्भांसह त्यात मांडलेला असावा, एखादया

पोटसमूहाचे पोटसंस्कृतीसह दर्शन घडवलेले असावे आणि संपूर्ण काळाचा किंवा समाजाचा छेद घेतलेला असावा.[५] तर कादंबरीतील सामाजिकतेच्या वैशिष्ट्यांबद्दल द. भि. कुलकर्णी म्हणतात "कादंबरीतील सामाजिकतेचे खास वैशिष्टय म्हणजे तिचे समकालीन जीवनाशी असलेले अचूक, अतूट नाते हे होय"[६] . या पार्श्वभूमीवर राजन गवस यांच्या कादंबन्यांचा व त्यात चित्रित झालेल्या समाजाच्या चित्रणाचे स्वरूप संक्षिप्तपणे पुढीलप्रमाणे सांगता येते.

राजन गवस यांच्या कादंबन्यांमध्ये आलेला समाज

चौडकं मधील समाज :

राजन गवस यांची चौडक ही पहिलीच कादंबरी. प्रस्तुत कादंबरीमधून त्यांनी जोगतीणच्या विश्वाचे, तिच्या जगण्याचे चित्रण केले आहे. एखाद्या स्त्रीला देवीला वाहण्यापासून ते जोगतीण म्हणून जगत असताना करावा लागणारा संघर्ष इथंपर्यंतचे चित्रण राजन गवस यांनी प्रस्तुत कादंबरीत विविध घटना-प्रसंग व पात्रांच्या आधारे जिवंतपणे केले आहे. या कादंबरीच्या केंद्रस्थानी महार समाज असून या समाजातील पारंपारिक रूढी, परंपरा यांचा वेध त्यांनी प्रस्तुत कादंबरीत घेतला आहे.

प्रस्तुत कादंबरीत जोगतीणची प्रथा निर्माण होण्यास कारणीभूत असलेली महार समाजातील अंधश्रद्धा आणि अडाणी अशिक्षितपणा कसा कारणीभूत ठरतो याचे चित्रण आले आहे. धर्म आणि धर्मसंस्था यांच्या अनुषंगाने मानवी जीवनाचे विशेषतः ग्रामीण भागातील मागासलेल्या समाजाचे कसे शोषण होते याचे चित्रण या कादंबरीत आले आहे. एखाद्या स्त्रीला देवीला वाहणे या मागे अंधश्रद्धा व त्याचा गैरफायदा घेणाऱ्या त्याच समाजातील व्यक्तींनी या अंधश्रद्धांना दिलेले बाजारी व्यावसायिक रूप असा विरोधाभास यात आढळतो त्या दृष्टीने कादंबरीत जोगतीणची आपापसातील स्पर्धा, आपणच श्रेष्ठ ठरवण्यासाठी चाललेली धडपड, अंगात अवसर येण्याचे प्रकार या सारख्या अनेक घटना नोंद घेण्यासारख्या आहेत.

राजन गवसांप्रमाणेच जोगतीणचा प्रश्न जयवंत दळवी यांनी त्यांच्या 'महानंदा', महादेव मोरे यांनी त्यांच्या 'वर आभाळ खाली धरती', बळवंत कांबळे यांनी 'नापत व जोगव्याचे दिवस, उत्तम बंडू तुपे यांनी 'झुलवा', राम शिर्के यांनी 'यज्ञ' व राजन गवस यांचीच दुसरी कादंबरी 'भंडारभोग' इ. कादंबन्यांमध्ये मांडला आहे.

भंडारभोग मधील समाज :

राजन गवस यांची भंडारभोग ही कादंबरीसुद्धा महार समाजातील जोगता - जोगतीण चा प्रश्न मांडणारी कादंबरी आहे. चौंडक या कादंबरीपेक्षा त्यांच्या भंडारभोग या कादंबरीचा असणारा वेगळेपणा म्हणजे प्रस्तुत कादंबरीत देवीला तायाप्पा नावाच्या एका पुरुषाला वाहिले जाते व त्यामुळे त्याच्या आयुष्याची जी दैना होते त्याचेच जिवंत चित्रण प्रस्तुत कादंबरीत आढळते. जोगता व जोगतीण यामध्ये असणारा फरक म्हणजे एखादी स्त्री जेव्हा जोगतीण होते तेव्हा निदान ती झुलवा लावू शकते, एखाद्या पुरुषाची रखेली म्हणून राहू शकते, एकापेक्षा जास्त पुरुषांच्या सहवासात ती राहू

शकते पण जेव्हा एखादा पुरुष या अंधश्रद्धेचा बळी ठरतो व त्याला जोगता बनवले जाते त्यावेळी वास्तविक खऱ्या अर्थाने त्याची विटंबना होते. पुरुष असूनही त्याला एखाद्या स्त्री प्रमाणे कापड नेसावे लागते, स्त्री प्रमाणे बोलावे लागते, इतर पुरुषांमध्ये तो चेष्टेचा विषय ठरतो, त्याच्या पुरुष्त्वावर तो अन्याय असतो, स्त्रीच्या सहवासात त्याला गावकरी राहू देत नाहीत, त्याच्या तिरडयाही गावातील माणूस येत नाही असे अत्यंत मानसिकदृष्टया वेदनायुक्त जीवन त्याच्या वाटयाला येते त्या जीवनाला प्रस्तुत कादंबरीचा नायक 'तायाप्पा' कसा सामोरा जातो हे खरोखरच मुळातून वाचण्यासारखे आहे. आपल्या नशिबाने अशा प्रकारचे जीवन जरी वाटयाला आले तरीही ते स्वीकारून सकारात्मकरित्या तो त्या जीवनाचा कसा स्वीकार करतो याचे चित्रण प्रस्तुत कादंबरीत विविध प्रसंगामधून आले आहे. चौंडकं प्रमाणेच या कादंबरीत चित्रित केलेला समाज हा महार समाजच आहे त्या अनुषंगाने या समाजातील समस्या व जीवनविषयक दृष्टिकोन गवस यांनी अतिशय जिवंतपणे चित्रित केले आहेत.

धिंगाणा, कळप आणि तणकट मधील समाज :

उपरोक्त तिन्ही कादंबऱ्यांच्या केंद्रस्थानी पुन्हा महार समाजच आढळतो परंतु या तिन्ही कादंबऱ्यांमधून अनुभवाचा वेगळेपणा जाणवतो. केवळ धर्म, श्रद्धा, अंधश्रद्धा एवढयापुरतेच त्यांचे अनुभव विश्व इथे मर्यादित नाही तर या कादंबऱ्यांमधून सामाजिक वास्तवाबद्दलचे त्यांचे आकलन आणि अवलोकन अधिक व्यापक व प्रगल्भ असल्याचे जाणवते. या तिन्ही कादंबऱ्या ग्रामीण भागातील सामाजिक मानसिकतेचे चित्रण करताना दिसतात.

धिंगाणा या कादंबरीत निवडणुकीचे आणि सत्ताकारणाचे जे वर्णन आले आहे ते वर्णन म्हणजे जणू आजच्या वास्तवातील देशातील लोकशाहीचा उपहासात्मकरित्या त्यांनी घेतलेला खरपूस समाचारच आहे. या कादंबरीत ग्रामीण भागातील महार समाजातील सुशिक्षित बेकार तरुणांची शोकांतिका ते मांडताना दिसतात. गावातील बेकार तरुणांची कुचंबणा, ग्रामीण समाजातील राजकीय व सामाजिक वातावरण, कादंबरीतील 'पोलीस पाटील निवडणूक, 'ग्रामपंचायत निवडणूक' यामधून आजच्या काळातील प्रत्यक्ष समाज व राजकारणातील चित्र त्यांनी रेखाटले आहे. आज ग्रामीण भागातील माणसांची मानसिकता कशी बदलली आहे, तो राजकारणात किती सक्रीय झाला आहे, आर्थिक विकासाचा सर्वात जवळचा मार्ग म्हणजे राजकारण असे त्याला कसे वाटू लागले आहे याचे जिवंत चित्रण या कादंबरीत आले आहे. गवस यांनी त्यांच्या धिंगाणा कादंबरीत ज्याप्रमाणे सुशिक्षित बेकार तरुणांचे चित्रण केले आहे त्याचप्रमाणे मराठीत भाऊ पाध्ये यांनी 'वासूनाका, सदानंद देशमुख यांनी तहान', रवींद्र शोभणे यांनी 'कोंडी' अशा कादंबऱ्या लिहिल्या आहेत.

