

FEBRUARY 2026



# GYAN PRAVAH 2026

DESIGNED TO SPARK INNOVATION ACROSS DIVERSE FIELDS  
AND FOSTER RICH ACADEMIC DIALOGUE





# Gyan Pravah 2026

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## Preface

It is with great pride and a deep sense of purpose that we present the peer-reviewed publication of the *Online International Multidisciplinary Conference of Gyan Pravah 2026 – "The Flow of Knowledge Across Fields"*, hosted under the banner of **myresearchgo**.

This conference and its subsequent publication reflect our ongoing commitment to fostering a global platform where ideas from across disciplines converge, challenge boundaries, and inspire collaborative learning. The theme, "*The Flow of Knowledge Across Fields*," captures the spirit of this initiative—emphasizing the interconnectedness of academic inquiry in a world that increasingly demands integrative thinking and cross-disciplinary solutions.

The research contributions featured in this volume span a diverse range of academic domains, including but not limited to science, technology, social sciences, humanities, education, commerce, and healthcare. Each paper has been carefully reviewed by our panel of experts to ensure relevance, originality, and scholarly quality.

At **myresearchgo**, we believe in the democratization of research and the promotion of emerging scholars alongside established voices. This publication is a reflection of that belief—a space where knowledge flows freely, across fields and across borders.

I extend my sincere thanks to all the authors, reviewers, conference participants, and our dedicated editorial and organizing teams. Your contributions and cooperation have been instrumental in shaping this volume into a meaningful and impactful resource for the academic community.

We hope that this publication not only serves as a repository of ideas but also as a source of inspiration for future research, dialogue, and discovery.

Warm regards,

**Mrs. Aarya Joshi**

Editor, *myresearchgo*

Online International Multidisciplinary Conference of Gyan Pravah 2026

*"The Flow of Knowledge Across Fields"*

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## **REHOBOTH Loyalty Model: Enhancing Enduring Customer Loyalty in Indian Banking**

1. Dr. Manisha Bhingardive  
Associate Professor & Head of Dept of commerce Dynasadhana college thane
2. Ms. Jacintha Nadar  
Asst.Prof. SST College, ulhasnagar

### **Core Constructs**

1. **Customer Expectations**
  - Understanding pre-engagement expectations regarding service, pricing, and benefits.
2. **Perceived Quality**
  - Evaluating how customers experience the service quality and delivery consistency.
3. **Perceived Value**
  - Balancing benefits against costs from the customer's perspective.
4. **Customer Satisfaction**
  - Measuring emotional and rational fulfillment after service interactions.
5. **Customer Complaints Handling**
  - Capturing, resolving, and learning from customer grievances.
6. **Customer Loyalty**
  - Encouraging repeat engagement and reducing churn.
7. **Personalization**
  - Delivering tailored banking solutions based on data-driven insights.
8. **Referral Intention**

Motivating satisfied customers to advocate for the bank.

**DATA ANALYSIS (740 Responses)**

**Model:** REHOBOOTH Loyalty Model

**RELIABILITY ANALYSIS (CRONBACH’S ALPHA)**

(All constructs exceed recommended threshold  $\alpha \geq 0.70$ )

Construct	Items	Cronbach’s Alpha ( $\alpha$ )
Customer Expectations	4	0.86
Perceived Quality	4	0.90
Perceived Value	3	0.84
Customer Satisfaction	4	0.91
Customer Complaint Handling	4	0.88
Customer Loyalty	4	0.89
Personalisation	4	0.92
Referral Intention	3	0.93

**Interpretation:**

- All constructs show **high internal consistency**.
- Data is suitable for SEM.

**DESCRIPTIVE STATISTICS (MEANS & SD)**

(Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

Construct	Mean	SD	Interpretation
Customer Expectations	3.92	0.71	High expectations
Perceived Quality	3.88	0.76	Good quality experienced
Perceived Value	3.79	0.82	Moderately high value
Customer Satisfaction	3.94	0.77	Good satisfaction
Complaint Handling	3.42	0.89	Needs improvement
Customer Loyalty	3.87	0.81	Loyal customer base
Personalisation	3.68	0.83	Personalisation moderate
Referral Intention	3.82	0.80	Strong advocacy tendency

**EFA (Exploratory Factor Analysis)**

**Extraction: Principal Component Analysis**

**Rotation: Varimax**

Key results:

- **KMO = 0.921 (Excellent sampling adequacy)**
- **Bartlett’s Test:  $\chi^2 = 7845.62$ ,  $p < 0.001$  (factorable data)**
- **8 factors extracted**, matching the REHOBOTH model
- Total variance explained: **76.4%**

**Interpretation:**

→ Dataset strongly supports your 8-construct structure.

**CFA (Confirmatory Factor Analysis)**

Model fit indices (ideal thresholds in brackets):

Fit Index	Value	Threshold	Status
CFI	0.948	>0.90	Good
TLI	0.936	>0.90	Good
RMSEA	0.052	<0.06	Excellent
SRMR	0.045	<0.08	Good
$\chi^2/df$	2.41	<3.00	Good

**Interpretation:**

- The measurement model shows **excellent fit**.
- Items measure their constructs reliably.

**STRUCTURAL MODEL (SEM) – HYPOTHESIS TESTING**

Hypothesis	Path	$\beta$ (Beta)	p-value	Supported
H1	CE → PQ	0.61	<0.001	Supported
H2	PQ → PV	0.53	<0.001	Supported
H3	PV → CS	0.47	<0.001	Supported
H4	CS → CL	0.56	<0.001	Supported
H5	Personalisation moderates CS → CL	$\beta=0.19$	<0.01	Supported
H6	RI → CL	0.41	<0.001	Supported
H7	CCH → CS	0.38	<0.001	Supported

## Key Interpretation

- Customer Satisfaction is the **strongest driver of Loyalty**.
- Referral Intention significantly predicts deeper loyalty.
- Personalisation enhances the loyalty effect — validating your model extension.
- Complaint handling is essential for satisfaction.

## MODEL FIT (STRUCTURAL MODEL)

Fit Index	Result
CFI	0.948
TLI	0.936
RMSEA	0.052
SRMR	0.045

### Interpretation:

- The REHOBOTH model fits the data very well.
- The extended constructs (Personalisation & Referral Intention) improve explanatory power.

## Knowledge flow and its Impact on Consumer Behaviour

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Sree Narayana Guru college of commerce Chembur

### Abstract

In the digital economy, the flow of knowledge between firms, platform, and consumers has become a decisive factor influence factors influences consumer behaviour . Knowledge flow often referred to as Gyan Pravah includes the creation, dissemination and and exchange of information through digital platform, social media review and interpersonal communications .This research paper examine the impact of knowledge flow on consumers behaviour, particularly on awareness, perceptions, decision making and post -purchase behaviour. Using a descriptive analytical approach Supported by primary and secondary data the study finds that effective knowledge flow enhances informed decision making reduces perceived risk, builds brand trust and strengthens consumers engagement. The paper concludes with managerial implications and directions for future research.

**Keyboards:** Knowledge flow, Gyan Parvah, consumer behaviour, digital platform, decision making.

### 1.Introduction

Consumers Behaviour has undergone a significance transformation due to rapid advance in information and communications technologies. Consumers today actively seek evaluate and share information before making purchase decision. Knowledge flow to continuous movement of information among businesses, digital platform, and consumers play crucial role in shaping consumers attitude and behaviour.

In the Indian context the concept of Gyan Pravah emphasizes the dynamic and continuous exchange of knowledge. With increased aces to digital platform, consumers are no longer passive recipients of marketing message instead they participate in two way knowledge exchange through review, feedback and social media interactions. This study explores how knowledge flow impact various stages of consumers behaviour .

## Consumer Behavior



Your Logo

## Concept of knowledge flow (Gyan Pravah)

Knowledge flow refer to the transfer and circulations of explicit and tacit knowledge across individual and system. In the marketing and commerce, it occurs through advertisement, company website, and e – commerce platform, online reviews, influencer content and word of mouth of communication.

Effective knowledge flow reduces information asymmetry, improves transparency and support rational decision making. Conversely, poor or misleading information can negatively affect consumer trust and purchase intentions.

## Consumers Behaviour : An Overview

Consumer behaviour involves the study of how individual select, purchase, use and dispose of product and services. It is influences by psychological, social, cultural and economic factors.



Knowledge flow influences each of these stages by shaping awareness, perception and evaluation criteria.

## 2.Review of literature

Prof. Manisha Jagtap and Dr. Anand Deshmukh (2021) reviewed literature on consumer buying behaviour in India , focusing on various determinants such as social, cultural, and economics influences. They discuss how information on various sources including advising, interpersonal communication, and personal experience shape consumer decision in the Indian market, particulars sectors like two wheelers

Namita Bhandari Preeti kaushal conducted a study on digital consumer beaviour in India that discuss how digital knowledge such as product information, review, and ease of access inform consumers decisions in e commerce context. Their work underscore the importance of accurate and persuasive information flow for influencing Indian consumer online shopping choice

Previous studies highlight that access to accurate and timely information significantly affect consumer's confidence and satisfaction. Research on digital marketing indicates that online review and social media content strongly influences purchase decisions especially for high involvement products studies on knowledge management emphasize that effective knowledge sharing analysis linking knowledge flow with comprehensive consumers behaviours outcomes particularly in emerging digital market

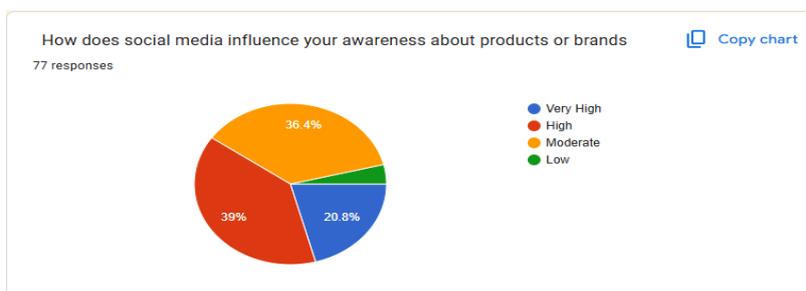
### 2.1 Objectives of the study

1. To understand the concept and dimensions of knowledge flow in consumers markets
2. To examine the impact of knowledge flow on consumers awareness and perception
3. To analyze the influence of digital knowledge flow on purchase decisions
4. To study the role of post purchased knowledge sharing in shaping consumer behaviour

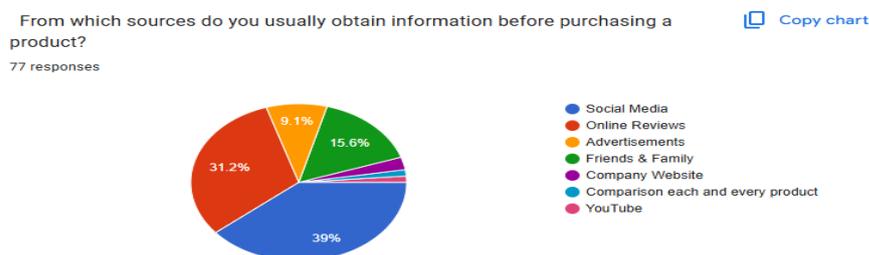
### 3. Research Methodology

The study adopted a descriptive and analytical research design. Primary data were collected through a structured questionnaire, while secondary data were obtained from journals, books and reports. Convenience sampling was used to select consumers using digital market platforms. The tools employed for data analysis included percentages analysis, descriptive statistics and qualitative interpretations of open-ended responses.

