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in the Future Business Era**

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Foreword

We are here at the tenth edition of ‘Vaidakthya.’ This year the theme for this edition is “Post Sustainability and Social Responsibility in the Future Business Era.” In today’s complex business environments, integrating Sustainability and Corporate social responsibility (CSR) is essential for aligning business objectives with societal interests and strengthening organizational resilience. Through the implementation of CSR, enterprises deeply engage with primary and public stakeholders, establish resilient relationships, and enhance organizational resilience through seven dimensions: development governance, strategic management, relationship, financial, product, cultural, and social. Thus, it is more important than ever for private and public organizations to fundamentally rethink the way they function. Transforming into a successful sustainable business requires new levels of resilience and agility, rooted in responsible practices that preserve our planet.

Businesses which were flexible to change were the ones who prospered most throughout the coronavirus. With the heavy emphasis that has been placed on business' resilience and adaptability. Sustainability efforts also serve as a means of stimulating organizations to think about what drives their business and where and how value can be created in the long run. The role of businesses can be redefined with the fact that sustainable development of the world and the future of the upcoming generations depend on the companies' current choices and actions. Creating a sustainable organization involves developing and implementing sustainable business strategies that balance growth and profit with environmental and social responsibility. Integrating sustainability into the business plan as part of the foundational framework creates value for all stakeholders, which in turn drives performance.

Research is a fundamental element of academics. It is the foundation for knowledge, that makes possible the much-needed innovation and application which provides wider benefit to all the stakeholders of education. Research adds to the stock of knowledge and provides the source of new ideas, methods, techniques, and findings across a whole range of disciplinary and multi-disciplinary areas.

‘Vaidakthya’ has been focusing on addressing the developing areas of management. To document this intellectual vibrancy will always be the key aspect of Vaidakthya. We focus to promote knowledge and make the various academic developments in the world accessible to every section of society. The current conference proceedings is a hub of diverse ideas and innovative arguments in sustainability management for governments and businesses. Articles in Vaidakthya are peer-reviewed to achieve this goal. ‘Vaidakthya - 2025’ is a significant step in achieving our aims and principles.

Influence of Internal Marketing on Employee Engagement: Evidence from Private Sector Banks in Kerala

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Abstract- This study examined the influence of internal marketing on employee engagement among private sector bank employees in Kerala, conducted because of the limited empirical evidence linking internal marketing practices to engagement in the Indian banking context, particularly in Kerala. A structured questionnaire was administered to a stratified random sample of 90 employees from five leading private banks. The investigation focused on five dimensions of internal marketing: Internal Communication, Training and Development, Reward and Recognition, Leadership Support, and Employee Empowerment. Employee engagement was assessed using the Utrecht Work Engagement Scale. Data were analysed using SPSS, employing reliability analysis, multiple regression, t-tests, and ANOVA. The regression model was statistically significant, explaining 41.8% of the variance in employee engagement ($F(5, 84) = 12.075, p < .001$). Among the predictors, Employee Empowerment ($\beta = .498$) and Internal Communication ($\beta = .423$) had the most substantial positive effects on Employee Engagement. Training and Development showed a marginal negative effect, while Reward and Recognition and Leadership Support were not significant. Demographic analyses indicated no significant differences in engagement based on gender, education, or marital status, though perceptions of internal marketing varied significantly by age. These findings suggest that empowerment and communication are critical drivers of engagement in the banking sector. It is recommended that banks should focus on these dimensions to improve employee involvement and performance outcomes in the banking sector.

Keywords: Internal Marketing, Employee Engagement, Private Sector Banks, Organisational Communication.