कळप ह्या त्यांच्या चौथ्या कादंबरीत बहुजन समाजात जन्मलेल्या, शेतकरी कुटुंबातील दुःख्खाचे अनेक चटके सहन करत शाळा, महाविद्यालयात शिकणाऱ्या, तरुणाईमुळे सामाजिक, वाड्मयीन, सांस्कृतिक व शैक्षणिक चळवळीत कार्यकर्ता म्हणून उत्साहाने वावरणाऱ्या परंतु चळवळीमधील पुढाऱ्यांच्या दांभिकता, स्वार्थीपणामुळे या साऱ्यातून बाहेर पडणाऱ्या रघु चीलमीची कथा यात मांडली

आहे. या कादंबरीला दोन स्तर आहेत एक वाङ्मयीन व दुसरा सामाजिक. एका बाजूला ते मराठी साहित्य क्षेत्रातील वास्तवाची चिरफाड करताना दिसतात तर दुसऱ्या बाजूला सामाजिक व शैक्षणिक पुढाऱ्यांचा स्वार्थीपणा, दांभिकपणा यांचे चित्रण आले आहे व तेही विशेषतः मागासलेल्या समाजाच्या शोषणाचे चित्रण यात आले आहे. राजन गवस यांच्या कळप या कादंबरीच्या संदर्भात डॉ. वासुदेव सावंत म्हणतात "राजन गवस वास्तवाकडे समग्रतेच्या भूमिकेतून पाहतात त्यामुळे कळप ही गावच्या संपूर्ण पोटसंस्कृतीचे दर्शन घडवणारी कादंबरी ठरते".[७]   तर याच कादंबरीच्या संदर्भातील किशोर सानप यांचे मतही लक्षात घेण्यासारखे आहे. ते म्हणतात "सत्तरीच्या नंतर जे नवे लेखक पुढे आले त्यांच्यावर नेमाडेचा प्रभाव असणे स्वाभाविक आहे कारण नेमाडे यांनी आपल्या नंतरच्या दुसऱ्या आणि तिसऱ्या पिढीतील बहुजन समाजातून पुढे आलेल्या लेखकांसमोर लेखनाचे नैतिक आणि कृतीशील असे आदर्श ठेवले".[८]

'तणकट' ही राजन गवस यांची कादंबरी म्हणजे जातीव्यस्था व शिक्षणव्यवस्था यामधील संघर्ष आहे. महार समाजातील कबीर कांबळे या नायकाच्या माध्यमातून प्रातिनिधिक स्वरुपात आजची शिक्षण व्यवस्था व जातीव्यवस्था यासंदर्भात भाष्य केले आहे. त्यांच्या या कादंबरीला आजपर्यंत अनेक पुरस्कारही लाभले आहेत. २००१ साली तिला साहित्य अकादमीचा पुरस्कारही प्राप्त झाला आहे. प्रस्तुत कादंबरीत दलित सामाजिक कार्यकर्ते, दलित सुशिक्षित तरुण पिढी, दलित प्राध्यापक यांचे चित्रण एका बाजूला केले आहे तर दुसऱ्या बाजूला बाबा साहेब आंबेडकरांनी दलितांना 'शिका संघटित व्हा आणि संघर्ष करा' असा मूलमंत्र दिला त्यातील पहिला शिक्षणाचा घटक बाजूला करून गावातील महारवाड्यातील लोक संघटित होऊन गावकऱ्यांना कसा त्रास देतात, त्यांच्या विरोधात पोलिसात खोट्या तक्रारी करतात, त्यांच्यावर केस करतात, कायदा आणि सरकार आपल्या बाजूने आहे त्याचा कसा गैरफायदा घेतात याचे चित्रण आले आहे. गावातील दलित वर्ग आजही मागासलेल्या अवस्थेत आहे. दलित आणि सवर्णांमध्ये आजही संघर्ष चालू आहे त्या संघर्षाचे वास्तव चित्रण प्रस्तुत कादंबरीत आढळते.

राजन गवस यांची तणकट ही एक महत्त्वपूर्ण कादंबरी आहे. या कादंबरीतील नायक हा समकालीन वास्तवात जगणारा कबीर सदोबा कांबळे हा दलित समजातील महार जातीतील आहे. या कादंबरीच्या अनुषंगाने राजन गवस यांनी ग्रामीण भागातील छोट्या छोट्या दलित जातीतील दुःख, त्याला कारणीभूत असणारी व्यवस्था यांचा शोध घेतला आहे. या कादंबरी संदर्भात नागनाथ कोतापल्ले म्हणतात "ग्रामीण भागातील दलित सवर्ण संघर्ष संपवायचा असेल तर परस्परांना समजून घेण्याची निकड राजन गवस प्रकट करतात. कृषीसंस्कृतीत राबणाऱ्या माणसांची मनोरचना, गावगाड्याची रचना समजून घेतल्याशिवाय आणि सौहार्दाचा दृष्टिकोन स्वीकारल्याशिवाय हे तणाव निवळणार नाहीत असा एक वेगळा दृष्टिकोन या कादंबरीतून प्रकट होतो".[९]   तर पंडित टापरे या कादंबरी विषयी म्हणतात "या जीवनाकडे, येथे नव्या, पुरोगामी अन विधायक अशा दृष्टिकोनातून पाहिले जाते. या भावविश्वातून केवळ वास्तववादाचे दर्शन घेत नाही, तर आत्मपरिक्षण आणि चिंतनाच्या

वाटेने हे जीवन दर्शन अधिक व्यापक आणि सखोल होते".[१०] हीच भूमिका काहीशा वेगळ्या प्रकारे डॉ. वासुदेव यांचीही असल्याचे दिसते. ते म्हणतात "दलित - सवर्ण प्रश्नाकडे लेखक केवळ आयडीओलोजीच्या दृष्टिकोनातून पाहत नाही, तर या प्रश्नाचे प्रत्यक्ष वास्तवातले स्वरूप काय आहे याचा विचार करतो".[११] एकूणच या कादंबरीच्या केंद्रस्थानी आजची शिक्षणव्यवस्था व समाजव्यवस्था यांमधील संघर्ष चित्रित करण्यात आला आहे. गवसांप्रमाणेच सुभाष भेंडे यांनीही त्यांच्या 'काजळ्या दिशा' या कादंबरीत अशाच प्रकारच्या जातीव्यवस्था व शिक्षणव्यवस्था यामधील संघर्षाचे चित्रण प्रामुख्याने दलितांच्याच संदर्भात केले आहे.

'ब बळीचा' ही राजन गवस यांची उपरोक्त पाचही कादंबऱ्यांपेक्षा सर्वस्वी आशय, विषय रूपबंध सर्वच दृष्ट्या वेगळी ठरणारी कादंबरी. प्रस्तुत कादंबरीच्या केंद्रस्थानी एखादा विशिष्ट समाज नसून प्रातिनिधिक स्वरुपात एकूणच मानवी अस्तित्वाचा, त्याच्या वृत्तींचा शोध ते घेताना दिसतात. या कादंबरीच्या माध्यमातून लेखक राजन गवस यांनी कादंबरी लेखनाचा एक आगळा वेगळा प्रयोग साकार केला आहे.

निष्कर्ष

१. साहित्य आणि समाज यांचा सबंध कसा अतूट असतो, साहित्याला समाजापासून कसे वेगळे काढता येणे शक्यच नाही, हा तेनचा सिद्धांत आपल्याला याची साक्ष प्रस्तुशोधनिबंधासाठी निवडलेल्या दोन्ही लेखकाच्या लेखनातून त्याचा प्रत्यय देतो.

२. राजन गवस या लेखकाचे लेखन केंद्र प्रामुख्याने ग्रामीण समाज जीवन असल्याचे दिसते.

३. प्रत्येक ग्रामीण समाजाची आपली अशी वेगळी समाज व्यवस्था असते व त्या समाज व्यवस्थेअंतर्गत त्यांची स्वतःची अशी वैशिष्टयपूर्ण अर्थव्यवस्था निर्माण झालेली असते. गावात राहणाऱ्या माणसांप्रमाणे व तिथिल तत्सम विविध घटकांप्रमाणे ही अर्थव्यवस्था कार्यरत असते. अर्थव्यवस्थेचा या ठिकाणी विचार करण्यामागचे कारण कार्लमार्क्स यांनी साहित्याच्या समीक्षेच्या संदर्भात समाजशास्त्रीय दृष्टिकोनातून साहित्यकृतीचे मूल्यमापन करण्यासाठी जो 'पाया इमला' सिद्धांत मांडला त्या अनुषंगाने आहे.

४. समाजाची आर्थिक परिस्थिती जशी असते त्यावर त्या समाजाची जीवन पध्दती अवलंबून असते असे हा सिद्धांत सांगतो. या पार्श्वभूमीवर राजन गवस यांच्या कादंबरी लेखनाचा विचार करता त्यांच्या सर्वच कादंबऱ्यांमध्ये ग्रामीण समाज व्यवस्थेच्या अनुषंगाने आर्थिक व्यवहाराचे चित्रण व दलित समाज जीवन आले आहे.

५. राजन गवस यांच्या कादंबऱ्यांच्या केंद्रस्थानी स्वानुभव आहेत त्यामुळे साहित्य समिक्षेसंदर्भात फ्रेंच समीक्षक हिप्पोलेत तेन यांनी मांडलेला 'साहित्य हे देश काळ आणि युगप्रवृत्ती यांचे अपत्य असते' हा सिद्धांत त्यांच्या या कादंबऱ्यांच्या अभ्यासासाठी उपयुक्त ठरतो. राजन गवस यांनी त्यांच्या चौंडकं, भंडारभोग, धिंगाणा, कळप, तणकट या कादंबऱ्यांमध्ये ज्या महार समाजाचे व

त्या समाजातील वास्तव, जीवनविषयक दृष्टिकोन, त्या समाजातील दुखः, प्रश्न, समस्या, महार समाजाच्या महारेतर समाजाकडून असणाऱ्या अपेक्षा, आजही २१व्या शतकांत जातीय रचनेत व त्याच्या राजकारणात अडकलेला ग्रामीण समाज, त्या समाजातील अनिष्ट रूढी परंपरांना बळी पडणारी अडाणी अशिक्षित माणसे या साऱ्या गोष्टी गवस यांनी स्वतः जवळून पाहिल्या आहेत.