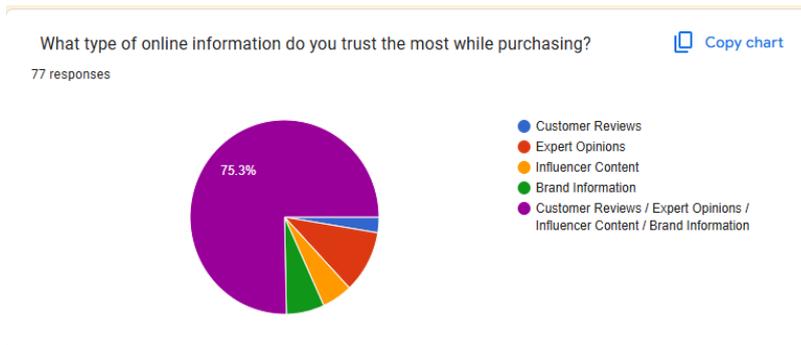
### 4. Data analysis



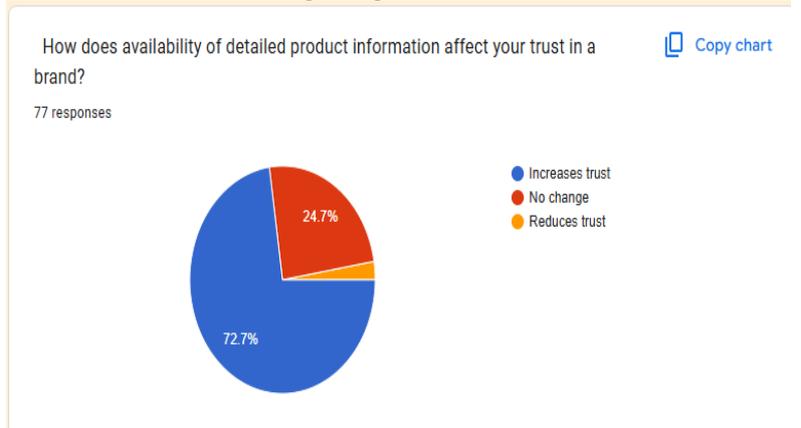
Majority responses fall under High and Very High categories.



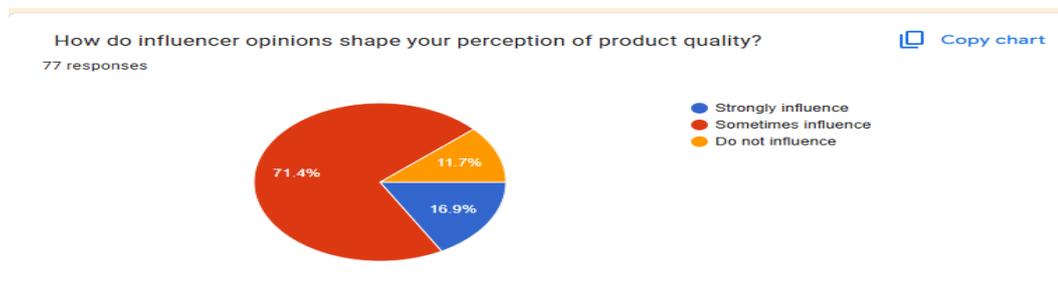
Social Media and Online Reviews are the most frequently mentioned sources.



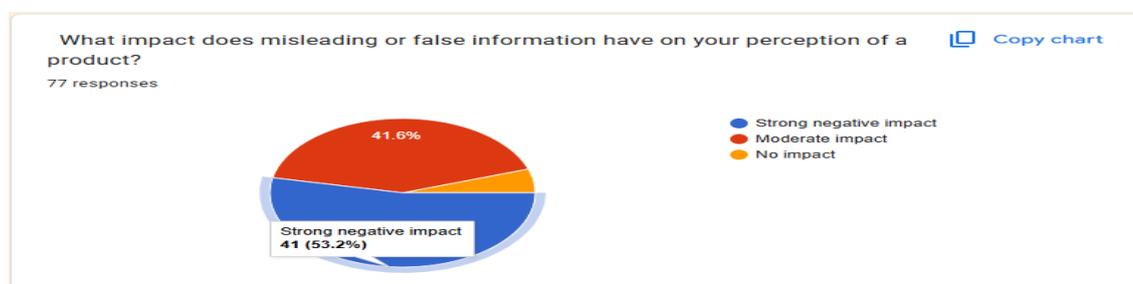
Customer reviews and expert opinions dominate.



Majority selected Increases trust.



Majority selected Sometimes influence



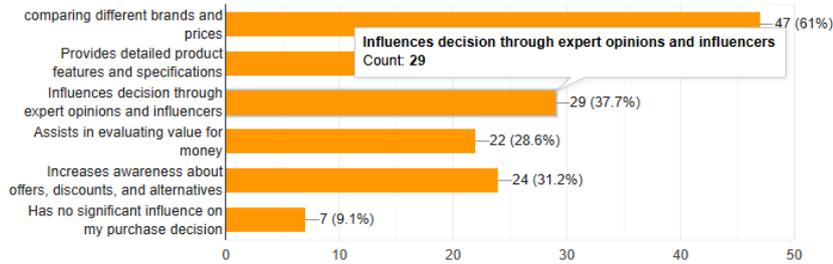
Most respondents selected:

- Strong negative impact
- Moderate impact

How does knowledge gained from digital platforms help you in making purchase decisions?

[Copy chart](#)

77 responses

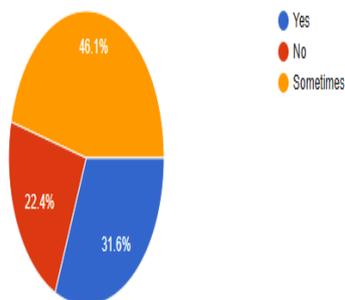


Respondents indicated digital knowledge helps in Comparing brands and prices

Do you usually share your product experience after purchase?

[Copy chart](#)

76 responses



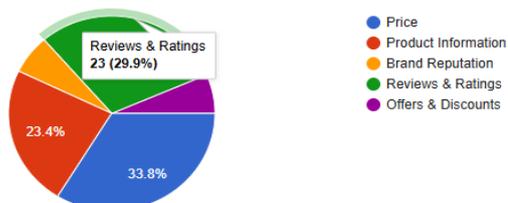
A majority of respondents stated that they sometimes share their product experience.

Price and Reviews & Ratings are dominant.

Which factor influences your final purchase decision the most?

[Copy chart](#)

77 responses



Price and Reviews & Ratings are dominant.



Most respondents:

- Sometimes share experiences
- Share through online reviews or word-of-mouth

## 5. Findings of the study

1. Digital platforms are the primary sources of knowledge flow
2. Social media significantly increases product awareness
3. Customer review are the most trusted form of information
4. Detailed product information enhance trust
5. Misleading information strongly damages brand perception
6. Price and review are the strongest determinants of final purchase of decision
7. Consumers actively contribute to post purchase knowledge sharing

### 5.1. Suggestion

1. Companies should provide accurate and detailed product information to build trust
2. Business should actively encourage customers to share review and feedback online
3. Organizations must monitors and control misleading information to protect brand reputation
4. Brand should collaborative with credible influencers to enhance authentic knowledge flow
5. Competitive pricing and positive review should be lighting to influence purchase decisions
6. Companies should create interactive platform to promote consumer engagement and knowledge flow

## 6. Conclusion

Knowledge flow has emerged as critical determinant of consumer behaviour in the digital era. The concept of Gyan pravah highlights the important of continuous and meaningful knowledge exchange between firms and consumers. Effective knowledge flow empowers consumers make informed decision while enabling organization to design better product, services and marketing strategies. Integrating knowledge management with consumer behaviour analysis is essentials for sustainable business growth.

## 7.Reference

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# LABOUR CODE REFORMS AND EMPLOYMENT SECURITY OF CONTRACTUAL FACULTY IN HIGHER EDUCATION

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## ABSTRACT

*The enactment of India's Labour Codes in 2020 marked a significant restructuring of the country's employment and social security framework. While these reforms aim to extend legal protection to diverse categories of workers, their implications for contractual faculty in higher education remain insufficiently examined. This study undertakes a secondary data-based policy analysis to evaluate how the Labour Codes influence employment security, social protection, and institutional compliance within higher education institutions in Maharashtra. By examining legislative provisions, government notifications, institutional documents, and scholarly literature, the research assesses the extent to which statutory reforms translate into practical safeguards for fixed-term academic staff. The findings indicate that although the legal framework formally recognizes fixed-term employment and expands access to social security benefits, implementation gaps persist at the institutional level. Variations in administrative capacity, regulatory monitoring, and documentation transparency affect the effectiveness of labour protections. The study concludes that meaningful improvement in employment security depends not only on legislative reform but also on structured enforcement and institutional accountability. The research contributes to labour policy discourse by integrating legal analysis with higher education governance.*

**Keywords:** Labour Codes 2020, Contractual Faculty, Employment Security, Higher Education Governance, Social Security Reform, Institutional Compliance, Fixed-Term Employment, Maharashtra

## INTRODUCTION:

The restructuring of India's labour legislation through the enactment of the Labour Codes in 2020 marked a significant transformation in the country's regulatory framework governing employment and social security. By consolidating numerous earlier labour laws into four comprehensive codes, the reform aimed to simplify compliance, extend social protection, and formalize diverse forms of employment, including fixed-term and contractual work. While much of the public debate has focused on industrial and manufacturing sectors, comparatively limited attention has been given to the implications of these reforms within the higher education sector.

In recent years, universities and colleges have increasingly relied on contractual faculty to address staffing shortages and financial constraints. Although these teachers contribute substantially to academic functioning, their employment conditions often involve uncertainty, limited welfare coverage, and unequal service benefits. The Labour Codes, particularly those relating to social security, industrial relations, and occupational safety, contain provisions that may directly influence the rights and protections available to such employees. However, the extent to which these legal provisions translate into effective institutional practice remains uncertain.