INTRODUCTION

Employee engagement has become a strategic priority for organizations, particularly in service-intensive sectors like banking, where human interaction plays a central role in service delivery. It is the emotional and cognitive commitment of employees to their work and organization and is closely associated with improved performance,

reduced turnover, and enhanced customer satisfaction. As banks face increasing pressures from technological disruptions, customer expectations, and talent retention challenges, they seek effective internal strategies to foster engagement and organizational alignment. One such strategy is internal marketing, a managerial approach that treats employees as internal customers and emphasizes communication, motivation, training, and coordination to align staff behaviour with organizational goals. Originally conceptualized by Rafiq and Ahmed (2000), internal marketing includes multiple dimensions such as internal communication, employee empowerment, reward systems, and leadership support. Empirical studies demonstrate that these dimensions significantly affect job satisfaction, organizational commitment, and engagement (de Bruin et al., 2021; Almaslukh et al., 2022; Haji et al., 2023). In the banking context, Sarangal and Nargotra (2017) found that effective internal marketing encourages employees to invest more fully in achieving service excellence.

Despite growing scholarly attention, the existing literature is primarily concentrated in developed economies or in national contexts with relatively homogenous workforce cultures. These studies often overlook the cultural, economic, and institutional diversity present in regional settings like Kerala, a state with a high literacy rate, a strong service orientation, and a workforce known for its social awareness. While several studies have linked internal marketing to job satisfaction or organizational commitment, few have empirically explored its direct influence on the multi-dimensional construct of employee engagement among private sector employees in Kerala, comprising Vigor, dedication, and absorption.

This study aims to investigate how various dimensions of internal marketing influence employee engagement among private bank employees in Kerala. Using structured survey data from five major banks

and applying multiple regression analysis, the study can identify the most impactful internal marketing practices on engagement. The research contributes to the literature by contextualizing internal marketing within an underrepresented regional banking sector and offering practical insights for human resource strategies in emerging economies. It also enhances the theoretical understanding of how internal marketing operates across distinct engagement dimensions in complex, servicedriven environments.

2. REVIEW OF LITERATURE

2.1 Internal Marketing: Conceptual Foundations and Dimensions

Internal marketing (IM) has evolved as a strategic management approach that treats employees as internal customers and jobs as internal products (Berry, 1981). The concept emphasizes aligning employees’ values and behaviours with organizational goals through internal communication, training, motivation, and trust-building (Rafiq & Ahmed, 2000). It aims to create a supportive internal environment that empowers employees to deliver superior service to external customers. Farzad et al. (2008) operationalized internal marketing into five core dimensions: job satisfaction, understanding, trust, inter-functional coordination, and motivation, variables that have been consistently validated in banking and service-oriented industries (Sarangal & Nargotra, 2017; Almaslukh et al., 2022).

Recent empirical works reaffirm that effective internal marketing significantly enhances organizational commitment and employee performance in both public and private banking sectors (de Bruin et al., 2021; Muramalla, 2021). Haji et al. (2023) demonstrated that internal marketing exerts a direct positive influence on job satisfaction and an indirect effect on employee engagement, with communication and training emerging as critical levers.

2.2 Understanding Employee Engagement

Employee engagement has gained significant attention as a multidimensional psychological state influencing organizational effectiveness. Kahn (1990) introduced engagement as the physical, cognitive, and emotional harnessing of employees in their work roles, driven by psychological conditions of meaningfulness, safety, and availability. Building on this, Schaufeli et al. (2002) defined engagement through the dimensions of Vigor, dedication, and absorption, a framework widely adopted in engagement research.