६. कोल्हापूर व आसपासच्या परिसरात ज्या परिसरात गवस यांचा जन्म झाला व पुढे त्यांच्या व्यक्तिमत्वाची जडणघडण झाली त्या समाजात वावरत असताना त्यांनी प्रत्यक्ष जे काही पाहिले ते त्यांना अस्वस्थ करणारे होते आणि कदाचित त्या अस्वस्थतेतूनच त्यांच्या या कादंबऱ्यांची निर्मिती झाली असावी.

७. राजन गवस यांच्या कादंबरी लेखनावर ग्रामीण व दलित साहित्यातील प्रभाव व परिणाम जाणवतो'

८. राजन गवस यांनी प्रामुख्याने दलित समाजाचे चित्रण केले असले तरी दलित साहित्यापेक्षा ते वेगळे आहे कारण नकार वेदना विद्रोह हे दलित साहित्याच्या केंद्रस्थानी असणारे घटक त्यांच्या कादंबरीत येत नाहीत तर त्या उलट करुणा, जिव्हाळा, आपलुकी यांनी ती जागा घेतल्याचे दिसते.

९. राजन गवस यांनी निवेदनासाठी जरी प्रमाण मराठीचा वापर केला असला तरी घटना प्रसंगातील जीवंतता निर्माण करण्यासाठी त्यांनी मोठ्या प्रमाणात तत्कालीन ग्रामीण बोलीचे संवांदांमध्ये मोठ्या प्रमाणात उपयोजन केले आहे.

१०. राजन गवस यांच्या कादंबरी लेखनावर व्यंकटेश माडगुळकर, श्री. माटे, भालचंद्र नेमाडे इ. पूर्वसुरींच्या लेखनाचा प्रभाव जाणवतो मात्र त्यांचे वैशिष्ट्य असे की ते पूर्वसुरींचे परिणाम पचवून ते स्वतःची स्वतंत्र ओळख निर्माण करताना दिसतात

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गोमंतकीय लोककथांचा सांस्कृतिक अभ्यास

डॉ. अपूर्वा बेतकेकर,

मराठी विभाग, सेंट झेवियर्स महाविद्यालय, म्हापसा- गोवा

Correspondence: Apurva.B@xavierscollegegoa.ac.in

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सारांश :

गोमंतकीय लोकसंस्कृतीतील लोकसाहित्याची व्याप्ती अनन्यसाधारण आहे. गोमंतकीय लोकसंस्कृतीचा विचार करताना इथला भूप्रदेश, विभिन्न जाती धर्मांतील लोकं, त्यांचे राहणीमान, श्रद्धा-अंधश्रद्धा, समूहमनाच्या भावना, त्यांची जीवननिष्ठा, शहरातील समिश्र संस्कृती इत्यादींचा विचार करावा लागतो. तसेच गोमंतकात साडेचारशे वर्ष पोर्तुगीजांची सत्ता होती म्हणून येथे ख्रिश्चन धर्मीय आहेत, काही काळ आदिलशहाची सत्ता होती म्हणून मुसलमान धर्मीय व प्राचीन काळापासून हिन्दू वसाहत असल्याने सामाजिकदृष्ट्या येथे मिश्र संस्कृती नांदताना दिसते. दक्षिण गोमंतकावर दाक्षिणात्य संस्कृतीचा प्रभाव आढळून येतो, तर उत्तरेकडे उत्तरीय संस्कृतीचा प्रभाव आढळून येतो. गोमंतकीय लोकसंस्कृतीचे वैशिष्ट्य म्हणजे इथला लोकसमूह स्थानिक देवदैवतांचे पूजन आत्मनिष्ठेने करताना आढळतो. इथे मोठमोठ्या मंदिरांमधून तर कुठे छोट्या घुमट्यांमधून स्थानिक देवदेवतां पुजल्या जातात. गोमंतकातील हिन्दू व ख्रिश्चन धर्मांतील सण-उत्सव उत्साहात व विशिष्ट पारंपारिक पद्धतीने साजरे केले जातात. विशेषकरून इथल्या लोकोत्सवांमध्ये मोठ्याप्रमाणात लोकगीते, लोककथा, लोकनृत्य आदी लोकसाहित्याचा नचुकता अंतर्भाव होताना दिसतो. गोमंतकीय लोकसाहित्याचा विचार हा अत्यंत व्यापक विषय असून या शोधनिबंधातून लोककथा या लोकसाहित्याच्या एका प्रकाराची वैशिष्ट्ये अभ्यासली आहेत.

विषयकेंद्री शब्द :

संस्कृती | लोकसाहित्य | लोककथा | देवदैवता | कर्मकांड | दंतकथा | आख्यायिका.

संस्कृती या संकल्पनेचा सर्व जीवनातील घटकांशी संबंध असतो. एडवर्ड टेलरने संस्कृतीची व्याख्या पुढीलप्रमाणे केली आहे, "Culture is a complex whole which includes knowledge, belief,

art, law, morals, custom and any other capabilities acquired by man as a member of society". वरखेडे, र., [२०१९] या व्याख्येप्रमाणे माणसाने समाजाचा सदस्य म्हणून संपादित केलेले ज्ञान, रूढी-परंपरा, कला, विश्वास इ. कोणत्याही क्षमता हे सर्व संस्कृती या संकल्पनेत सामावते. प्रत्येक समाजात समूहगटानुसार एक पोटसंस्कृतीही नांदत असते.   संस्कृती ही मूल्यदृष्ट्या व तात्त्विकदृष्ट्या स्थलकालपरत्वे परिवर्तित होत असते, परंतु त्यात होणारे बदल हे मानवनिर्मित असतात, ते सामाजिक नियमांनुसार न होता वाढत्या पर्यावरणीय समस्यांमुळे उद्भवल्याचे आढळून येते. लोकसाहित्य हा देखील संस्कृतीचा भाग आहे व समूहमनाची अभिव्यक्ती म्हणून आपण त्याचा विचार करतो. लोकसाहित्यात लोकजीवन, लोकाचार, सामाजिक रूढी परंपरा इत्यादींचे प्रतिबिंब पडलेले असते. लोकसाहित्यात प्रतिबिंबित होणाऱ्या संस्कृतीला लोकसंस्कृती असे म्हटले जाते. संस्कृतीप्रमाणे लोकसंस्कृती संकल्पनाही अतिशय व्यापक आहे. मानवी वर्तनव्यवहाराचे नियम, संकेत, रूढी, प्रथा, परंपरा, विधी-निषेध, सण-उत्सव, सुख-दुःख व्यक्त करण्याचे संकेत, सोळा संस्कार, कर्मकांड इत्यादी समूहजीवनाचे घटक लोकसंस्कृतीत सामावतात. पाटणकर, ज., [२०१०] मॉलिनोस्किनने संस्कृतीच्या व्याख्येत लोकश्रध्दा, लोकविश्वास व प्रथा-परंपरांना स्थान दिले आहे. तसेच कलाशिल्पे, भौतिक वस्तू, तांत्रिक रचना, निर्मितीप्रक्रिया, श्रध्दा, सवयी मूल्ये, तत्त्वज्ञान मिळून संस्कृती सिध्द होते, म्हणूनच स्थानिक लोकमानस, त्यांचे लोकसाहित्य आणि त्यांचे विधी कर्म जाणून घेतले तर त्यांची विचारपद्धती, समजूत यावर प्रकाश पडू शकतो. पाटणकर, ज., [२०१०]

लोककथा, लोकगीते, लोकनाट्य, म्हणी-वाक्प्रचार, सण-उत्सव, रूढी, विधी-परंपरा इत्यादी लोकाविष्कारांना लोकसंस्कृतीत महत्त्वाचे स्थान आहे. उदा. लोकगीते किंवा धार्मिक सण उत्सवांमधून समूहमनाच्या श्रध्दा जपल्या जातात; नीतिमूल्यांची परंपरा जतन केल्या जातात; धार्मिक विधींना महत्त्व प्राप्त होते, म्हणूनच लोकसाहित्याच्या द्वारे लोकसंस्कृतीचे जतन करता येते. उदा. हिन्दू लग्नविधीत म्हटल्या जाणाऱ्या लोकगीतांना सांस्कृतिक महत्त्व असते, अर्थात लोकसाहित्याच्या जपणूकीतून समाजाची सांस्कृतिक ओळख सिध्द होत असते.   लोकसाहित्याच्या अभ्यासक दुर्गा भागवत म्हणतात "लोकसाहित्याचा अभ्यास म्हणजे संस्कृतीच्या अभिसरणाचा अभ्यास आहे. संस्कृतीचे सातत्य व त्यात होणारे बदल यांचा अभ्यास व बदलांचे निरिक्षण तर ते लोकसाहित्यातच करावे. एकूण जगातील कोणत्याही भूप्रदेशाच्या मानवाच्या निर्मितीपासून आजपर्यंतच्या त्याच्या परंपरा, श्रध्दा, विश्वास, आचार-विचार आणि त्यांचे कलाविष्कार समजून घ्यावयाचे झाल्यास अभ्यासकाला त्याच्या लोकसाहित्याकडे जावे लागते." भागवत, दु., [१९७७] पश्चिमेकडे 'फोकलोअर' म्हणजेच लोकसाहित्याची संकल्पना सर्वप्रथम समाजशास्त्र व मानवशास्त्र यांच्या अभ्यासातून निर्माण झाली. म्हणूनच तिथे लोकसाहित्याचा अभ्यास हा लोकसंस्कृतीचा अभ्यास म्हणून सांस्कृतिक मानवशास्त्र (कल्चरल अँथ्रोपॉलॉजी) याच नावाने प्रारंभीच्या काळात झाला. असे म्हटले

जाते की लोकसाहित्य म्हणजे संस्कृतीमधील केवळ शब्द साधने होय (*विश्वकोश*). एकूणच संस्कृतीच्या रचनेत ही शब्द साधने महत्त्वाची भूमिका पार पाडतात.