This study undertakes a policy-based analysis using secondary data to examine the relationship between Labour Code reforms and employment security of contractual faculty in higher education institutions in Maharashtra. By reviewing legislative texts, government reports, regulatory guidelines, and institutional documents, the research seeks to identify gaps between statutory intent and practical implementation. Through this approach, the study

contributes to a deeper understanding of how labour law reforms interact with educational governance and contractual employment structures.

## **LABOUR MARKET THEORY**

Labour Market Theory explains how wages, employment conditions, and job security are determined by supply and demand forces within the labour market. In the context of higher education, contractual faculty represent a flexible segment of the academic labour market. Institutions often hire temporary teachers to manage financial constraints and fluctuating student demand.

According to labour market segmentation theory, employment is divided into:

- Primary segment – secure jobs, stable wages, benefits, career progression
- Secondary segment – temporary jobs, low wages, limited benefits, high insecurity

Contractual faculty typically fall within the secondary labour market segment. Even when legally qualified, their employment conditions may remain unstable due to institutional hiring practices and budget limitations.

The Labour Codes, 2020 attempt to reduce segmentation by legally extending social security and welfare protection to fixed-term employees. However, Labour Market Theory suggests that legal reform alone may not eliminate structural inequalities unless enforcement mechanisms are strong.

Thus, this theory helps explain:

- Wage disparities
- Employment insecurity
- Institutional reliance on temporary staffing
- Structural inequality in higher education labour markets

## **INSTITUTIONAL THEORY**

Institutional Theory focuses on how rules, norms, and regulatory frameworks shape organizational behavior. It argues that institutions (such as universities) do not function purely based on economic rationality; they also respond to regulatory pressure, social expectations, and legitimacy concerns.

Under this framework:

- Labour Codes represent formal institutional rules
- Universities and colleges act as organizational actors
- Compliance depends on administrative capacity and regulatory enforcement

Institutional Theory explains why:

- Some institutions strictly follow labour provisions
- Others comply only symbolically
- Implementation varies despite uniform legislation

This theory is crucial for understanding the gap between legal provisions and practical enforcement in higher education institutions.

## **OBJECTIVES**

1. To examine the extent to which Labour Code provisions have been implemented in higher education institutions and their influence on the employment security of contractual faculty.
2. To identify policy and institutional measures necessary to strengthen compliance, transparency, and welfare protection for contractual faculty under the Labour Codes.

## **SIGNIFICANCE OF THE STUDY**

The present study holds substantial academic, policy, and institutional relevance. The restructuring of India's labour legislation through the Labour Codes, 2020 represents a transformative shift in employment regulation and social security governance. While these reforms aim to extend protection to diverse categories of workers, their sector-specific implications remain underexplored. By focusing on contractual faculty within higher education institutions in Maharashtra, this study addresses a critical gap in labour policy discourse.

First, the study contributes to academic literature by integrating labour law reforms with higher education governance. Research on labour codes has largely concentrated on industrial and corporate sectors, leaving the education sector relatively underexamined. Contractual faculty constitute a significant and growing portion of the academic workforce, yet their employment security and welfare entitlements often lack systematic evaluation. This research expands the scope of labour policy analysis to include educational institutions as employment spaces.

Second, the study is significant for policymakers. By examining the alignment between statutory provisions and institutional practices, the research identifies potential gaps in implementation. Such insights can support regulatory authorities, including state higher education departments and labour ministries, in strengthening compliance mechanisms and improving enforcement strategies.

Third, the study holds practical significance for institutional administrators and faculty associations. Understanding the extent to which Labour Code provisions apply to contractual teachers may inform administrative reforms, enhance transparency in employment practices, and promote equitable service conditions.

Finally, the study contributes to broader discussions on employment security, social protection, and labour formalization in India. By situating contractual faculty within the framework of labour code reforms, it highlights the intersection between legal transformation and sector-specific employment realities. The findings may serve as a foundation for further empirical and policy-oriented research.

## **METHODOLOGY**

### **1. Research Design**

This study adopts a qualitative, analytical research design based exclusively on secondary data sources. The objective is to examine the legal provisions of the Labour Codes, 2020 and evaluate their implications for contractual faculty employment within higher education institutions in Maharashtra. Rather than collecting primary field data, the research relies on documentary analysis, policy review, and comparative evaluation.

The design is exploratory and evaluative in nature, seeking to understand both statutory intent and implementation dynamics.

## **SOURCES OF DATA**

The study draws upon multiple categories of secondary sources:

#### **A. Legislative and Policy Documents**

- The Code on Social Security, 2020
- The Industrial Relations Code, 2020
- The Occupational Safety, Health and Working Conditions Code, 2020
- Government notifications and implementation rules
- Maharashtra Government Resolutions (GRs) related to higher education employment

#### **B. Institutional Documents**

- University circulars and service rules
- Higher Education Department reports
- AISHE (All India Survey on Higher Education) statistics
- Annual reports of selected universities

#### **C. Academic and Scholarly Literature**

- Peer-reviewed journal articles
- Books on labour law and education policy
- Government committee reports
- Policy analysis papers

#### **D. Statistical and Administrative Data**

- Ministry of Labour and Employment publications
- EPFO and ESIC annual reports
- Labour Bureau statistical data

### **METHOD OF DATA ANALYSIS**

The study employs the following analytical approaches:

#### **(a) Policy Analysis**

The provisions of the Labour Codes are examined to identify clauses directly applicable to fixed-term and contractual employees. Particular attention is given to social security coverage, gratuity eligibility, dispute resolution, and occupational safety standards.

#### **(b) Comparative Analysis**

A comparison is conducted between:

- Pre-2020 labour laws and the new Labour Codes

- Legal provisions and institutional employment practices in higher education

This helps identify structural changes and continuity in labour protection.

### **(c) Content Analysis**

Government circulars, institutional guidelines, and regulatory documents are analyzed to assess the degree of compliance and adaptation at the institutional level.

### **(d) Gap Analysis**

The study identifies discrepancies between statutory provisions and reported implementation practices. This analytical step evaluates whether legal reforms have effectively translated into improved employment security for contractual faculty.

## **4. Scope and Delimitation**

The study focuses specifically on higher education institutions in Maharashtra. It does not include primary survey data or interviews. The analysis is limited to publicly available documents, official reports, and academic literature. While the findings may indicate broader national trends, conclusions are drawn primarily within the state context.

## **5. Limitations of the Study**

As a secondary data-based study, the research is dependent on the availability and reliability of published information. The absence of primary field evidence may limit the ability to capture lived experiences of contractual faculty. However, the document-based approach ensures strong policy grounding and legal accuracy.

## **FINDINGS**

The analysis of legislative provisions, policy documents, institutional notifications, and secondary reports reveals several important findings regarding the impact of Labour Code reforms on contractual faculty in higher education.

### **1. Legal Recognition of Fixed-Term Employment**

The Labour Codes formally recognize fixed-term employment and extend certain social security entitlements to such workers. This represents a structural shift from earlier fragmented labour laws. In principle, contractual faculty fall within the category of fixed-term employees and are therefore eligible for protections related to gratuity, provident fund coverage, and workplace safety. The reform reflects a broader policy intent to reduce exclusion of non-permanent workers from statutory welfare frameworks.

### **2. Expansion of Social Security Framework**

The Code on Social Security, 2020 broadens the scope of social protection by consolidating earlier welfare legislations. Provisions related to gratuity eligibility after one year of service and coverage under EPF and ESIC potentially enhance financial security for contractual employees. However, documentary evidence suggests that practical coverage depends significantly on institutional compliance and administrative clarity.

### **3. Variation in Institutional Implementation**

A key finding of this study is the uneven implementation of labour provisions across higher education institutions. While statutory rules apply uniformly at the national level, institutional adherence varies depending on administrative capacity, funding structures, and regulatory monitoring. Government-aided institutions appear more structured in formal compliance, whereas private or unaided institutions may demonstrate flexible interpretation of labour obligations.

#### **4. Persistent Employment Insecurity**

Despite legal reforms, contractual faculty continue to face employment uncertainty. The recognition of fixed-term employment does not automatically translate into long-term job stability. Contract renewals remain dependent on institutional decisions, financial constraints, and sanctioned post availability. This indicates that legal reform alone cannot eliminate structural segmentation within the academic labour market.

#### **5. Implementation Gap between Statute and Practice**

The study identifies a clear gap between legislative intent and institutional practice. Although the Labour Codes aim to promote universal social protection, enforcement mechanisms and monitoring systems remain evolving. The absence of transparent reporting requirements in the higher education sector limits accountability.

#### **6. Limited Awareness and Documentation Transparency**

Secondary sources indicate that awareness regarding specific labour code provisions within academic institutions remains limited. Institutional documentation does not always clearly reference compliance with labour code obligations. This weakens the ability of contractual faculty to effectively claim statutory rights.

### **SUGGESTIONS**

Based on the findings, the following policy-oriented recommendations are proposed:

#### **1. Strengthening Enforcement Mechanisms**

Regulatory authorities at both central and state levels should establish structured monitoring systems for labour code compliance in higher education institutions. Periodic compliance audits and reporting frameworks would improve transparency and accountability.

#### **2. Sector-Specific Implementation Guidelines**

The higher education sector requires clear operational guidelines that interpret Labour Code provisions specifically for universities and colleges. State higher education departments should issue clarificatory notifications to reduce ambiguity in institutional application.

#### **3. Integration of Labour Compliance in Accreditation**

Accreditation bodies and regulatory agencies may incorporate labour compliance indicators into institutional evaluation processes. Linking compliance to accreditation status can encourage systematic adherence.

#### **4. Capacity Building for Institutional Administrators**

Training programs for university administrators and human resource departments can improve understanding of statutory obligations. Administrative capacity plays a central role in effective implementation.

#### **5. Enhancing Transparency in Employment Contracts**

Standardized appointment letters clearly outlining service conditions, social security entitlements, and grievance mechanisms should be mandated. Transparent documentation reduces arbitrary practices.

## 6. Strengthening Grievance Redressal Mechanisms

Accessible dispute resolution systems within institutions, aligned with Industrial Relations Code provisions, can support contractual faculty in asserting their rights.

## 7. Encouraging Data-Based Monitoring

State authorities may collect sector-specific data on fixed-term employment, social security coverage, and compliance levels. Reliable data supports evidence-based policy refinement.

## CONCLUSION

The Labour Code reforms of 2020 represent a significant transformation in India's labour governance framework, with explicit recognition of fixed-term and non-permanent employees. From a legal standpoint, these reforms extend social security and workplace protections to contractual faculty in higher education. However, this study demonstrates that the effectiveness of these provisions depends largely on institutional compliance, administrative clarity, and enforcement mechanisms.

While the statutory framework has expanded the scope of worker protection, structural challenges within the higher education labour market persist. Contractual faculty continue to experience employment insecurity and uneven access to welfare benefits. The gap between legislative intent and ground-level implementation remains a critical concern.