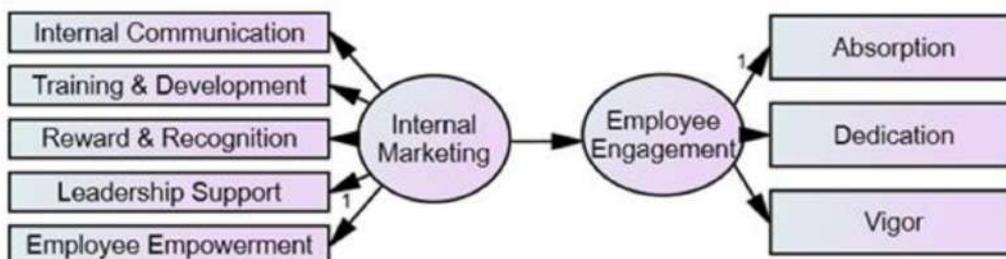
Subsequent models, such as Saks' (2006) differentiation between job and organizational engagement, emphasized the role of perceived organizational support and supervisor relationships. The Job Demands-Resources (JD-R) model developed by Bakker and Demerouti (2007) further contributed to this understanding by positing that job resources (autonomy, feedback, support) promote engagement, especially under high demands. These models collectively underscore that engagement arises from both individual and environmental factors, making it highly responsive to internal organizational strategies like internal marketing.

2.3 Internal Marketing and Employee Engagement

The interface between internal marketing and employee engagement is now well-recognized in contemporary organizational behaviour research. Internal marketing fosters job satisfaction, organizational alignment, and trust—core precursors to engagement (Mainardes & Rodrigues, 2019; Haji et al., 2023). As internal communication and employee support improve, employees are more likely to exhibit Vigor, dedication, and absorption in their roles (Schaufeli et al., 2002). Studies in banking contexts confirm that internal marketing initiatives increase engagement by shaping perceptions of psychological safety, meaningfulness, and motivation (Muramalla, 2021; Sarangal & Nargotra, 2017).

Figure 1

Conceptual Model



Source: Compiled by Researcher

Despite theoretical consensus and supporting empirical evidence, the nuanced relationship between internal marketing and employee engagement in Indian private banks, particularly in Kerala, is not sufficiently understood. Existing studies have not fully examined how internal marketing influences Vigor, dedication, and absorption as distinct outcomes. This study aims to bridge that gap by evaluating the predictive power of internal marketing dimensions on employee engagement among private sector bank employees in Kerala. It contributes to literature by contextualizing engagement in a culturally unique service economy and by offering practical insights for human resource practices in emerging markets.

3. MATERIALS AND METHODS

This study adopted a descriptive and analytical research design to examine how various dimensions of internal marketing influence employee engagement among private sector bank employees in Kerala. Data were collected using a structured questionnaire administered to a sample of 90 respondents from five leading private banks in Kerala: Federal Bank, South Indian Bank, HDFC Bank, Catholic Syrian Bank, and ICICI Bank. The questionnaire comprised three sections: demographic characteristics, internal marketing dimensions, and

Table 3.1

Reliability Analysis

Constructs	No. of items	Cronbach's Alpha coefficient
Internal Communication	4	.767
Training and Development	4	.759
Reward Systems	4	.802
Senior Leadership Support	4	.861
Employee Empowerment.	4	.813
Employee Engagement	12	.804

Source: Primary data

The reliability analysis using Cronbach's Alpha indicated that all constructs in the study exhibit acceptable to high internal consistency, with alpha values ranging from .759 to .861. Internal Communication (.767), Training and Development (.759), and Employee Engagement (.804) demonstrate acceptable reliability, while Reward Systems (.802), Employee Empowerment (.813), and Senior Leadership Support (.861) showed strong internal consistency. These results confirmed that the measurement scales used in the study are reliable and suitable for further statistical analysis.

employee engagement. Internal marketing was measured using constructs adapted from Ahmed and Rafiq (2003). Employee engagement was assessed by adapting the Utrecht Work Engagement Scale (UWES-17) developed by Schaufeli et al. (2002), covering the dimensions of Vigor, Dedication, and Absorption.

A multi-stage stratified proportionate random sampling technique was employed to ensure balanced representation of officers and clerical staff from branches located in Thiruvananthapuram, Ernakulam, and Kozhikode districts, with the highest concentration of bank branches in their respective zones. Sample branches were selected systematically and proportionally across the selected banks and districts, with data collected from two officers and two clerks from each branch. The collected data were analysed using SPSS software. Cronbach's Alpha was used to test the internal consistency of the scales. Multiple regression analysis was performed to assess the influence of internal marketing dimensions on employee engagement. Additionally, independent t-tests and one-way ANOVA were used to evaluate the impact of demographic variables on perceptions of internal marketing and engagement levels.