लोककथा हा लोकसाहित्याचा एक महत्त्वपूर्ण भाग आहे. 'पारंपारिक सांस्कृतिक आशय असलेली, मौखिक परंपरेतून जतन केली जाणारी कथा म्हणजे लोककथा' (विश्वकोश). लोकसाहित्याप्रमाणे लोककथादेखील समूहनिर्मित व समूहरक्षित असते. ती मौखिकरीत्या एका पिढीकडून दुसऱ्या पिढीकडे, एका भाषेतून दिसऱ्या भाषेकडे, एका संस्कृतीतून दुसऱ्या संस्कृतीकडे संक्रमित होत रहाते. इंग्रजीमध्ये लोककथांना फोकटेल्स असे म्हणतात. वास्तविक भारतात लोककथांची परंपरा अत्यंत प्राचीन आहे. संस्कृत पंचतंत्राचे भाषांतरकार बेन्फाय याने तर 'भारत देशाला जागतिक कथा वाङ्मयाची गंगोत्रीच म्हटले आहे'. लोकसाहित्याचे अभ्यासक प्रभाकर मांडे यांनी "लोकजीवनात मौखिक परंपरेने चालत आलेली अशी कथा, जिचा आधार एखादी ऐतिहासिक घटना असते, मात्र मौखिक परंपरेमध्ये जिचे स्वरूप पूर्णपणे बदललेले असते तिला दतकथा म्हणतात" अशी दंतकथेची व्याख्या केली आहे. या व्याख्येवरून दंतकथा ही एखाद्या ऐतिहासिक घटनेवर आधारित असते व तिचे स्वरूप हे मौखिक परंपरेने बदलत जाते हे स्पष्ट आहे.

लोककथेत अनेक प्रकार आढळून येतात. दैवतकथा/ पुराणकथा, उत्पत्तीकथा, दंतकथा/ आख्यायिका, बोधकथा, वीरकथा इत्यादी. यात दैवतकथा या अत्यंत प्राचीन असून त्यांना पुराणकथा असे देखील म्हटले जाते. आदिमानवाच्या धार्मिक विधी आणि त्यामागची कारणे आणि उत्तर दैवतकथेत आढळून येते. सृष्टीची उत्पत्ती व विनाश त्याचबरोबर दैवी घटना आणि देवतांची वर्णने यात येतात. या कथांमधील घटना प्राचीन काळात कधीतरी घडल्या आहेत असे मानले जाते. या कथांना तत्त्वविचारांचा आधारही असतो. दुसरा प्रकार म्हणजे दंतकथा किंवा आख्यायिका. या मौखिक परंपरेने चालत आलेल्या अशा असतात ज्याचा आधार एखादी ऐतिहासिक घटना असते परंतु मौखिक परंपरेमुळे त्याचे स्वरूप बदललेले असते. दुर्गा भागवत म्हणतात दैवतकथा या साऱ्या प्रभूतदैवतवादी (Polytheistic) धर्मसंप्रदायातूनच जन्मलेल्या आहेत. वाकोडे, म. [१९९२]

लोककथेला दंतकथा, मिथक, मौखिक कथा इत्यादी अनेक नावाने संबोधले जाते. त्यावरून तिची वैशिष्ट्येही लक्षात येतात. अर्थात ती दंतकथेवर आधारित असते, ती मौखिक परंपरेने चालत आलेली असते, तसेच अनेकदा ती मिथक रुपातही असते. पण सर्वप्रथम लोकसाहित्यातील तिचे स्थान व व्याप्ती लक्षात घेणे आवश्यकता आहे. भारतीय मिथ्यकथांचा मागोवा या ग्रंथात विश्वनाथ खैरे लिहिलात, "आपले जीवन, आचार विचार, उद्योग, रंजन, सण-उत्सव, विधी, व्याप इ. साऱ्याबद्दल आपल्या समाजात संचित आणि प्रचलित कथा असतात. त्यात कथन आणि वर्णनही असते. या

कथांचा आशय समाजात श्रद्धेने ठरवला जातो, या कथांना मिथ्यकथा म्हणायचे. त्यांचे प्राणतत्त्व मिथ्य असते. मिथ्य हे सत्य नसते व असत्यही नसते." खैरे, वि., [१९८६]

लोककथांच्या निर्मितीची विविध मते प्रचलित आहेत. मानवी अस्तित्वाच्या प्रारंभावस्थेतील मानवाने सृष्टीच्या ज्या अनंतरूप घडामोडी अनुभवल्या, त्यांचे जे अर्थ लावले, त्यातून निसर्गरूपवादी कथांचा जन्म झाला. नंतर सृष्टिविषयक आकलन जसजसे वाढले आणि देव कल्पनेचा जन्म झाला, तसतसे प्राथमिक सृष्टिविषयक कथांमध्ये भर पडली आणि त्यातून मिथ्यकथा व दैवतकथांचा जन्म झाला. निसर्गघटितेच या सर्व प्राक्कथांची जन्मभूमी आहे. मॅक्सम्युलरच्या मते मिथ्यकथा हा भाषेचा एक रोग आहे, तर मानसशास्त्रज्ञ कार्ल युंग यांच्या मते ती समूहमनाला पडलेली स्वप्ने आहेत. लोककथांची निर्मिती, जपणूक व संग्रह करण्याचे काम अबोध लोकमानसच करीत असतो. भौगोलिकदृष्ट्या दूर अंतरावरील प्रदेशांमध्ये अनेकदा साम्य आढळून येते. (विश्वकोश)

गोमंतकीय लोकसंस्कृतीतील लोकसाहित्याची व्याप्ती देखील अनन्यसाधारण आहे. गोमंतकीय लोकमानसाचे सांस्कृतिक जीवन अतिशय समृध्द आहे. गोमंतकीय लोकसंस्कृतीचा विचार करताना इथला भूप्रदेश, विभिन्न जाती धर्मातील लोकं, त्यांचे राहणीमान, श्रद्धा-अंधश्रद्धा, समूहमनाच्या भावना, त्यांची जीवननिष्ठा, शहरातील समिश्र संस्कृती इत्यादींचा विचार करावा लागतो. तसेच गोमंतकात साडेचारशे वर्षे पोर्तुगीजांची सत्ता होती म्हणून येथे ख्रिश्चन धर्मीय, काही काळ आदिलशहाची सत्ता होती म्हणून मुसलमान धर्मीय व प्राचीन काळापासून हिन्दू धर्मीयांची वसाहत येथे असल्याने सामाजिकदृष्ट्या येथे मिश्र संस्कृती नांदताना दिसते. दक्षिण गोमंतकावर दाक्षिणात्य संस्कृतीचा प्रभाव आढळून येतो तर उत्तरेकडे उत्तरीय संस्कृतीचा प्रभाव आढळून येतो. गोमंतकीय लोकसंस्कृतीचे वैशिष्ट्य म्हणजे इथला लोकसमूह स्थानिक देवदैवतांचे पूजन आत्मनिष्ठापूर्वक करतो. येथे मोठमोठ्या मंदिरांमधून तर कुठे छोट्या घुमट्यांमधून स्थानिक देवदेवतां विलक्षण भक्तिभावाने पुजल्या जातात. गोमंतकातील हिन्दू व ख्रिश्चन धर्मातील सण-उत्सव अतिशय उत्साहात व विशिष्ट पारंपारिक पद्धतीने साजरे केले जातात. विशेषकरून इथल्या लोकोत्सवांमध्ये लोकगीते, लोककथा, लोकनृत्य आदी लोकसाहित्याचा नचुकता अंतर्भाव होताना दिसतो. गोमंतकीय लोकसाहित्याचा विचार हा अत्यंत व्यापक अंगाने करता येतो.