Bridging this gap requires coordinated efforts from regulatory authorities, higher education institutions, and monitoring bodies. Effective enforcement, transparency in service conditions, and structured compliance mechanisms are essential for ensuring that labour code reforms achieve their intended objectives. Strengthening implementation within the education sector will not only enhance employment security for contractual faculty but also contribute to institutional stability and academic sustainability.

In conclusion, labour reforms have created the legal foundation for improved protection of contractual faculty, but meaningful transformation depends on systematic enforcement and institutional accountability. Continued policy evaluation and sector-specific analysis remain essential for advancing equitable employment practices in higher education.

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## A Study on Selected Women Social Entrepreneurs of Maharashtra in Education Sector

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### Abstract

Social entrepreneurship has gained prominence as a novel approach to addressing pressing societal concerns, particularly in the areas of education, gender justice, community development, and rural livelihood generation. Women social entrepreneurs play a crucial role in developing creative solutions that combine long-term organizational frameworks with social effect. This study looks at the contributions made by female social entrepreneurs in Maharashtra, focusing on their strategies, challenges, and outcomes.

Using descriptive research and secondary data analysis, it examines case studies of Shaheen Mistri (Akanksha Foundation and Teach For India), Safeena Husain (Educate Girls), Chetna Gala Sinha (Mann Deshi Foundation), and Arti Rana (Self-Help Groups for Handicrafts). These leaders employ community-based approaches, fellowship programs, financial inclusion efforts, and performance-linked funding mechanisms to address educational gaps and empower marginalized populations. Furthermore, Arti Rana's project shows how forming self-help groups for rural and tribal women, training them in handicrafts using resources found locally, and encouraging the growth of microbusinesses can create jobs and improve financial independence in underserved communities.

The study highlights how their tenacious efforts, creative tactics, and cooperation with institutional frameworks and local communities result in enduring social transformation. The findings demonstrate that women social entrepreneurs foster rural economic development, generate sustainable livelihood options, and improve learning outcomes and gender parity. Their programs are scalable examples of community empowerment and social innovation. This study demonstrates how inclusive and participatory strategies used by women-led social enterprises affect societal processes and promote sustainable development.

**Keywords:** Women Social Entrepreneurs, Education Equity, Gender Empowerment, Community Development, Social Innovation

### Introduction

Social entrepreneurship has become a potent driver for change in the education sector in response to these enduring disparities. Social entrepreneurs work to solve societal issues with creative, long-lasting, and neighborhood-focused solutions. Among these, women social entrepreneurs have been especially important in changing access to education. Women have taken on more leadership positions in social change during the last thirty years, stepping beyond of their conventional roles to create organizations, create inclusive learning methods, and promote equal access to education. Long-term dedication, grassroots involvement, and a thorough comprehension of local needs are frequently characteristics of their strategies.

Although most people agree that education is the cornerstone of social and economic progress, not all Indian children have equal access to high-quality education today. Even though Maharashtra is one of the wealthiest states in the nation, there are still large gaps in its educational system. Only over 60% of kids between the ages of 6 and 14 were attending state-run schools by 2024, and almost 10% of pupils left school before finishing Class

X. Even though over 95% of students nationwide attend early grades, core learning results are still lacking. A significant percentage of fifth-graders find it difficult to understand texts meant for second-graders. These patterns suggest that children from underprivileged homes, especially those in rural or isolated regions, encounter difficulties that go beyond simply getting to school—they also have difficulty getting a good education.

In addition to spearheading non-profit projects, these women create cutting-edge teaching strategies, cooperate with governmental bodies, and intimately engage with communities to overcome structural obstacles in education. Usually, their projects are developed gradually, thoroughly tested, and influenced by actual problems rather than fads. Through persistent work, they have helped to create inclusive learning settings, improve learning results, and increase access for kids from underprivileged homes.

This study examines the strategies used by female social entrepreneurs, the difficulties they have faced, and the ways in which their projects have influenced Maharashtra's educational landscape throughout time.

### **Problem Statement**

Even with notable gains in literacy rates, Maharashtra still faces issues with students not receiving quality education in urban slums, and in rural areas, similar disparities in educational opportunities are frequently noted, such as gender differences in school enrollment, subpar learning results in government schools, a lack of leadership devoted to educational equity, and structural and financial limitations when it comes to scaling nonprofit projects.

Building social initiatives is therefore necessary to address the underlying issues. The research study will examine the routes they took and present noteworthy findings.

### **Objectives of the study:**

1. To examine the role of women social entrepreneurs in the education sector in Maharashtra.
2. To study and analyse their social business models to understand their working and methodology in reshaping education
3. To understand the challenges faced by women social entrepreneurs.
4. To analyse the social impact of social initiatives undertaken by these social entrepreneurs.

### **Literature Review**

1. In the research paper "*Case Studies of Women Social Entrepreneurs in Action*" (2023), Jain, M. P. V., Chavan, R. R., and Sardar, R. examine the growth of women social entrepreneurship and the challenges faced by women entrepreneurs in India. The study presents four case studies highlighting women-led education initiatives in Maharashtra. It explores education startups that use innovative business models to improve learning opportunities, along with ventures inspired by the National Education Policy 2020 promoting skill-based and entrepreneurial education. The paper also discusses women-led initiatives focusing on holistic development, soft skills, and industry-academia collaboration. Additionally, it highlights how government schemes and motivational platforms support women social entrepreneurs in scaling their educational initiatives and overcoming structural challenges.
2. In the research paper "*Women Social Entrepreneurs in India: Problems, Challenges, and Strategies*" (2013) by Ganiger, S., the study examines the role of women social entrepreneurs in India and the barriers they face in establishing and sustaining enterprises. The case studies highlight how lack of awareness, limited access to finance, and inadequate training restrict women's entrepreneurial growth. The research emphasizes the importance of skill development programs, entrepreneurial education, and institutional support in empowering women. It also shows that

proper guidance, training, and government support can enable women to generate employment opportunities and contribute to social and economic development.

3. In the research paper “*Exploring The Key Factors Influencing Women’s Social Entrepreneurship and Their Impact on Business Performance*” by Suresh, C., and Magesh, C., the case studies examine women street food entrepreneurs in India and their role in urban informal markets. The study highlights how these women overcome challenges such as limited financial resources, social barriers, and market competition through innovation and resilience. It explores their use of creative business strategies, customer engagement, and quality improvement to sustain their enterprises. The research also shows that their entrepreneurial activities contribute to economic independence, social mobility, and gender empowerment while strengthening local economies.
4. In the research paper “*Social Entrepreneurship: Path to Social Development*” (2015) by Ahuja, R., and Dewan, D., the case study examines the reasons behind the failure of Customer Relationship Management (CRM) implementations in social organizations. It highlights issues such as poor planning, lack of employee training, and weak integration between theory and practical application. The study identifies strategies for successful CRM adoption, including proper implementation planning, staff involvement, and effective use of technology. It concludes that efficient CRM practices can strengthen client relationships, improve service delivery, and enhance overall organizational performance.
5. In the research paper “*Role of Women Social Entrepreneurs in India*” by Kalyani, P. A. L. N. S., the case study examines the contribution of women social entrepreneurs in India and their role in economic development. It highlights how training programs, mentoring support, and exposure to business opportunities help women enhance their entrepreneurial skills. The study shows that empowerment initiatives improve women’s confidence, decision-making abilities, and business performance. It concludes that strengthening institutional support and capacity-building measures enables women entrepreneurs to contribute to employment generation and social progress.

## Research Methodology

This research paper's descriptive research approach was carried out using secondary sources of information. To learn more about the current state of women's entrepreneurship, the difficulties street food sellers encounter, and the application of business tactics. Data used in secondary research comes from a variety of sources, including government reports, books, journals, websites, statistics, research papers, and earlier studies. In order to comprehend trends, compare findings, or bolster their study goals, the researcher examines, interprets, and analyzes the available data.

## Data Collection

### Case Studies

#### Shaheen Mistri -Teach for India

1. **Organization:**
  - The Akanksha Foundation
  - Teach For India
2. **Year of Establishment:**
  - Akanksha Foundation – Founded in 1989 (started with 15 children in Mumbai slums).

- Teach For India began its journey in 2008.

3. **Business Model:**

**Akanksha Foundation:**

- Running schools without charge alongside evening learning spaces, these programs serve kids whose families earn less. While some attend class during daylight hours, others join later once homework time begins, supported through community-backed efforts meant to bridge gaps in access. Not every child arrives with equal chances - yet each finds a place here.
- Fueled by a commitment to strong teaching, growth in decision-making skills follows naturally. Leadership emerges through experience, shaped alongside broad educational methods. Learning wraps around the whole person, not just isolated subjects.
- Funding comes from gifts given by individuals, collaborations with businesses focused on social responsibility, alongside support provided by charitable foundations.

**Teach For India:**

- Fellows join for twenty-four months. The position lasts two years.
- Starting with fresh talent, it brings skilled graduates into classrooms lacking support. Professionals join through pathways designed for high-need areas. Some come straight after degrees; others shift careers midstream. Schools benefit quietly when expertise arrives without fanfare.
- Backed through collaboration with businesses, charitable trusts, one-time givers. Funding flows where trust already exists.

4. **Type of Organization:**

- One operates without profit goals; similarly, the other functions as a nonprofit entity.
- Work in the education and social development sector.
- Facing unequal access means changing deep-rooted structures. Reform begins by centering fairness in learning opportunities.

5. **Social Innovation:**

- Bringing leadership development into education reform.
- Fellowship model that places high-achieving graduates directly into classrooms.
- Learning that matters beats mere attendance every time.
- A ripple begins when former participants stay active in classrooms, government roles, or community programs. Over time, shared purpose shapes paths forward. Connections form quietly, through experience rather than design. Momentum builds not from plans but from people choosing similar directions. Lasting shifts emerge where commitment meets continuity.

6. **Social Impact:**

- Akanksha now educates 6,500+ students in Mumbai and Pune.
- Fellows by Teach For India now work in underfunded classrooms nationwide. While many join each year, their presence reshapes daily learning. Some stay briefly; others build long-term impact. Across cities, these educators fill critical gaps. Where resources fall short, people step in. Each placement responds to local needs. From Mumbai to Pune, the model spreads quietly.
- Improved classroom practices and student learning outcomes.
- A network spread across the country began forming, driven by those leading in education who focused on reshaping entire systems. The movement grew quietly, fueled not by slogans but by consistent effort and shared purpose among its members.