4. RESULTS AND DISCUSSION

4.1 Influence of Organizational Practices on Employee Engagement

To investigate the impact of organizational practices on employee engagement, a multiple regression analysis was conducted. The independent variables included Internal Communication (IC), Training and Development (TD), Reward and Recognition (RR), Leadership Support (LS), and Employee Empowerment (EE), while Employee Engagement (EEG) was the dependent variable.

H1: Organizational practices significantly influence employee engagement.

Table 4.1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.647 ^a	.418	.384	.33442
a. Predictors: (Constant), Employee Empowerment, Leadership Support, Reward and Recognition, Internal Communication, Training and Development				

Source: Primary data

The model summary shows a moderate correlation between the predictors and employee engagement ($R = .647$), with $R^2 = .418$ indicating that approximately 41.8% of the variance in employee engagement is explained by the selected organizational practices. The adjusted $R^2 = .384$ confirms a reasonably well-fitting model with a standard error of .33442.

Table 4.2

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.752	5	1.350	12.075	.000 ^b
	Residual	9.394	84	.112		
	Total	16.147	89			
a. Dependent Variable: Employee Engagement						
b. Predictors: (Constant), Employee Empowerment, Leadership Support, Reward and Recognition, Internal Communication, Training and Development						

Source: Primary data

The ANOVA results indicate that the regression model is statistically significant ($F(5, 84) = 12.075$, $p < .001$), confirming that the independent variables collectively have a significant effect on employee engagement.

Table 4.3

Co-efficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.185	.337		3.516	.001
	Internal Communication	.346	.105	.423	3.306	.001
	Training and Development	-.194	.103	-.262	-1.885	.063
	Reward and Recognition	.067	.072	.099	.931	.354
	Leadership Support	.046	.062	.062	.735	.464
	Employee Empowerment	.358	.071	.498	5.032	.000
a. Dependent Variable: Employee Engagement						

Source: Primary data

The coefficients revealed the relative influence of each variable on engagement levels. The constant value ($B = 1.185, p = .001$) reflects the base level of engagement when all predictors are zero. Among the variables, Employee Empowerment had the strongest positive influence ($\beta = .498, p < .001$), indicating that involving employees in decision-making significantly boosts engagement. Similarly, Internal Communication showed a significant positive effect ($\beta = .423, p = .001$), highlighting the importance of clear and consistent communication in fostering a committed workforce. Training and Development had a marginal negative impact ($\beta = -.262, p = .063$), suggesting a potential mismatch between training efforts and employee expectations. Reward and

Recognition ($\beta = .099, p = .354$) and Leadership Support ($\beta = .062, p = .464$) were not significant predictors, implying these factors may not independently enhance engagement in this context. In summary, Employee Empowerment and Internal Communication were the key drivers of engagement, underscoring the need for participative leadership and transparent internal communication in private sector banks.

4.2 Analysis of Work Life Balance and Job Satisfaction based on Demographic Information

T-test and ANOVA results were used to assess whether employee engagement and internal marketing perceptions varied significantly across demographic subgroups.