गोमंतकात उपलब्ध कथा कहाण्या या पद्यमय आहेत व त्या बव्हंशी दैवतकथा स्वरुपात आढळून येतात. गोमंतकातील सण उत्सवांमध्ये स्थानिक देवदेवतांचा उत्सव अतिशय भक्तिभावाने साजरा केला जातो, त्यात म्हणावयाची गीते ही कथनात्मक असतात, त्यात विशेषत्वाने त्या त्या देवी देवतांची कथने आढळून येतात. गोमंतकातील दैवतकथा या एकमेकांशी संबंधित असल्याचे आढळून येते. उदा. सात बहिणींची कथा. गोव्यात सात बहिणी या प्रसिद्ध देवता आहेत. त्या कलश रूपात

आहेत. त्यात पुढील देवतांचा समावेश होतो. मोरजीची मोरजाय, शिरगावची लयराय, वळवईची केळबाय, मयेची महामाय, सावईवेरेची शितलाय, मिलाग्र ही धर्मांतर झालेली म्हापसा येथील तर त्यांचा एकमेव भाऊ म्हणजे मयेचा खेतलो. या प्रत्येकीची एक आख्यायिका असल्याचे दिसते. इथल्या समाजमनाशी या कथा एकरूप झालेल्या आहेत. तसेच गोमंतकातील ग्रामसंस्कृतीमध्ये ग्रामदैवताला अतिशय महत्त्व असते. त्यात हिन्दू देवदेवतांचे प्रकार म्हणजे संस्कृत शिष्ट देवता, ग्रामदेवता, लोकदेवता, शक्तीदेवता इत्यादी. गोमंतकात प्रत्येक देवदेवतेचा उत्सव साजरा होतो. शिवाय इथले काही जत्रोत्सव पारंपारिक पद्धतीने मोठ्या थाटात पार पडतात. शिरगांवची जत्रा, साळातील गडे, फातप्र्याची जत्रा, काणकोणचे शिशारान्नी, पेडणेचा दसरा, जांबावलीचा गुलाल इत्यादी गोमंतकातील जत्रोत्सवांना त्या त्या देवदेवतांची लोककथा जुळलेली आहे.

गोमंतकातील व कोकण प्रदेशातील एक महत्त्वाचा लोकोत्सव म्हणजे शिगमा. शिगमोत्सव गोमंतकातील असंख्य गावांमध्ये विविध पद्धतीने साजरा होतो. प्रत्येक गावात शिगमोत्सवाची एक देवतकथा आढळून येते. उदा. काणकोण येथील शिशारान्नी हा उत्सव शिगम्याच्या वेळी पार पडतो. तर या उत्सवात तीन गड्यांच्या शिरांवर चूल पेटवून भात शिजवला जातो. तो भात तिथल्याच भगतांच्या रक्ताने कालवून सर्वत्र शिंपडला जातो. या विधीमागे एक आख्यायिका आहे. पूर्वी या उत्सवात म्हणे खरी शिरे धडावेगळी करून आणली जात व उत्सव संपताच पुन्हा त्या शिरांना त्या त्या धडाला नेऊन जोडले जात होते. परंतु एकदा त्या शिरांची अदला बदल झाल्याची कथा सांगितली जाते. ती शिरे धडांना न जुळल्याने उत्सवाच्या या पारंपारिक पद्धतीमध्ये ही प्रथा बंद पडली व केवळ नावापूरती मत्सकाला तलवार लावून हा विधी करण्यात येऊ लागला.

गोमंतकीय लोककथांची वैशिष्ट्ये म्हणजे इथल्या कथा कहाण्या बव्हंशी पद्यमय असल्याचे आढळून येते. मधले दुवे जोडण्यासाठी कधी कधी गद्याचा वापर झालेला दिसून येतो. गोमंतकाच्या लोकसाहित्यात दोन प्रकारच्या लोककथा आहेत. एक पुराणकथांचा संदर्भ असलेली दुसरी सामाजिक घटना प्रसंगांवरून कल्पनाविलासाने फुललेली. या दोन्हीपैकी सामाजिक घटना प्रसंगांवरील लोककथा ही इथल्या लोकजीवनाचे दर्शन घडवते. जीवनमुल्यांचा प्रसार करणारी, तत्त्वबोध देणारी अशी ही कथा असते. यात राक्षस, भूतं, दैवत, देवदूत तसेच माणसे असतात. सामाजिक कथांमध्ये सांस्कृतिक जीवनाचे दर्शन घडते. पौराणिक कथेवर आधारित कथा कहाण्या लोकरंजन व विधीचा भाग म्हणून सांगितल्या जातात. यांची अनुभूती केवळ विधी प्रसंगावेळीच येते. त्या ओवीबद्ध वा मुक्तछंदातदेखील असतात. गद्य कहाण्या सांगण्यासाठी त्यांना ओवीबद्ध रचले जाते. केपे येथील अवेडे गावात ख्रिस्ती गावड्यांच्या जीवनात पाऊस पडण्यासाठी व तो थांबण्यासाठी विशिष्ट लोककथा गायल्या जातात. धनगर, कुळवाडी समाजात काही कहाण्या गायचे दिवस ठरलेले असतात. काही

कहाण्या फक्त पुरुषांसाठी तर काही फक्त बायकांनी गायच्या अशा प्रथा आढळून येतात. कहाणी गद्यात असली तरी ती सांगण्याची पद्धत गेय असते.

मूळ गोमंतकीय संस्कृतीशी संबंधित दंतकथेप्रमाणे गोमंतभूमी ही परशुरामाने निर्माण केल्याचे मानले जाते. परशुरामाने सह्याद्री पर्वताच्या एका शिखरावर उभे राहून पश्चिम समुद्रात बाण सोडला व शुपरिकासह भडोचपासून केरळपर्यंतची पश्चिम किनारपट्टी निर्माण केली अशी कथा पुराणात सांगितली जाते. त्यात गोमंतकाचा देखील समावेश होतो. विशेषतः कोकण, कर्नाटक, तुळव आणि केरळ या प्रदेशांचे आर्यीकरण परशुरामाने केल्याचे या दंतकथेनुसार आढळते. सातोस्कर, बा., [२००९], परंतु गोमंतकाचे आर्यीकरण होण्यापूर्वी येथे द्रविड संस्कृती नांदत होती. आर्य लोकांची संस्कृती पितृसत्ताक होती तर द्रविड संस्कृती मातृसत्ताक, त्यामुळे गोमंतकीय समाजात आपल्याला या दोन्ही संस्कृतीची वैशिष्ट्ये आढळतात. परंतु प्राचीन अशी समजली जाणारी वसाहत ही अनार्य लोकांचीच आहे व गोमंतकाच्याही सांस्कृतिक घडणीत त्यांचा महत्त्वाचा वाटा असल्याचे लक्षात येते.

तसेच गोमंतकाच्या प्रत्येक गावच्या देवस्थानाची एक कथा सापडते. भौगोलिक दृष्ट्या निसर्गसंपन्न असलेला गोमंतक देवदेवतांच्या विश्वासावर जगत असल्याचा पुरावा या कथा देतात. गोमंतकात देवदेवता, त्यांची पूजाविधी, अर्चनपद्धती, आवडी निवडी, स्तुतिस्तोत्रे, सूक्ते गीतगायन, पठन, विधींचे अनुष्ठान, बलिदान अशा सर्वच लोकाचारांना महत्त्व आहे. अनादिकालापासून चालत आलेल्या प्रथांचे आचरण इथला मनुष्य करीत आला आहे. बहुतांश विधींच्या बाबत आख्यायिका, कथा, दंतकथा आढळून येतात. पेडणे गावात दसऱ्याला तरंगांची पूजा केली जाते त्यामागे एक दंतकथा प्रसिध्द आहे. पेडण्याची कोजागिरी पौर्णिमा दरवर्षी मोठ्या थाटात साजरी केली जाते. त्या रात्री तिथे तरंग नाचवली जातात व तेथे ढोल वाजवले जातात व त्या ढोलाच्या आवाजावर तिथे असलेल्या लोकांवर जर भूत-प्रेत असली तर ती नाचायला लागतात व देव त्या वाईट आत्म्यांना विचारतो "जातात की नाही हा देह सोडून" व नंतर त्यांची काय मागणी आहे, ती पूर्ण करून त्यांना मुक्त केले जाते. हा विधी झाल्यानंतर देव भूतनाथाचे तरंग घेतलेला भक्त आपल्या देवळात जाण्यासाठी आतुरतेने धावत सुटतो, यावेळी हजारो संख्येने भाविक तिथे उपस्थित असतात ते त्याला अडवतात. ते जल्लोषात हर हर महादेव हा घोष करीत असतात, तेव्हा देव भूतनाथ आपल्यासाठी मंदिर बांधण्याची मागणी करतो. येथील भूतनाथाचे देऊळ बांधलेले नाही, ते अजूनही मोडलेले आहे. या मागची कथा म्हणजे जेव्हा पांडव गोव्यात आले होते, तेव्हा त्यांनी हे मंदिर बांधण्याची जबाबदारी घेतली होती, परंतु अशी अट होती की ते देऊळ 'एका रात्रीत व एका वातीत' बांधायचे होते, पण जेव्हा ते बांधत होते तेव्हा देव रवळनाथ एका कोंबड्याचे रूप घेऊन आरवला व त्यांना असे वाटले की सकाळ झाली व ते देऊळ तसेच सोडून निघून गेले व ते देऊळ आजही तसेच आहे. म्हणूनच जेव्हा भूतनाथ पुनवेच्या दिवशी आपल्या देवळाबद्दल प्रश्न विचारतो तेव्हा इतर गावचे लोक

आपल्या पेडण्याच्या भाषेत उत्तर देतात 'बान तू देवा' याला दोन अर्थ लाभले आहेत. एक अर्थ पेडण्याच्या बोलीत म्हणजे 'बांधतो' व दुसरा अर्थ 'तू बांध देवा' असे म्हणून ते भूतनाथ देवाला शब्दात अडकवून शांत करतात, त्याला देऊळ बांधायला जाऊ देत नाहीत कारण असा समज आहे की जर तो गेला तर पेडणे गावात पौर्णिमा कधीच होणार नाही, म्हणून ते त्याला शांत करतात. सत्तरी तालुक्यातील झरमे गावात होणाऱ्या चोरोत्सवाची अशीच एक कथा सांगितली जाते. फार फार वर्षापूर्वी झरमे या गावाच्या वाटेवर विश्रांतीसाठी झोपलेल्या काही युवकांची या गावातील लोकांनी लुटारू समजून गावच्या संरक्षणासाठी हत्या केली. नंतर त्यांचे नातेवाईक त्यांना शोधण्यासाठी गावात दाखल झालेवर गावकऱ्यांना त्यांनी निष्पाप जीवांची हत्या केल्याचे लक्षात आले, म्हणूनच या पापाचे प्रायश्चित म्हणून या गावात दरवर्षी शिगम्याला चोरोत्सव साजरा केला जातो. त्यात विधीचा भाग म्हणून तलवारीने गड्याना निजवून मारण्याची क्रिया केली जाते.