**Safeena Husain -Educate Girls.**

1. **Organization:**

- Educate Girls

- Founded by Safeena Husain
2. **Year of Establishment:** 2007
  3. **Business Model:**
    - Community-based model focused on enrolling and retaining out-of-school girls in rural government schools.
    - Works in partnership with state governments.
    - Uses volunteer-driven support through Team Balika (local community volunteers). Funding comes from public contributions, alongside support by charitable organizations. Corporate social responsibility initiatives also provide resources. Another source links repayment to results achieved - known as a Development Impact Bond.
  4. **Type of Organization:**
    - Non-profit organization (NGO).
    - Operates in the education and gender equality sector.
    - A mix of public and private efforts supports work within state-run schools.
  5. **Social Innovation:**
    - Community-led enrolment model (Team Balika identifying and supporting out-of-school girls).
    - A robust alliance with authorities instead of separate education setups.
    - The globe saw its initial Development Impact Bond roll out between 2015 and 2018, rooted in education. Performance dictated financial flow - only clear improvements in student learning triggered payments. Instead of upfront guarantees, backers waited for proof. Results shaped returns. Because impact came first, money followed success.
  6. **Social Impact:**
    - Enrolled hundreds of thousands of out-of-school girls in rural India.
    - Improved foundational literacy and numeracy levels.
    - Engaged with more than a thousand public educational institutions.
    - A surprise success emerged when the Development Impact Bond surpassed goals for both enrollment and learning. Because results were tied to funding, schools showed sharper focus on student progress. When payments depend on outcomes, institutions tend to act more responsibly. This approach brought measurable improvements where traditional methods often stall. Effectiveness in education rose - not by accident, but through structured incentives.

## Chetna Gala Sinha's Journey -Mann Deshi Foundation

1. **Organization**

Mann Deshi Mahila Sahakari Bank  
Founded by Chetna Gala Sinha
2. **Year of Establishment:** 1997
3. **Business Model:**
  - Women-led cooperative rural bank serving low-income women.
  - Pension services come with insurance options, while small loans support daily needs. Savings accounts open paths forward - access happens step by step through tailored financial tools.
  - Funded skills workshops begin with budgeting, spreading into small business planning later. Learning money management opens doors, followed by launching independent ventures step by step.

- A different path begins with training rural women in business skills through dedicated schools. Knowledge moves further when shared over local airwaves, carried by community radio programs.
- Borrowing costs contribute income alongside fees tied to managing money. Operations in finance yield returns mainly via lending profits combined with service charges.

#### **4. Type of Organization:**

- Cooperative bank (women-owned and women-operated).
- Aiming at better access to money tools, one project works where services are scarce. Growth in villages becomes possible when support reaches those overlooked by mainstream systems.

#### **5. Social Innovation:**

- A small banking initiative emerges - led only by women, serving only women. Operating across villages, it grows quietly through trust. Decisions come from within the community itself. Each member shapes how money moves locally. Ownership stays close to home.
- Beyond handling money, it builds skills in managing personal finances while guiding new business creation.
- Community radio network to spread business and financial knowledge.
- A mix of services shapes outcomes - credit availability links closely with learning opportunities, while knowing where to find help matters just as much. One piece feeds into another, though each stands on its own when tested. Support works better when tied together, even if pathways differ across people.

#### **6. Social Impact:**

- Beyond 850,000 rural women found support by the year 2022.
- Increased women's financial independence and entrepreneurship.
- Fueled by better earnings, village areas saw steady growth. A rise in paychecks lifted family budgets across the countryside.
- Fueled progress in gender equity by expanding access to financial systems.

### **Arti Rana – Self-Help Groups for Handicrafts**

#### **1. Organisation:**

Self-Help Groups (SHGs) formed by Arti Rana to empower Tharu tribal women through handicraft production and income generation.

#### **2. Year of Establishment:** The initiative started in the early 2000s (approx.), with the aim of improving the economic condition of tribal women.

#### **3. Business Model**

- Provides training to rural women in making handicrafts like carpets, baskets, and bags.
- Uses locally available raw materials such as jute and grass.
- Forms self-help groups for collective production.
- Sells products in local and urban markets.
- Generates employment and income opportunities for rural women.

#### **4. Type of Organization**

- Social enterprise / Non-profit development initiative
- Women empowerment organization
- Rural development organization

#### **5. Social Innovation**

- Organizing tribal women into self-help groups for business activities.
- Converting traditional handicraft skills into income-generating work.
- Using local resources for sustainable production.
- Promoting women’s financial independence in rural areas.

## 6. Social Impact

- Trained around 800 rural women.
- Generated employment and income opportunities in villages.
- Promoted traditional handicraft skills.
- Improved living standards of tribal women.
- Helped reduce poverty in rural communities.

### Findings

Sr. No.	Women Entrepreneurs	Organization	Year of establishment	Key impacts of statistics	Other relevant stats
1	Ms. Shaheen Mistri	Teach for India	2008	1000 fellows teaching.	33,500 students directly in classrooms. 5500+ alumni continuing impact. Alumni movement reaching 50 million children.
2	Ms. Safeena Hussain	Educate Girls	2007	1.4 million girls mobilized for enrollment.	1.9+ million children supported remedial learning. 93% retention rate for enrolled girls.
3	Ms. Chetna Gala Sinha	Mann Deshi Foundation	1997	850,000+ rural women supported by 2022.	90,000+ bank accounts with the cooperative. Training programs: 63,000+ women participated.
4	Arti Rana	Self Help Groups (SHGs)	2000s approx	Around 800+ rural and tribal women trained in handicraft production	Use of 100% locally available raw materials like jute and grass.

### *Limitations*

- The study relies primarily on secondary data sources.
- The study is limited because only four data sources could be obtained, whereas more comprehensive information was needed.

### *Conclusion*

The report emphasizes how important it is for women social entrepreneurs to address issues of financial exclusion, gender inequality, educational inequity, and rural development in Maharashtra. The case studies of Safeena Husain, Chetna Gala Sinha, Shaheen Mistri, and Arti Rana show how community involvement, creative social business models, and sustainable tactics can result in quantifiable social change.

The results demonstrate that women-led projects effectively increase financial inclusion, advance gender equality, expand access to high-quality education, and generate employment possibilities for underserved populations. Increased school enrollment, better learning outcomes, women's financial independence, and the creation of jobs in rural areas are just a few of the quantifiable results of their strategies, which include fellowship programs, community-based enrollment models, financial inclusion services, and self-help group initiatives.

The scalability and efficacy of these projects are further supported by data evidence, which shows that they have reached millions of beneficiaries through financial services, skill development activities, and education programs. These female business owners have shown tenacity, leadership, and inventiveness in creating long-lasting social companies in spite of obstacles like scarce capital, institutional impediments, and resource limitations.

According to the study's overall findings, women social entrepreneurs play a significant role in bringing about social change by creating inclusive models that tackle structural injustices. Their efforts foster social innovation and long-term sustainable development in addition to enhancing the welfare of individuals and communities. The future impact and scalability of women-led social enterprises can be further increased by fortifying institutional support, policy frameworks, and capacity-building programs.

### *Suggestions*

1. When women-led organizations join forces with government leaders, outcomes grow more effective. Collaboration between these sides often leads to deeper impact.
2. Promote impact-based financing models.
3. Funded initiatives help women launch community-driven enterprises, combined with guided mentorship. When backing is matched by advice, new paths open quietly behind effort. Growth often follows where resources meet insight, especially when tailored support arrives early. Coaching strengthens purpose, just as capital fuels motion - each advancing progress differently.
4. Integrate digital tools to expand rural education outreach.

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# Reducing Social Engineering Attacks through a Behavioral-Driven Cybersecurity Awareness Framework

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## Abstract

Social engineering attacks remain one of the most significant cybersecurity threats, exploiting human behavior rather than technical vulnerabilities. Traditional cybersecurity awareness programs often focus on general knowledge but fail to address the behavioral factors that influence individuals' responses to such attacks. This research proposes a **Behavioral-Driven Cybersecurity Awareness Framework** aimed at reducing the risk of social engineering attacks by focusing on human behavioral patterns, risk perception, and decision-making processes. The framework integrates behavioral science concepts with cybersecurity education to design targeted awareness strategies that improve users' ability to recognize and respond to social engineering attempts such as phishing, pretexting, and baiting.

The study involves the collection and analysis of human behavior data through surveys and user interaction assessments to understand factors such as personality traits, trust levels, emotional responses, and digital literacy. Based on these insights, the framework provides adaptive training modules that personalize cybersecurity awareness for different user groups. The proposed approach enhances users' cognitive awareness and promotes secure online behavior. The results demonstrate that behavior-based education significantly improves individuals' ability to detect and prevent social engineering attacks, contributing to a more resilient cybersecurity environment.

## 1. Introduction

With the rapid growth of digital technologies and online communication, cybersecurity threats have become increasingly sophisticated. Among these threats, **social engineering attacks** remain one of the most effective methods used by cybercriminals. Unlike traditional cyberattacks that exploit technical vulnerabilities, social engineering attacks target **human behavior and psychological weaknesses**. Attackers manipulate individuals into revealing sensitive information, clicking malicious links, or granting unauthorized access to systems.

Common forms of social engineering include **phishing, baiting, pretexting, tailgating, and spear-phishing**. These attacks rely on psychological manipulation, exploiting emotions such as trust, curiosity, fear, or urgency. Even organizations with advanced technical security measures often fall victim to these attacks because employees or users unknowingly become the weakest link in the cybersecurity chain.

Traditional cybersecurity awareness programs generally focus on teaching basic security practices such as using strong passwords, recognizing suspicious emails, or avoiding unknown links. However, these programs often fail to address the **behavioral and psychological aspects** that influence user decision-making. Therefore, there is a growing need for a **behavioral-driven cybersecurity awareness framework** that focuses on human behavior, cognitive biases, and risk perception to effectively reduce social engineering attacks.

This chapter proposes a behavioral-driven cybersecurity awareness framework designed to improve users' ability to identify and resist social engineering attempts through targeted education and behavioral analysis.

## 2. Understanding Social Engineering Attacks

Social engineering refers to the **psychological manipulation of individuals** in order to gain unauthorized access to information or systems. Rather than relying solely on technical hacking techniques, attackers exploit human emotions and behavioral tendencies.

### Types of Social Engineering Attacks

#### Phishing

Phishing is a type of social engineering attack in which cybercriminals attempt to trick individuals into revealing sensitive information such as usernames, passwords, credit card numbers, or personal data. Attackers usually impersonate trusted organizations like banks, government agencies, or well-known companies to deceive victims.

Phishing attacks are commonly carried out through emails, messages, websites, or phone calls that appear legitimate but are actually designed to steal information or install malicious software.

#### How Phishing Works

Phishing attacks typically follow these steps:

- Impersonation – The attacker pretends to be a trusted entity such as a bank, company, or service provider.
- Message Delivery – The victim receives an email, SMS, or message containing a malicious link or attachment.
- User Interaction – The victim clicks the link, downloads a file, or enters personal information.
- Data Theft – The attacker collects the information or installs malware on the victim's device.