Table 4.4

T-Test and ANOVA Results for Demographic Variables

Categorical Variable	Continuous Variable	Results
Gender	Employee Engagement	$t(38.566) = -0.340, p = 0.736 > 0.05$
	Internal Marketing	$t(33.135) = -1.423, p = 0.164 > 0.05$
Age Group	Employee Engagement	$F(3,86) = 2.501, p = 0.065 > 0.05$
	Internal Marketing	$F(3,86) = 8.774, p = 0.000 < 0.05$
Education Level	Employee Engagement	$F(3,86) = 0.841, p = 0.475 > 0.05$
	Internal Marketing	$F(3,86) = 0.115, p = 0.951 > 0.05$
Marital Status	Employee Engagement	$F(1,88) = 0.001, p = 0.974 > 0.05$
	Internal Marketing	$F(1,88) = 0.540, p = 0.464 > 0.05$

Source: Primary data

There was no significant difference in employee engagement or internal marketing between males and females, with $t(38.566) = -0.340, p = .736$, and $t(33.135) = -1.423, p = .164$, respectively. When considering age group, internal marketing showed a statistically significant difference ($F(3,86) = 8.774, p < .005$), suggesting age-based variation in perceptions. However, employee engagement did not differ significantly by age ($F(3,86) = 2.501, p = .065$). Neither education level nor marital status had a significant effect on either employee engagement or internal marketing, as all p-values exceeded the .05 threshold. These findings highlight that age may influence how employees perceive internal marketing efforts, while other demographic factors showed limited or no impact.

The analysis confirmed strong internal reliability of the constructs used, reinforcing the validity of the measurement instruments. The regression model explained 41.8% of the variance in employee engagement, with Employee Empowerment and Internal Communication emerging as significant predictors. These results underscore the

importance of autonomy and transparent communication in promoting engagement, aligning with earlier findings that emphasize the value of internal alignment in service settings. In contrast, Training and Development showed a marginally negative effect, suggesting that current training programs may not adequately address job-specific challenges or employee expectations. Reward and Recognition and Leadership Support were not statistically significant, indicating that extrinsic motivators and top-down initiatives may have limited engagement value without concurrent relational and communication support. Demographic analysis showed no significant differences in engagement or internal marketing perceptions based on gender, education, or marital status. However, age-based differences in internal marketing perceptions highlight generational nuances in how organizational strategies are received, suggesting the need for differentiated approaches.

The findings support the JD-R model, affirming that job resources like communication and empowerment

foster engagement. The study also contributes to literature by offering region-specific insights from Kerala's banking sector—an underrepresented context in internal marketing research. While the cross-sectional design and limited geographic scope pose constraints, the study advances understanding of how internal marketing influences engagement in service-intensive environments and suggests that HR strategies should prioritize employee-centric and generationally responsive practices.

5. Conclusion

This study offers valuable insights into the role of internal marketing in enhancing employee engagement within private sector banks in Kerala. By empirically examining the relationship between internal marketing dimensions and engagement, the study underscores the strategic importance of treating employees as internal customers in service-intensive industries like banking. The findings confirm that internal marketing practices have a significant impact on employee engagement, with the regression model explaining 41.8% of the variance. Among the various dimensions analysed, Employee Empowerment and Internal Communication emerged as the strongest positive predictors, emphasizing the need for autonomy and transparent information flows within banking organizations. Conversely, Training and Development demonstrated a marginally negative influence, while Reward and Recognition and Leadership Support did not show a statistically significant impact, suggesting that engagement is more effectively driven by structural empowerment and interpersonal communication than by extrinsic rewards or hierarchical support alone. In addition, the analysis of demographic variables revealed that age significantly influenced perceptions of internal marketing, while gender, education, and marital status did not lead to notable differences. This indicates that generational diversity may shape how internal marketing initiatives are perceived, necessitating more nuanced, age-responsive strategies in employee communication and motivation.

These findings highlight the urgent need for banks to integrate empowerment-driven policies and consistent internal communication into their human resource and organizational development frameworks. HR managers should also reassess the design and delivery of training programs to ensure alignment with employee needs and expectations. By doing so, banks can foster a more engaged workforce capable of delivering service excellence in an increasingly competitive and customer-centric environment.