अशीच समान कथा फोंडा तालुक्यातील बेतकी या गावची आहे. जिथे गावात आलेला पूर ओसरावा म्हणून एका लहान मुलीचा बळी तिच्या आईच्या नकळत देण्यात आला मात्र तिच्या आईला या गोष्टीची चाहूल लागताच तिने संपूर्ण गावाला शाप दिला की बेतकी या गावात कुणीच टिकणार नाही. तेव्हा त्या शापाला घाबरून गावकरी गाव सोडून निघून गेले व त्यानंतर अनेक वर्षांनी वेर्णे गावातील लोकं पोर्तुगीज काळात गाव सोडून भटकत भटकत बेतकी गावात पोचले तेव्हा त्यांना या गावचा इतिहास लक्षात आला, मात्र त्यांनी त्या वृद्ध स्त्रीचा शोध घेऊन तिचा शाप मागे घ्यावयास लावला व तिच्या मुलीचे मंडोदरीचे मंदिर या गावात बांधण्यात आले. अशाप्रकारे गोमंतकीय ग्रामजीवनात आपल्याला सत्य घटनांवर आधारित अनेक कथा ऐकायला मिळतात, ज्यांचा गावातील समूहजीवनाशी विलक्षण भावनिक संबंध असतो. चारही स्तरावरील दैवतांसाठी केले जाणारे विधी भिन्न असतात. लोकदेवतांसाठी विशिष्ट पद्धतीने केले जाणारे अर्चन विधी, बलिदान हे शांत्यर्थ असतात, म्हणजे या दैवतांनी पीडा, उपद्रव करू नये म्हणून त्यांना शांत करणं हे त्यामागचे कारण असते. खेडेकर, वि., [२०१२]

गोमंतकात देवचार ही शक्तीदैवता आढळून येते त्याची लोकसंस्कृतीत भक्तिभावाने पूजाविधी केली जाते. तो सीमेवरील अनिष्ठांपासून गावचे रक्षण करतो असा समज आहे. त्या देवचारांच्या देखील अनेक कथा, दंतकथा, आख्यायिका प्रचलित आहेत, ज्यांचा संबंध अनेकदा गोमंतकातील गावच्या जत्रोत्सवांशी असतो. अनादिकालापासून चालत आलेल्या प्रथांचे आचरण इथला मनुष्य करतो, त्याचा धागा जोडणाऱ्या गोमंतकीय लोककथा त्या त्या समाजाला पोषक असे संकेत प्रदान करणाऱ्या आहेत.

निष्कर्ष :

- गोमंतकीय लोकसाहित्याचा विचार हा अत्यंत व्यापक अंगाने करता येतो.

- बहुतांश गोमंतकीय लोककथा या पद्यमय आहेत. त्यांना ठराविक प्रसंगी व ठराविक विधी करताना म्हटले जाते.

- एक पुराणकथांचा संदर्भ असलेली दुसरी सामाजिक घटना प्रसंगांवरून कल्पनाविलासाने फुललेली. या दोन्हीपैकी सामाजिक घटना प्रसंगांवरील लोककथा ही इथल्या लोकजीवनाचे दर्शन घडवते.

- गोमंतकातील सण उत्सवांमध्ये स्थानिक देवदेवतांचा उत्सव अतिशय भक्तिभावाने साजरा केला जातो, त्यात म्हणावयाची गीते ही कथनात्मक असतात त्यात विशेषत्वाने त्या त्या देवी देवतांची कथने आढळून येतात. गोमंतकातील दैवतकथा या एकमेकांशी संबंधित असल्याचे आढळून येते.

- अनादिकालापासून चालत आलेल्या प्रथांचे आचरण इथला मनुष्य करतो, त्याचा धागा जोडणाऱ्या गोमंतकीय लोककथा त्या त्या समाजाला पोषक असे संकेत प्रदान करणाऱ्या आहेत.

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साळ येथील गडे: एक सांस्कृतिक अभ्यास

डॉ. वृंदा माधव केळकर

मराठी विभाग, सेंट झेवियर्स महाविद्यालय, म्हापसा - गोवा.

Correspondence : Vrunda.M@xavierscollegegoa.ac.in

सारांश :

ग्रामीण भागात जपल्या जाणाऱ्या परंपरांमधून लोकसंस्कृतीचे वैविध्य दिसून येते. गोमंतकात होणारे उत्सव आणि जत्रा या विषयाचा अभ्यास करताना गोव्याचे उत्सव आणि जत्रा हे येथील समृद्ध सांस्कृतिक आणि धार्मिक परंपरांचे प्रतीक आहेत असे जाणवले. 'गडे पडणे' हा प्रकार तसा भयप्रदच असून डिचोली, पेडणे, फोंडा, काणकोण आदि तालुक्यातून हा गडे पडण्याचा प्रकार आढळतो. गोव्यात होणाऱ्या गड्यांपैकी पैंगीण, कुडणे (साखळी) आणि साळमधील गडे यांचा विचार करता यातून वैविध्यता जाणवते. यात होणाऱ्या विर्धींमधून काहीवेळा वेगळेपणा जाणवला.

या अभ्यासाच्या निमित्ताने स्थानिक लोकांच्या मुलाखती घेऊन प्रत्यक्ष निरीक्षणाद्वारे या जत्रेच्या विविध पैलूंची ओळख, गड्यांच्या जत्रेतील वैशिष्ट्ट्ये, त्याची ऐतिहासिक पार्श्वभूमी, सुरूवात, विकास आणि सांस्कृतिक महत्त्व या सर्व गोष्टींचा बारकाईने अभ्यास केला आहे.

संस्कृतीचा विचार करता संस्कृती ही प्रत्येक समाजाची ओळख असून ती त्याच्या जीवनशैली, परंपरा, कला आणि सामजिक मूल्यांमध्ये प्रतिबिंबीत होते. संस्कृतीच्या विविध व्याख्यांमधून तिचे व्यापक स्वरूप स्पष्ट होते. संस्कृती ही **फक्त** भूतकाळातील परंपरांचा संग्रह नसून ती सतत विकसित होणारी जीवनपद्धती आहे. या अभ्यासात गोमंतकीय लोकसंस्कृतीचा परिचय प्रथमत: इथे दिला आहे. लोकसंस्कृती ही समाजाच्या मूळ ओळखीचा भाग आहे. लोकगीते, लोकनृत्य, परंपरा आणि सण यांद्वारे लोकसंस्कृती पिढ्यानद्या पुढे नेली जाते. ग्रामीण भागात जपल्या जाणाऱ्या परंपरांमधून लोकसंस्कृतीचे

वैविध्य दिसून येते.

गोमंतकात होणारे उत्सव आणि जत्रा या विषयाचा अभ्यास करताना गोव्याचे उत्सव आणि जत्रा हे येथील समृद्ध सांस्कृतिक आणि धार्मिक परंपरांचे प्रतीक आहेत असे जाणवले. हे उत्सव केवळ धार्मिक श्रद्धेशी संबंधित नसून, समाजातील एकता, परस्पर प्रेम आणि आनंद यांचे प्रतीक म्हणूनही ओळखले जातात. जांबावलीचा गुलाल उत्सव, पेडण्याची पूनव, गावागावात होणारे धालोत्सव, माशेलमधील गोपाळकाला, विविध ठिकाणी होणारे गडे, जत्रांपैकी, पातर्पा, बोडगेश्वर आणि लईराई इत्यादी जत्रा. यांसारखे विविध उत्सव आणि जत्रा गोव्याच्या सामाजिक आणि सांस्कृतिक जीवनाचा अविभाज्य भाग असल्याचे समजले.

उत्सवांमधून लोकांची परंपरांप्रती निष्ठा, देव-देवतांबद्दल श्रद्धा आणि सामाजिक ऐक्याचे दर्शन घडते. पारंपरिक रीतीरिवाज, लोककला, नृत्य, संगीत आणि भक्तीभाव यांचा सुरेख संगम या उत्सवांमधून आणि जत्रांमधून पाहायला मिळतो. गोव्यात होणारे हे उत्सव, जत्रा इत्यादींचा वारसा राज्याच्या सांस्कृतिक ओळखीचा भाग आहे. आपण तो पुढील पिढ्यांसाठी जपण्याची जबाबदारी आपली सर्वांची आहे असे आम्हाला वाटते .