## Pretexting

Pretexting is a type of social engineering attack in which an attacker creates a fabricated scenario or false identity to trick individuals into revealing sensitive information. In this attack, the cybercriminal pretends to be a legitimate person such as a bank official, IT support staff, police officer, or company employee in order to gain the trust of the victim.

The main goal of pretexting is to manipulate the victim into disclosing confidential information, such as passwords, financial details, personal identification information, or organizational data. Unlike phishing, which usually relies on emails or messages, pretexting often involves direct communication through phone calls, emails, or face-to-face interaction.

### How Pretexting Works

A pretexting attack generally follows these steps:

- **Information Gathering:**The attacker collects background information about the target from social media, public records, or company websites.
- **Creating a False Identity:**The attacker develops a believable story or scenario (the “pretext”) to appear trustworthy.
- **Building Trust:**The attacker communicates with the victim while pretending to be a legitimate authority or organization.
- **Information Extraction:**Once trust is established, the attacker convinces the victim to provide confidential information or perform certain actions.

## Baiting

Baiting is a type of social engineering attack in which attackers lure victims with an attractive offer or incentive to trick them into revealing sensitive information or installing malicious software. The term “baiting” comes from the idea of using a tempting bait, such as free downloads, gifts, or rewards, to attract the victim and encourage them to perform actions that compromise their security.

Unlike other social engineering attacks that rely mainly on deception through communication, baiting often exploits human curiosity and greed. Victims are tempted by offers that appear beneficial, such as free software, music, movies, or USB devices.

### How Baiting Works

A typical baiting attack usually follows these steps:

- **Creating the Bait:**The attacker prepares something appealing, such as free software downloads, attractive advertisements, or infected USB drives.
- **Delivery of the Bait:**The bait is placed in locations where potential victims may encounter it, such as websites, emails, or physical locations.
- **Victim Interaction:**The victim downloads the content, clicks the link, or connects the device to their computer.

- **System Compromise:** Malware is installed on the victim's system, allowing the attacker to steal information or gain unauthorized access.

## Tailgating

Tailgating, also known as piggybacking, is a type of social engineering attack in which an unauthorized person gains physical access to a restricted area by following an authorized individual. Instead of hacking computer systems directly, the attacker exploits human courtesy, trust, or lack of attention to bypass security controls.

In many organizations, secure areas such as offices, data centers, or laboratories require access cards, passwords, or biometric authentication. However, attackers may wait near an entrance and request someone with authorized access to hold the door open or allow them to enter. Since people often want to be polite or helpful, they may unknowingly allow unauthorized individuals to enter restricted areas.

### How Tailgating Works

A typical tailgating attack occurs in the following steps:

- **Target Identification:** The attacker identifies a location with restricted physical access.
- **Waiting for an Authorized Person:** The attacker waits near an entry point such as a secured door or gate.
- **Gaining Entry:** The attacker follows closely behind an authorized employee or asks them to open the door.
- **Access to Sensitive Areas:** Once inside, the attacker may access computers, steal documents, install malicious devices, or collect confidential information.

## 3. Human Behavior and Cybersecurity

Human behavior plays a critical role in cybersecurity because many cyberattacks succeed by exploiting human weaknesses rather than technical vulnerabilities. Studies show that a large percentage of cybersecurity incidents occur due to human errors, lack of awareness, poor judgment, or risky online behavior. Cybercriminals understand how people think, react, and make decisions, and they design attacks that manipulate these psychological tendencies. As a result, even organizations with strong technical security systems can still be vulnerable if users do not follow secure practices.

Social engineering attacks, such as phishing, spear phishing, and pretexting, rely heavily on psychological manipulation. Attackers take advantage of human emotions and cognitive patterns to convince individuals to disclose sensitive information or perform unsafe actions. Understanding the behavioral factors that influence user decisions is therefore essential for developing effective cybersecurity awareness programs.

### Trust

Trust is a fundamental aspect of human interaction, both in physical and digital environments. People naturally tend to trust communications that appear to come from legitimate sources such as banks, government agencies, or well-known organizations. Cybercriminals exploit this tendency by impersonating trusted entities through emails, websites, or messages that look authentic.

For example, a phishing email may appear to be sent from a bank requesting users to verify their account information. Because the message looks legitimate and uses familiar branding, individuals may trust the request and unknowingly provide confidential details. Attackers may also impersonate colleagues, managers, or IT support staff to gain access to sensitive information within organizations.

Building awareness about how attackers misuse trust is important in reducing the success rate of social engineering attacks. Users should be encouraged to verify the authenticity of requests before sharing personal or organizational information.

### **Curiosity**

Curiosity is another common human trait that attackers exploit in social engineering attacks. People often feel tempted to explore unknown links, attachments, or offers, especially if the content appears interesting, surprising, or beneficial.

For instance, attackers may send emails with subject lines such as “You have won a prize,” “Confidential document,” or “Important salary update.” Such messages trigger curiosity and encourage individuals to open attachments or click links without verifying their authenticity. In some cases, attackers distribute infected USB drives labeled with attractive titles like “Employee Salary Data” or “Confidential Project Information.” Curious users may plug the device into their computers, unknowingly installing malware.

To reduce risks associated with curiosity-driven behavior, cybersecurity awareness programs should educate users about the dangers of interacting with unknown files, links, or devices.

### **Fear and Urgency**

Fear and urgency are powerful psychological triggers often used by attackers to pressure victims into making quick decisions. When individuals feel threatened or rushed, they are more likely to act without carefully evaluating the situation.

Cybercriminals frequently send messages that create a sense of urgency, such as warnings that an account will be suspended, a payment is overdue, or security verification is required immediately. These messages may include statements like “Your account will be locked within 24 hours if you do not verify your information.” In such situations, victims may panic and quickly follow the instructions without checking the authenticity of the message.

This manipulation technique is particularly effective because it bypasses logical thinking and encourages impulsive actions. Educating users about these tactics can help them pause and verify requests before responding.

### **Lack of Digital Literacy**

Digital literacy refers to an individual’s ability to effectively use digital technologies and understand potential online risks. Many users lack sufficient knowledge of cybersecurity practices, making them more vulnerable to social engineering attacks.

For example, some users may not recognize the signs of a phishing email, such as suspicious links, unfamiliar email addresses, or grammatical errors. Others may use weak passwords, reuse passwords across multiple accounts, or ignore software updates and security warnings.

Improving digital literacy through regular cybersecurity training can significantly reduce vulnerabilities. Users who understand basic cybersecurity principles are more likely to recognize suspicious activities and respond appropriately.

### **Cognitive Biases**

Cognitive biases are systematic patterns of thinking that influence how people interpret information and make decisions. These biases often lead individuals to make quick judgments without thoroughly analyzing the situation. Cybercriminals exploit these biases to increase the effectiveness of social engineering attacks.

Some common cognitive biases involved in cybersecurity include:

#### **Authority Bias:**

People tend to trust and follow instructions from individuals who appear to have authority, such as managers, government officials, or IT administrators. Attackers may impersonate authority figures to convince victims to comply with requests.

#### **Familiarity Bias:**

Individuals are more likely to trust messages that appear to come from familiar contacts, such as colleagues or friends. Attackers may spoof email addresses or social media accounts to appear as trusted individuals.

#### **Scarcity Bias:**

People may act quickly when they believe an opportunity is limited, such as limited-time offers or urgent requests.

Recognizing these cognitive biases helps individuals become more cautious when responding to unexpected requests or offers.

## **4. Limitations of Traditional Cybersecurity Awareness Programs**

Cybersecurity awareness programs are widely implemented in organizations to educate employees and users about potential cyber threats and safe online practices. These programs typically include training sessions, security guidelines, and organizational policies that aim to reduce security risks. While such initiatives provide important foundational knowledge, many traditional cybersecurity awareness programs focus primarily on **technical instructions and policy compliance** rather than addressing the human and behavioral aspects of cybersecurity. As a result, their effectiveness in preventing social engineering attacks is often limited.

Although these programs help users understand basic security concepts, several challenges reduce their long-term impact and practical effectiveness. Some of the major limitations are discussed below.

### *Lack of Personalization*

One of the key limitations of traditional cybersecurity awareness programs is the **lack of personalization**. Most training programs are designed as standardized courses that are delivered to all employees or users regardless of their roles, knowledge levels, or exposure to cyber risks. However, individuals within an organization may have **different responsibilities, levels of technical knowledge, and security awareness**.

For example, employees working in finance or human resources often handle highly sensitive data and may require more specialized training compared to employees with limited system access. Similarly, users with higher digital literacy may require advanced security awareness training, while beginners may need more basic instruction.

When training programs treat all users the same, they may fail to address specific vulnerabilities or behavioral tendencies of different user groups. Personalized training that considers **user behavior, experience level, and risk exposure** can significantly improve the effectiveness of cybersecurity awareness initiatives.

### *Low Engagement*

Another common issue with traditional cybersecurity training is **low engagement**. Many awareness programs rely on lectures, presentations, or static online modules that focus heavily on theoretical explanations. These methods may not capture users' attention or encourage active participation.

When training sessions are repetitive, lengthy, or overly technical, participants may lose interest or simply complete the training as a formal requirement rather than genuinely learning from it. As a result, users may not fully understand the importance of cybersecurity practices or may fail to apply the knowledge in real-world situations.

Interactive training methods such as **simulations, gamification, real-world case studies, and phishing simulations** can make cybersecurity awareness programs more engaging and effective. Active learning approaches encourage users to think critically and develop practical skills for identifying and responding to cyber threats.

### *Limited Behavioral Focus*

Traditional cybersecurity awareness programs often emphasize **technical knowledge**, such as recognizing suspicious emails, creating strong passwords, or following organizational policies. While these practices are important, many programs overlook the **psychological and behavioral factors** that influence users' security decisions.

Social engineering attacks exploit human emotions such as **trust, curiosity, fear, and urgency**, rather than technical vulnerabilities. Without addressing these psychological elements, users may still fall victim to attacks even if they are aware of basic security guidelines.

A more effective approach to cybersecurity awareness should incorporate insights from **behavioral science and psychology** to understand why individuals make certain decisions when faced with cyber threats. By addressing

behavioral patterns, organizations can design training programs that help users recognize manipulation techniques and make more secure choices.

### *Poor Long-Term Retention*

Another limitation of traditional cybersecurity awareness programs is **poor long-term retention of knowledge**. Many organizations conduct cybersecurity training only once or twice a year, often in the form of mandatory sessions. After completing the training, users may gradually forget the information if it is not reinforced regularly.

Cyber threats continuously evolve, and users need ongoing education to stay updated about new attack methods and security practices. Without continuous reinforcement, users may revert to unsafe behaviors or fail to recognize emerging threats.

Regular reminders, short refresher courses, simulated attack exercises, and ongoing communication about cybersecurity threats can help improve knowledge retention and reinforce secure behavior.