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The Influence of Post-Sustainability Practices on Waste Management: A Study of Individual Behaviour

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Abstract The Influence of Post-Sustainability Practices on Waste Management: A Study of Individual Behaviour," examines the relationship between public awareness, motivations, and demographic factors in shaping sustainable waste management practices. The research focused on assessing the level of awareness, participation, and the role of community influences in waste management behaviors. Primary data was collected from 100 respondents in Thrissur District using a structured questionnaire. The findings revealed a positive correlation between sustainable waste management awareness and sustainable waste practices, with education level playing a significant role in adoption. These insights can help guide policymakers and advocates in designing effective awareness programs and promoting sustainable waste management at the individual level.

Keywords: Post-Sustainability, Waste Management, Environmental Awareness, Sustainable Behavior.

INTRODUCTION

As the world shifts towards sustainability, individual behavior plays a crucial role in effective waste management. Post-sustainability practices focus on reducing, reusing, recycling, and composting to minimize environmental impact. However, the success of these practices largely depends on public awareness and personal motivation to participate. This study aims to explore how factors like education, environmental awareness, and community influence affect sustainable waste management behaviors. Understanding these factors is key to developing strategies that encourage individuals to adopt sustainable waste management practices in their daily lives.

STATEMENT OF THE PROBLEM

The growing importance of sustainability has highlighted the need for effective waste management practices, yet the widespread adoption of post-sustainability behaviors such as reducing, reusing, recycling, and composting remains limited. While many

individuals recognize the environmental benefits of these practices, there is a lack of consistent participation due to varying levels of awareness, motivation, and socio-demographic factors. This gap in engagement raises concerns about how to encourage more widespread involvement in sustainable waste management at the individual level. The challenge lies in understanding the specific barriers and motivators that influence personal behavior, and how community and demographic factors shape the adoption of these practices. Addressing these issues is essential for designing targeted strategies to improve sustainable waste management practices and reduce environmental impact.

OBJECTIVES

- To analyse relationship of individuals 'level of awareness about sustainability waste management Practices and sustainable waste management behaviour.
- To analyse the key motivational and deterrent factors influencing individuals' adoption of sustainable waste management behaviour.
- To analyse the association between individual's educational level and their frequency of participation in sustainable waste management practices
- To evaluate the role of community influence in shaping sustainable waste management behaviour.

HYPOTHESIS

- There is a positive correlation between individuals' level of awareness and their sustainable waste management behaviour.
- There is a significant association between an individual's educational level and their frequency of participation in sustainable waste management practices.

RESEARCH METHODOLOGY

This study adopts a descriptive research design to explore the awareness and behavioral factors influencing sustainable waste management practices among individuals in Thrissur district. A sample of 100 respondents was selected using convenience sampling, allowing easy access to participants from various parts of the district. Primary data was collected through a structured questionnaire. The data was analysed using percentage analysis, correlation, and chi-square tests to examine relationships between awareness, education level, and waste management behaviour. This methodology aims to assess public awareness, identify key motivators and barriers, and understand the influence of community factors in promoting sustainable waste practices.

IMPORTANCE OF THE STUDY

This study is important as it provides insights into the factors that influence individual participation in sustainable waste management practices. By understanding the role of awareness, motivation, and community influences, the study can help design more effective strategies to promote environmentally responsible behaviours. The findings will be valuable for policymakers and sustainability advocates in encouraging broader adoption of post-sustainability practices, ultimately contributing to improved waste management and environmental conservation.

LIMITATIONS OF THE STUDY

A key limitation of this study is its exclusive focus on individuals, neglecting other important categories such as businesses, organizations, and government bodies, which also play a significant role in sustainable waste management. These groups have a considerable influence on waste reduction and recycling efforts, yet their behaviours and responsibilities were not examined in this research. As a result, the findings may not fully capture the broader scope of waste management practices needed for effective sustainability efforts.