'साळ येथील गडे' या विषयाची सखोल आणि विस्तृत माहिती मिळविण्यासाठी प्रत्यक्ष त्या ठिकाणी अनेक भेटी दिल्या. या अभ्यासा दरम्यान, स्थानिक लोकांच्या मुलाखती घेतल्या आणि प्रत्यक्ष निरीक्षणाद्वारे या जत्रेच्या विविध पैलूंची ओळख गड्यांच्या जत्रेतील वैशिष्ट्ट्ये, त्याची ऐतिहासिक पार्श्वभूमी, सुरूवात, विकास आणि सांस्कृतिक महत्त्व या सर्व गोष्टींचा बारकाईने अभ्यास केला. या सगळ्या गोष्टी या विषयामध्ये येताना दिसतात. ही जत्रा होळीच्या दिवसात होते. जेव्हा देवचार डोंगरावरील चूड दाखवतो तेव्हाच या जत्रेची सुरूवात होते हे कळले. परंपरेनुसार असा समज आहे की होळी जेव्हा पूर्णपणे उभी होत नाही, तेव्हा गावच्या डोंगराच्या माथ्यावरून चुड्ती दिसते तेव्हाच ती होळी पूर्णपणे उभी होते. हे सगळे आटपायला रात्रीचे ११.३० वाजतात. त्यानंतर विधीप्रमाणे होळीची पूजा केली जाते आणि गवत गोळाकरून होळी पेटवली जाते. पारंपरिक वाद्यांच्या तालावर आनंद उत्सव साजरा केला जातो.

दुसऱ्या दिवशी गड्यांच्या जत्रेची सुरूवात होते. गडे हा उत्सव तीन रात्रींचा खेळ असतो. गड्यांच्या जत्रेच्या दिवशी संध्याकाळच्या वेळी गावातील पुरूष- मुले रोमट खेळतात. त्या दिवशी सांगणे आणि गाऱ्हाणे होते. रात्री १२ वाजता गीत म्हटले जाते. माडीवरचा गडा नाचत गाजत येईपर्यंत चार वाजतात. नंतर त्या गड्याला होळी कडे आणून गाऱ्हाणे घालतात. नमन सुरू झाल्यावर ढोल सुरू होतात.कुणाची आंगवण होते. ती पुरी केली जाते. गड्यांचे सांगणे होते. ढोलाच्या आवाजावर पस्तीस चाळीस गडे ज्यांच्यावर भार आलेला असतो ते सगळे देवळाच्या पाठीमागे असलेला व्हाळ ओलांडून डोंगरावर जातात. इथेच गड्यांच्या देवचारांचा कार्यक्रम सुरू होतो. या जाणाऱ्या गड्यातले पाच गडे तरी देवचार लपवून ठेवतात. गड्यांना परत मागण्यासाठी देवचाराची चूड आणि जमावाला हुलकावणी देत पेटती चुडी घेऊन पळणारा देवचार इथे अनुभवायला मिळतो. गाण्याच्या बोलावर ढोलाच्या

तालावर गड्यांचे देवसपण सुरू होते. साडेसहाच्या सुमारास देवचार चूड दाखवतो. करे आणायला गेलेले गडे त्याच्याबरोबर देवळाच्या भोवती जमा झालेली गर्दी म्हणजे सर्व गोळा झालेला जमाव पुढचे सारे दृश्य पाहायला तयार होतो.

तिसऱ्या दिवशी गडे गावात असतात त्या दिवशी त्यांची समाप्ती होते. चाळो असतो ते पोहोचलेले पणती, दाणों आणतात. भूताकडून धावत येतात. गडे स्मशानभूमीतून घेऊन ते आणून होळी जवळ ठेवतात इथे अंदाजे ४० गडे असतात. ते झाल्यावर ते करीवर उडी मारतात. नंतर ज्या गड्याला जी वस्तू दिली जाते तो गडा उचलून घेऊन जातो आणि नंतर स्मशानभूमीत नेऊन ठेवतात. परत होळीकडे येऊन याची समाप्ती होते.

गोव्यात होणाऱ्या गड्यांपैकी पैंगीण, कुडणे (साखळी) आणि साळमधील गडे यांचा विचार करता यातून वैविध्यता जाणवते. यात होणाऱ्या विर्धीमधून काहीवेळा वेगळेपण जाणवते. काणकोण पैंगीण येथे होणारी जत्रा प्रत्येक तीनवर्षातून एकदा होते. परंतु साळ येथील होणारी गड्यांची जत्रा दरवर्षी होळीच्या वेळी होते. साळ येथील गडे डोंगरात जातात आणि तिथून करे म्हणजे लहान मातीच्या भांडी (बुडकुली) घेऊन परत येतात. मग ते होळीभोवती गोल फिरत नाचतात. गड्यांना विशेष विधीनंतर तेल लावले जाते आणि जत्रेच्या विविध विर्धीमध्ये सहभागी होता येते.

साळ येथे होणारी गड्यांची जत्रा महादेवाच्या मंदिराच्या परिसरात होते. तर पैंगीण इथे होणारी गड्यांची जत्रा वेताळ देवळाच्या परिसरात होते. गोमंतकात होणाऱ्या विविध उत्सवामध्ये स्त्रियांचा प्रत्यक्ष सहभाग अपवादाने आढळतो. मात्र साळ मध्ये होणाऱ्या गड्यांच्या जत्रेमध्ये महिलांचा समावेश होतो पण पैंगीणच्या गड्यांच्या जत्रेमध्ये महिलांचा समावेश नसतो. प्रत्येक वर्षी होळीची जबाबदारी वेगवेगळ्या घरांना दिली जाते असा प्रत्यक्ष अनुभव ऐकायची संधी इथे मिळाली. साळमधील महिलांच्या मते, गड्यांच्या उत्सवात स्त्रीयांच्या तुलनेने पुरुषांचा सहभाग जास्त असतो त्यांच्या मते गावातील मेलेल्या माणसांचे आवाज या दिवसात ऐकू येतात.

वर्तमानकाळात होणाऱ्या गडे उत्सवात काही चांगले बदल जाणवतात, पैकी पूर्वी या ठिकाणी जुगार खेळला जायचा. आता हे चालत नाही असे अभ्यासातून जाणवले. या अभ्यासात इथल्या लोकसंस्कृतीशी निगडीत दिवटी, अवसर, देवचार, गडा, मांड, होमखंड, रटा (कुंकवाचे पाणी) इत्यादी शब्द नव्याने अभ्यासायला मिळाले.

गोमंतकातील विविध लोकवाद्यांच्या परिचयाबरोबर 'चौघुल' सारख्या लोकवाद्याचा परिचय झाला. गडे पडणे हा प्रकार तसा भयप्रदच असून डिचोली, पेडणे, फोंडा, आदि तालुक्यातून हा गडे पडण्याचा प्रकार आढळतो हे सारे या अभ्यासाच्या निमिताने समजले.

(कु. दिक्षा मारुती खोत, कु. ओम श्रीकृष्ण सामंत, कु. वेदांत विनायक बांदोडकर कु. शेफाली संतोष गोवेकर, कु. मेहा हनुमंत परब या विद्यार्थ्यांनी माझ्या मार्गदर्शनाखाली हा प्रकल्प पूर्ण केला आहे.)

संदर्भग्रंथ :

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२. फळदेसाई पांडुरंग, गोमंतक संस्कृतीच्या पाऊलखुणा, मित्रसमाज प्रकाशन.प्रथम आवृत्ती.

३. माने वसुधा(संकलन) गोव्यातील धालो उत्सव, मकरंद साहित्य प्रकाशन.मुंबई.

४. आर्लेकर सुदेश, श्री. बोडगेश्वर, जागर प्रकाशन गोवा, प्रथम आवृत्ती.२०२४.

५. सातोस्कर बा. द ; गोमंतक प्रकृती आणि संस्कृती, सह्याद्री प्रकाशन २००९.

संजीव की कहानियों में आदिवासी विमर्श
'टीस' और 'ऑपरेशन जोनाकी' कहानी के विशेष संदर्भ में

प्रा. प्रितम साळगांवकर,

सहायक प्राध्यापक, हिंदी विभाग, सेंट झेवियर्स महाविद्यालय म्हापसा गोवा

Correspondence : Pritam.S@xavierscollegegoa.ac.in

सारांश :

आदिवासियों का अपना एक इतिहास रहा है। उनकी संस्कृति, खान-पान, रहन सहन सब कुछ अजूबा है। आदिवासी विस्थापन के कारण अपने जंगल, जमीन से दूर होता जा रहा है । लोक भुल जाते हैं कि आदिवासी भी एक इंसान हैं। अनेक साहित्यकारों ने आदिवासियों की परिस्थितियों को साहित्य के माध्यम से व्यक्त किया हैं, लेखक संजीव की कहानियों में दयनीय और पीड़ित स्थितियों के साथ साथ शोषित, उपेक्षित आदिवासी लोगों का विरोध का स्वर भी दिखायी देता हैं । उनके पात्र वेदना और संघर्ष से कहानी को सजीवता प्रदान करते हैं। प्रपत्र में संजीव की 'टीस' और 'ऑपरेशन जोनाकी' कहानियों के माध्यम से आदिवासी समाज की वेदना और संघर्ष को स्पष्ट करने का प्रयास किया है ।

आदिवासी साहित्य की अवधारणा :