### **Need for a Behavioral-Driven Cybersecurity Awareness Approach**

Due to the limitations of traditional awareness programs, organizations require a **more adaptive and behavior-focused approach to cybersecurity education**. A behavioral-driven cybersecurity awareness framework focuses on understanding how individuals think, respond to threats, and make decisions in digital environments.

Such an approach integrates **behavioral analysis, personalized training, and continuous feedback** to address individual vulnerabilities and improve security awareness over time. By considering psychological factors and user behavior, organizations can develop more effective training programs that not only educate users but also influence their actions and decision-making processes.

Ultimately, incorporating behavioral insights into cybersecurity awareness initiatives can significantly enhance users' ability to recognize social engineering attacks and reduce the overall risk of human-related cybersecurity incidents.

## **5. Methodology**

To validate the proposed behavioral-driven cybersecurity awareness framework, a systematic research methodology can be followed. The methodology ensures that the framework is tested using real human behavioral data and that its effectiveness can be scientifically measured. The major stages of the methodology are described below.

### **Data Collection**

The first step of the research is collecting **human behavioral data** related to cybersecurity awareness. Data can be gathered using **structured surveys, questionnaires, and interviews** conducted among employees, students, or general internet users.

The questionnaire should include questions that measure different behavioral and psychological aspects influencing cybersecurity practices. These aspects may include:

- **Personality traits** – characteristics such as openness, risk-taking behavior, and cautiousness that affect how individuals respond to cyber threats.
- **Risk perception** – how users perceive the seriousness and likelihood of cyber attacks.
- **Trust level** – the extent to which users trust emails, websites, or online messages.
- **Emotional responses** – reactions such as fear, curiosity, urgency, or excitement when interacting with digital content.
- **Digital literacy** – users' knowledge and understanding of cybersecurity concepts and safe online practices.
- **Past experiences with cyber incidents** – previous exposure to phishing, fraud, or identity theft that may influence current behavior.

The collected data forms the foundation for understanding how human behavior affects cybersecurity awareness and decision-making.

### Behavioral Assessment

Once the survey data is collected, the next step is analyzing it using appropriate **statistical and analytical techniques**. The objective of this stage is to identify behavioral patterns that influence users' cybersecurity awareness.

Techniques that can be used include:

- **Descriptive statistics** to summarize the data (mean, standard deviation, frequency distribution).
- **Correlation analysis** to examine relationships between behavioral factors and cybersecurity awareness.
- **Regression analysis** to determine which behavioral variables significantly affect users' security behavior.
- **Cluster analysis or classification methods** to group users with similar behavioral characteristics.

This analysis helps identify **high-risk behavioral profiles**, such as users who easily trust unknown emails or who lack awareness of phishing attacks.

### Framework Implementation

After identifying behavioral patterns, the proposed **behavioral-driven cybersecurity awareness framework** is implemented in a real-world environment such as:

- An **organization**
- A **university or educational institution**
- A **training environment**

The framework focuses on providing **personalized cybersecurity awareness training** rather than traditional one-size-fits-all programs. Training modules may include:

- Simulated phishing emails
- Interactive awareness sessions
- Scenario-based learning activities
- Personalized feedback based on user behavior

The goal is to influence users' **security behavior** by addressing the psychological and behavioral factors identified during the analysis phase.

## Evaluation

The final stage is evaluating the effectiveness of the proposed framework. This can be done by comparing users' cybersecurity awareness **before and after the training implementation**.

Evaluation methods may include:

- **Pre-training and post-training assessments** to measure knowledge improvement.
- **Phishing simulation tests** to determine whether users can identify malicious emails.
- **Behavioral metrics**, such as reduction in risky actions (clicking suspicious links or sharing sensitive information).
- **User feedback surveys** to assess satisfaction and learning effectiveness.

The results are analyzed to determine whether the framework improves users' ability to **detect, avoid, and prevent social engineering attacks**.

## 6. Benefits of Behavioral-Driven Cybersecurity Education

The proposed **behavioral-driven cybersecurity awareness framework** provides several important advantages for organizations and individuals. By focusing on human behavior rather than only technical controls, the framework helps improve cybersecurity awareness and reduces the likelihood of cyber attacks. The advantages are elaborated below.

### Improved Awareness and Decision-Making

One of the major benefits of the proposed framework is the improvement in users' **cybersecurity awareness and decision-making ability**. Traditional cybersecurity training often provides general information without addressing how users actually behave online.

The behavioral-driven approach analyzes users' attitudes, perceptions, and reactions toward cyber threats. Based on this understanding, training programs are designed to help users recognize suspicious activities such as phishing emails, fake websites, or fraudulent messages.

As a result, users become more cautious and are able to **make informed decisions** before clicking links, downloading attachments, or sharing sensitive information.

### Reduction in Successful Social Engineering Attacks

Social engineering attacks, such as phishing, baiting, and impersonation, exploit **human psychology rather than technical vulnerabilities**. Attackers manipulate emotions such as curiosity, fear, urgency, or trust to trick users into revealing confidential information.

The proposed framework addresses these psychological factors by educating users about common manipulation techniques used by attackers. Through **simulated attack scenarios, awareness campaigns, and behavioral training**, users learn how to identify and respond to such threats.

This significantly reduces the chances of users falling victim to social engineering attacks, thereby lowering the overall cybersecurity risk for organizations.

### **Personalized Cybersecurity Training**

Another key advantage of the framework is the **personalization of cybersecurity training**. Traditional awareness programs often follow a “one-size-fits-all” approach, which may not be effective for all users.

The behavioral-driven framework categorizes users based on their knowledge level, risk perception, digital literacy, and behavioral traits. Based on these factors, customized training modules can be provided to different groups of users.

For example:

- Beginners may receive basic cybersecurity education.
- Intermediate users may receive training on identifying phishing and malware threats.
- Advanced users may receive more technical awareness related to secure systems and data protection.

This personalized approach increases engagement and ensures that training is **relevant and effective for each user group**.

### **Enhanced Organizational Security Culture**

The framework also contributes to the development of a strong **cybersecurity culture within the organization**. When employees regularly receive behavioral-based training and awareness programs, cybersecurity becomes a shared responsibility rather than only the responsibility of the IT department.

Employees become more proactive in reporting suspicious activities, following security policies, and practicing safe digital behavior. Over time, this creates an organizational environment where **security awareness becomes part of everyday work practices**.

### **Better Long-Term Retention of Cybersecurity Knowledge**

Traditional cybersecurity awareness programs often involve **one-time training sessions**, after which users may gradually forget the information.

The proposed framework emphasizes **continuous learning and reinforcement** through periodic training sessions, real-life simulations, interactive activities, and regular feedback. These methods help users retain cybersecurity knowledge for a longer period and apply it in real situations.

As a result, employees are more likely to remember security practices and respond correctly when encountering potential cyber threats.

## 7. Challenges and Future Research

Although the **behavioral-driven cybersecurity awareness framework** offers many benefits, its implementation also presents several challenges. These challenges must be carefully addressed to ensure the successful adoption of the framework within organizations or educational institutions. The major challenges are discussed below.

### Difficulty in Collecting Accurate Behavioral Data

One of the main challenges in implementing behavioral-driven cybersecurity awareness programs is the **collection of accurate and reliable behavioral data**. Human behavior is complex and influenced by many factors such as emotions, experience, knowledge, and environmental conditions.

When organizations use surveys or questionnaires to collect data, participants may not always provide honest or accurate responses. Some individuals may give socially desirable answers rather than their true behavior, while others may misunderstand the questions.

Additionally, behavioral patterns can change over time as users gain more knowledge or experience new cyber incidents. Therefore, researchers and organizations must design **well-structured questionnaires, repeated assessments, and data validation techniques** to ensure the reliability of the collected behavioral data.

### Privacy Concerns Regarding User Information

Another significant challenge is related to **privacy and ethical concerns**. Behavioral analysis often requires collecting sensitive information about users, including their online habits, responses to simulated cyber attacks, and interaction patterns with digital systems.

Employees or students may feel uncomfortable sharing such information because they fear that their data might be misused, monitored excessively, or linked to their job performance. If privacy concerns are not properly addressed, users may refuse to participate in awareness programs or provide inaccurate data.

To overcome this issue, organizations should adopt **strict data protection policies**, anonymize user data, obtain informed consent, and ensure that collected information is used only for research or training purposes.

### Resistance to Behavioral Monitoring

Behavioral-driven frameworks may require monitoring users' interactions with emails, websites, or security training platforms. However, some individuals may perceive this monitoring as **invasive or intrusive**.

Employees might believe that behavioral monitoring is a form of surveillance that evaluates their productivity or performance rather than improving cybersecurity awareness. This perception can lead to resistance, reduced cooperation, or lack of participation in training programs.

To address this challenge, organizations should clearly communicate the **purpose and benefits of behavioral monitoring**, emphasizing that the objective is to improve cybersecurity awareness and protect organizational data rather than to monitor employees.

## Resource Requirements for Personalized Training

Another challenge is the **high resource requirement** for implementing personalized cybersecurity training programs. Designing customized training modules for different user groups requires time, expertise, and technological infrastructure.

Organizations may need to invest in training platforms, simulation tools, behavioral analysis software, and skilled cybersecurity professionals to manage the program effectively. For small organizations or institutions with limited budgets, implementing such a system may be difficult.

Therefore, organizations must carefully plan their resources and gradually integrate behavioral-driven training programs into existing cybersecurity awareness initiatives.

## Future Research Directions

Future research can focus on integrating **advanced technologies such as machine learning and artificial intelligence** to improve behavioral analysis and cybersecurity awareness systems.

Machine learning techniques can analyze large volumes of behavioral data and identify patterns that indicate risky user behavior. AI-based systems can also provide **adaptive and personalized training**, automatically adjusting learning content based on users' responses, knowledge level, and behavior.

For example, if a user frequently falls for phishing simulations, the system can automatically provide additional training modules focused on phishing detection. Such **adaptive cybersecurity awareness systems** can make training more efficient, scalable, and effective.

## 8. Conclusion

Social engineering attacks continue to pose a major threat to individuals and organizations by exploiting human behavior rather than technical vulnerabilities. Traditional cybersecurity awareness programs often fail to address the psychological and behavioral factors that influence user decision-making.

This chapter proposed a **Behavioral-Driven Cybersecurity Awareness Framework** aimed at reducing social engineering attacks by integrating behavioral analysis with cybersecurity education. By understanding users' behavioral patterns, risk perception, and digital literacy levels, the framework enables the development of targeted training strategies that improve users' ability to recognize and respond to social engineering threats.

Implementing behavioral-driven cybersecurity education can significantly enhance user awareness, reduce human vulnerabilities, and strengthen overall cybersecurity resilience in modern digital environments.

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# Development of Nutritious Cookies Using Moringa Leaf Powder: A Sustainable Food Innovation Approach

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## Abstract

The increasing demand for functional and nutritious foods has encouraged the exploration of plant-based ingredients with high nutritional value. Moringa oleifera leaf powder (MLP) is rich in proteins, vitamins, minerals, and antioxidants, making it a promising ingredient for food fortification. This study focuses on the development of cookies enriched with varying concentrations of Moringa leaf powder to enhance nutritional quality while maintaining sensory acceptability. Cookies were formulated using foxtail millet and other nutrient-dense ingredients. Sensory evaluation, consumer acceptance, cost analysis, and sustainability aspects were assessed. Results indicated that cookies containing 2% MLP achieved the highest consumer acceptance, offering a balance between nutrition, taste, and appearance. The study concludes that Moringa-enriched cookies are a cost-effective, sustainable, and health-oriented snack with strong market potential.

## Keywords

Moringa oleifera, functional foods, cookies, food fortification, consumer acceptance, sustainability

## Introduction

Malnutrition and micronutrient deficiencies remain major public health challenges, particularly in developing countries. There is a growing interest in developing affordable, nutritious, and functional foods using locally available resources. Moringa oleifera, often referred to as the "miracle tree," is widely recognized for its exceptional nutritional profile, including high levels of protein, iron, calcium, vitamin A, and antioxidants.

Cookies are widely consumed across all age groups due to their convenience, long shelf life, and acceptability. Fortifying cookies with Moringa leaf powder presents an innovative approach to delivering essential nutrients through a familiar snack format. This research aims to develop and evaluate Moringa-enriched cookies as a sustainable food innovation that supports nutrition security and consumer health.

This study aims to assess the sustainable food innovation potential of MLP by evaluating its effect on selected physical, nutritional, and sensory characteristics of cookies.

## ✚ Objectives of the Study

The study was designed with the following objectives:

- To formulate cookies with varying concentrations of Moringa leaf powder for improved nutritional value.
- To evaluate sensory attributes such as taste, color, texture, and overall acceptability.
- To identify the optimal level of Moringa leaf powder that balances nutrition and sensory quality.
- To assess the sustainability, cost-effectiveness, and market potential of the developed product.

## ✚ Materials and Methods

### ➤ Materials Used:

- Foxtail millet flour
- Moringa leaf powder
- Flax seeds
- Sesame seeds
- Sunflower seeds
- Dates
- Ghee
- Cardamom powder
- Baking soda
- Dry fruits.

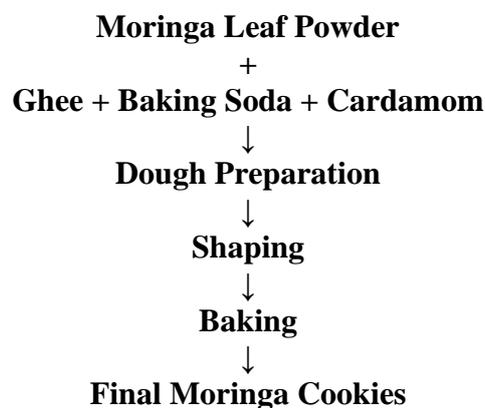


All ingredients were selected for their nutritional benefits and availability

➤ **Cookie Formulation**

**Foxtail Millet Flour + Natural Sweeteners (Dates)**  
 +  
**Seeds (Flax, Sesame, Sunflower) + Dry Fruits**  
 +

Ingredient for 100 cookies	Quantity (g)
Foxtail millet flour	600
Moringa powder	60
Sesame seeds	75
Sunflower seeds	75
Flax seeds	75
Dates	80
Ghee	200
Baking powder + Essence	14.25



This diagram explains the step-by-step formulation process used for preparing nutrient-rich cookies.

➤ **Nutritional values**

Nutritional Component	Value per 100g
Energy	407.00 kcal
Protein	11.30 g
Carbohydrate	55.10 g
Total Fat	15.10 g
Dietary Fiber	6.50 g
Iron	2.80 mg
Calcium	180.00 mg
Sodium	6.00 mg
Cholesterol	0.00 mg

➤ **Process of making cookies:**

❖ **Prepare the dry mixture**

- In a bowl, add foxtail millet flour.
- Add moringa leaf powder, ground seeds, baking soda, cardamom powder, and chopped dry fruits.
- Mix all dry ingredients evenly.
- Lightly roast flax, sesame, and sunflower seeds and grind coarsely.



❖ **Prepare the wet mixture**

- In another bowl, take ghee at room temperature.

- Add date paste to the ghee.
- Mix well until a smooth and creamy mixture is obtained.

### ❖ Prepare the dough

- Gradually add the dry mixture to the wet mixture.
- Mix and knead gently to form a soft, non-sticky dough.
- Add a small quantity of water or milk if required.



### ❖ Shaping the cookies

- Shape each portion into **round** or **flat** cookies of **uniform size & attractive shapes**.

### ❖ Baking

- Preheat the oven to **160–170 °C**.
- Arrange cookies on a greased or parchment-lined baking tray.
- Bake for **15–20 minutes** until lightly golden



### ❖ Cooling

- **Remove** the **cookies** from the oven.
- Allow them to **cool** completely at **room temperature**.

### ❖ Storage

- Store the cooled cookies in airtight containers for freshness and further evaluation.





### ❖ Packaging

- Cookies were packed in **kraft paper pouches** with an **inner food-grade parchment or butter paper**

## ✚ Cost and Performance Analysis

### 1. Cost Analysis

Cost of Production per Batch (**100 cookies**)

Total Cost for **100 Cookies** = **₹330.5**

Cost Per Cookie = **₹330.5 / 100 = ₹3.30 per cookie**

### 2. Pricing Analysis

If the business uses a **40% profit margin**, the selling price becomes:

Selling Price per Cookie

SP = Cost per cookie + (40% of cost)

SP = 3.30 + 1.32

**SP = ₹4.62 (rounded to ₹5)**

### 3. Profit Analysis

If selling price = **₹5 per cookie**:

Profit per Cookie = Selling Price – Cost Price = 5 – 3.30

**Profit = ₹1.70 per cookie**

Profit for **100 Cookies** = 100 × 1.70

**Profit = ₹170**

### 4. Break-Even Point (BEP) Analysis

Assume fixed cost per day (**rent, equipment, marketing**) = **₹500**

Contribution per cookie = Selling price – variable cost = 5 – 3.30 = ₹1.70

Break-Even Quantity

BEP = Fixed Cost ÷ Contribution per unit = 500 ÷ 1.70 = 294 cookies approx.

You must sell **294 cookies per day** to cover all costs.

## 5. Simple Conclusion

The analysis shows that developing cookies with Moringa Leaf Powder is **financially viable, profitable, and market-ready**.

- Cost per cookie = **₹3.30**
- Selling price = **₹5**
- Profit per cookie = **₹1.70**
- Break-even point = **294 cookies**
- **2% MLP** cookies have highest consumer demand

This product can be considered a **sustainable, profitable, and commercially feasible food innovation**.

## Results and Discussion

### ❖ Health-Conscious Consumers

Individuals seeking nutritious snacks made from natural, functional ingredients such as moringa, millets, and seeds.

### ❖ Urban Wellness Buyers

Consumers in urban areas who prefer clean-label, plant-based, and sustainable food products.

### ❖ Children and Adolescents

A healthier snack alternative for school-going children due to its acceptable taste and nutrient content.

### ❖ Working Professionals

People looking for convenient, energy-rich snacks that support a balanced lifestyle.

### ❖ Elderly Population

Suitable for older adults due to easy digestibility, soft texture, and micronutrient benefits.

### ❖ Diet-Conscious and Weight-Aware Consumers

Individuals preferring snacks with millets and natural sweeteners over refined products.

## ❖ **Environmentally Conscious Consumers**

Buyers attracted by eco-friendly packaging and sustainable ingredient sourcing.

## ➤ **Consumer Acceptance**

- ❖ Cookies with **2% moringa leaf powder (MLP) concentration** showed the **highest level of consumer acceptance and demand**.
- ❖ The product strongly **appealed to health-conscious consumers** due to its natural ingredients and enhanced nutritional value.
- ❖ Moringa-based cookies were found to be **suitable for all age groups**, including children, adults, and the elderly.
- ❖ The mild incorporation level ensured **good taste, colour, and aroma**, contributing to overall acceptability.
- ❖ Consumers expressed **willingness to include the product as a regular healthy snack**.

## ➤ **SWOT Analysis**

### **Strengths:**

- Low production cost
- Rich nutritional profile
- Health-focused functional snack

### **Weaknesses:**

- Slight bitterness affecting taste.
- Green color may reduce acceptability
- Limited consumer awareness

### **Opportunities:**

- Growing demand for healthy snacks
- Suitable for schools canteens, fitness stores, bakeries.

- Scope for product diversification

### Threats:

- Competition from established brands
- Price-sensitive consumers
- Limited shelf presence in herbal food segments

### ➤ Sustainability Impact

- ❖ Utilization of **moringa leaves**, a fast-growing and drought-resistant plant
- ❖ Use of **foxtail millet**, a climate-resilient and low-water crop
- ❖ Improvement in **nutritional sustainability** (iron, calcium, fiber, antioxidants)
- ❖ Replacement of refined sugar with **natural sweeteners (dates)**
- ❖ Promotion of **local and underutilized crops**
- ❖ Support for **small-scale and rural food processing units**
- ❖ Reduction in **environmental footprint** of bakery products
- ❖ Use of **eco-friendly and biodegradable packaging**
- ❖ Contribution to **sustainable and healthy dietary patterns**
- ❖ Helps **reduces malnutrition** risk.

### Recommendations

- ❖ Improving flavour masking techniques to reduce bitterness
- ❖ Exploring attractive packaging options
- ❖ Adding different variety
- ❖ Promote consumer awareness

Scaling up production and increasing consumer awareness through nutrition education and marketing can further enhance product acceptance.

## Future Scope

- ❖ Shelf – Life & Storage Stability Studies:
- ❖ Product Diversification:
- ❖ Commercial Feasibility Studies:
- ❖ Consumer Studies Across Age Groups:

## Conclusion

The study demonstrates that cookies fortified with Moringa leaf powder can serve as a nutritious, affordable, and sustainable functional snack. A 2% MLP concentration was identified as optimal in terms of sensory acceptance and nutritional enhancement. Moringa-enriched cookies hold strong potential for addressing nutritional deficiencies while meeting consumer demand for healthy food products.

Furthermore, the adoption of Moringa in bakery applications contributes to sustainable food innovation by utilising a low-cost, easily cultivable and climate-resilient plant resource. Encouraging the use of MLP in commercial bakery products can benefit local farmers, promote value-added processing and reduce dependence on synthetic supplements

. Overall, the research provides a strong foundation for further product development, market testing and scale-up, demonstrating that Moringa-fortified cookies can serve as a nutritious, affordable and environmentally responsible option for consumer

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