"आदिवासी शब्द, दो शब्दों 'आदि' और 'वासी' से मिलकर बना है आदि का शाब्दिक अर्थ प्रारंभ या शुरू होना होता है एवं वासी का अर्थ निवास करने वाला माना जाता है, अर्थात जो प्रारंभ या शुरू से निवास करता हो, जिसका अर्थ हम मूल वासी या मूल निवासी मानते है ।''[1] आदिवासी समुदायों के स्थानीय लोक जहाँ निवास करते है उस क्षेत्र से उनका संबंध जीतने नजदीकी रहते हैं उतने ही विवादों से घिरे हुए भी रहते है। आदिवासी लोगों का मूल जीवन पूर्णतः पर्यावरण पर आधारित होता है । वे लोग पर्यावरण के साथ अपनी अलग संस्कृति एवं समाज के साथ दूरस्थ एवं दुर्गम वन्य क्षेत्रों में निवास करते रहे है ।

संजीव की कहानियों में आदिवासी विमर्श :

आधुनिक हिंदी साहित्य में संजीव का महत्वपूर्ण स्थान हैं । उनकी कहानियों की कथावस्तु मानवीय जीवन की समस्याओं से भरी हैं। संजीव की कहानियों का परिवेश मुख्यतः ग्रामीण क्षेत्र से सम्बन्धित है। लेखक ने दलित, पीड़ित, शोषित, एवं आदिवासी समुदाय की वेदना को अभिव्यक्ति दी है। उनके अधिकांश कहानियों के पात्र आदिवासी समाज से सम्बन्धित हैं। संजीव ने अपने लेखन में स्वयं कहा है "मैं अपनी उम्र की पाँच साल से लेकर दो हजार पाँच तक किसी न किसी रूप में आदिवासियों के बीच रहा हूँ। जितना उन्हें समझ पाया हूँ उन्हीं विचारों को मैं अपने साहित्य में स्थान देता हूँ ।"[2]

संजीव व्दारा लिखित 'टीस' कहानी में गरीबी, जातिगत भेद, नारी यौन शोषण तथा भ्रष्ट अधिकारी, गाँव प्रमुख तथा पुलिस द्वारा सामान्यजन का उत्पीडन व्यक्त हआ है। मुखिया के कारण लोग घर से बेघर बनाये गये, कहानी में गाँव के मन्दिर के पुजारी पंचानन भट्टाचार्य को आदिवासी लोगों का पूजा के लिए मन्दिर आना बिल्कुल अच्छा नहीं लगता है ।

कहानी का पात्र शिबू अपनी पत्नी माताई के साथ कांकड़ डीहा के आदिवासी क्षेत्र में रहता था अन्य आदिवासियों की तरह वह भी खेती करता था उसकी अपनी कोई संतान नहीं थी। जंगल में रहनेवाले इन आदिवासी सन्थालों की बस्ती के पास गाँव का मुखिया अपनी सुविधा और मुनाफे के लिए खुली खदान शुरु करता है। धीरे-धीरे सन्थालों के खेत खदान में समाते जाते हैं । आदिवासी अशिक्षित होने के कारण खदान मालिक उनके खेत का मुआवजा अत्यन्त कम देकर उन्हें चुप कराता है । अनपढ़ आदिवासियों में से कुछ गाँव छोड़कर अन्यत्र निकल जाते हैं तो कुछ वहीं खदान में मजदूर बन रह जाते हैं । शिबू के खेत नष्ट होने पर वह सपेरे का जीवन जीना शुरु कर देता हैं । आदिवासी सपेरे शिबूकाका की सुन्दर पत्नी माताई को पंडित ने अपनी वासना का शिकार बनाता है। माताई का पति शिबूकाका एक बार किंग कोबरा बेचने कलकता जाता है, तो अकेले माताई की सुन्दरता का पंडित पूरा फायदा उठाता है। पण्डित के कारण शिबूकाका की दुनिया उजड़ जाती है । कहानी में आदिवासी शिबूकाका इस वास्तविकता का प्रतिनिधि चरित्र हैं।

शिबूकाका अपनी पत्नी मताई और पण्डित के अनैतिक सम्बन्धों को बर्दाश्त न करने के कारण अपनी पत्नी की हत्या करता है, पण्डित उसके हाथों से बच निकलता है। शिबूकाका को हत्या के आरोप में जेल हो जाती है । ईमानदार डी.एस.पी. पण्डित को सजा दिलाने के लिए प्रयत्न करता है परन्तु सामाजिक, राजनीतिक दबावों के कारण वह कुछ नहीं कर पाता है ।भट्टाचार्य भ्रष्ट व्यवस्था की सहायता से निर्दोष रह जाता हैं । प्रतिशोध का पछतावा टीस बनकर शिबूकाका का पहले मानसिक सन्तुलन बिगाड़ती है और बाद में उसे मौत देती है।

नक्सलबाड़ी आंदोलन की पृष्ठभूमि में लिखी **'ऑपरेशन जोनाकी'** कहानी में जोनाकी गाँव जर्मींदार, पटवरी जैसे सामंतों के पास है । केवल बीस प्रतिशत संपदा आदिवासियों के पास है और उसे भी

सामंती हथियाना चाहते है । इसके लिए आदिवासियों के लिए पेड़ स्वयं काटना, जंगली संपदा से आजीविका करने के लिए प्रतिबंध लगाया जाता है और इसके लिए गाँव में पुलिस को बुलाया जाता है ताकि आदिवासियों पर सामंती के साथ साथ अन्याय अत्याचार भी बना रहे। जोनाकी गाँव के किसानों, आदिवासियों को सत्येन नामक युवक अपने अधिकारों के लिए लड़ने के लिए प्रेरित करता है तब उसे उस इलाके के भूस्वामी और संभ्रांत लोग अपने रास्ते में बाधा मानते हुए उसे रास्ते से हटाने का निर्णय लेते हैं , इस कार्य में पुलिस और प्रशासन भी उनका साथ देते हैं ।

 कहानी में दिखाया है की किस तरह वन विभाग के भ्रष्ट कर्मी, महाजनों ,अफसरों आदि द्वारा आदिवसियों का शोषण किया जाता है और पुलिस भी इस शोषण में अत्याचारियों के साथ नजर आती है । आदिवासी समाज बिना डरे संघर्ष के लिए तयार हुआ है लेकिन उन्हें देश के लिए घातक मानकर उन्हें कुचलने के ऑपरेशन में पुलिस अफसर अनिमेष दा का वहाँ आना होता है । कहानी का पात्र अनिमेष दा सामंती व्यवस्था के संदर्भ में कहानी में कहता है - “यह वन विभाग के कुछ भ्रष्ट कर्मी और कुछ वैसे ही भ्रष्ट महाजन अफसर,जोतदार और इनके गूंगे यहीं है न आपके शांती प्रिय प्रतिष्ठित नागरिक ?” इस कथंन के द्वारा सामंती व्यवस्था व्दारा किस प्रकार आदिवासी समाज का शोषण होता है इसका चित्रण संजीव ने इस कहानी में चित्रित किया है। प्रस्तुत कहानी में   सत्येन जैसे शिक्षित युवक के सहयोग के द्वारा आदिवासी समाज अपने अधिकारों के प्रति कहानी में सचेत होता दिखायी देता है ।तो दूसरी ओर अन्याय के विरुद्ध आवाज़ उठाने वाले आदिवासी, उनका नेतृत्व करने वाले युवा ही किस प्रकार भ्रष्ट व्यवस्था व्दारा देश के लिए घातक घातक सिद्ध किए जाते हैं इसका चित्रण किया हैं

मानव की प्रगति का महत्त्वपूर्ण माध्यम शिक्षा ही है । शिक्षा के सहारे मनुष्य अपना पारिवारिक, सामाजिक और आर्थिक विकास कर सकता है। अशिक्षित व्यक्ति दूसरों के शोषण का शिकार बड़ी आसानी से हो जाता है। संजीव ने एक ओर टीस कहानी में शिक्षा से वंचित गरीब, शोषित, पीड़ित लोगों की दयनीय स्थिति को उजागर किया है। कहानी में लोगों का विस्थापन, उन पर होने वाले अन्याय , शोषण करने वाली पूँजीपति व्यवस्था के प्रति आक्रोश कर शोषण की पोल खोलता हैं उसी प्रकार ‘ऑपरेशन जोनाकी’ कहानि में संजीव आदिवासी समाज को अपने अधिकार के प्रति सचेत करते नजर आते है। उनका नेतृत्व करने वाले युवा ही किस प्रकार भ्रष्ट व्यवस्था व्दारा देश के लिए घातक घातक सिद्ध किए जाते हैं इसका वर्णन भी करते हैं ।

निष्कर्ष :

आदिवासी समाज का संघर्षशील इतिहास संजीव की कहानियों में दिखायी देता है। उनकी कहानी में प्रेम की जगह संघर्ष है, पिछड़ी जनजाति का दर्द है । उनकी कहानियों की कथावस्तु मानवीय जीवन की समस्याओं से से भरी है। संजीव की कहानियों के पात्र अशिक्षा के कारण जर्मींदार,

पूंजीपति तथा सरकारी अधिकारियों के अत्याचार का शिकार हुए हैं। पीडित नारियों के प्रति संजीव की सम्पूर्ण सहानुभूति परिलक्षित होती है। संजीव के कथा साहित्य में मानव जीवन का हर पहलू विद्यमान है। गाँव, नगर, शहर, आदिवासी, दलित, शोषित, पीड़ित, शोषक, नारी, पुरुष सभी का परिवेश और जीवन उनके कहानियों में समाहित है।

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