REVIEW OF LITERATURE

Several studies have explored the role of individual behaviour in sustainable waste management, emphasizing the importance of public awareness and participation. For instance, Smith et al. (2020) in their study "The Impact of Environmental Awareness on Waste Management Practices" found a direct link between environmental education and increased recycling rates. Similarly, Johnson (2021) in "Barriers to Waste Reduction: The Role of Demographic Factors" identified how age and income influence individuals' willingness to engage in waste reduction behaviors. Lee et al. (2022) in "Community Engagement and Its Role in Sustainable Waste Practices" emphasized the critical role of community-based initiatives in shaping waste management behaviors.

Another important study by Patel and Singh (2021), "The Influence of Education on Waste Management Behavior," found that higher levels of education correlate with more sustainable waste practices. In contrast, Brown (2020) in "Motivational Factors in Sustainable Waste Management" argued that intrinsic motivations, such as personal values, play a larger role than external factors like policy or community initiatives. Williams and Carter (2021) in "Understanding the Role of Motivation in Recycling Behavior" highlighted that social norms and peer influence can significantly affect individual participation in recycling programs. A study by Zhao et al. (2023) titled "The Influence of Socio-Demographic Variables on Waste Management Practices" found that factors like income, employment status, and geographic location are important predictors of waste management behaviors. Harris (2022) in "Post-Sustainability Practices in Waste Management" explored how individuals' adoption of post-sustainability practices such as composting is influenced by both education and community support. Lastly, Robinson and Taylor (2023) in "Examining the Community's Role in Waste Management Participation" argued that community outreach programs and local leadership are essential in motivating individuals to adopt sustainable waste practices. These studies collectively show the significant influence of personal, social, and community factors in shaping sustainable waste management behaviors.

RESULT AND DISCUSSION

Table 1: Educational Qualification of Respondents

Educational Qualification	No. of Respondents	Percentage
Below High School	5	5%
High School	12	12%
Undergraduate Degree	38	38%
Postgraduate Degree	35	35%
Professional/Doctorate	10	10%
Total	100	100%

(Source: Primary Data)

Interpretation:

Most respondents (83%) hold at least an undergraduate degree, indicating that most participants are highly qualified. This suggests a well-educated sample population, which may contribute to higher awareness and better understanding of sustainable practices.

Table 2: Awareness of Sustainable Waste Management Practices

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
I am familiar with the 3Rs (Reduce, Reuse, Recycle).	48 (48%)	36 (36%)	10 (10%)	4 (4%)	2 (2%)
I understand how composting contributes to sustainability.	40 (40%)	34 (34%)	16 (16%)	6 (6%)	4 (4%)
I know the environmental benefits of recycling household waste.	42 (42%)	38 (38%)	12 (12%)	6 (6%)	2 (2%)
I believe that waste segregation at source is important.	50 (50%)	34 (34%)	10 (10%) 4 (4%)	2 (2%)	

(Source: Primary data)

Most respondents either strongly agree or agree with all four statements, showing a consistently high level of awareness regarding sustainable waste management practices. On average, over 80% of respondents demonstrate positive awareness, while very few are neutral or disagree, indicating that sustainability concepts are well understood by most individuals in the sample.

Table 3 : Frequency of Participation in Sustainable Waste Management Practices.

Frequency Level	No. of Respondents	Percentage
Always	28	28%
Often	36	36%
Sometimes	22	22%
Rarely	10	10%
Never	4	4%
Total	100	100%

(Source : Primary Data)

A total of 64% of respondents participate in sustainable waste management practices either always or often, indicating strong engagement. However, 14% (rarely or never) show low participation, highlighting a need for targeted awareness and motivation campaigns to improve involvement.

Table 4: Motivational Factors Influencing Sustainable Waste Management

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
I feel a personal responsibility to protect the environment.	46 (46%)	34 (34%)	10 (10%)	6 (6%)	4 (4%)
I am motivated by seeing others in my community practicing sustainability.	38 (38%)	36 (36%)	14 (14%)	8 (8%)	4 (4%)
I believe sustainable waste practices improve community health.	42 (42%)	40 (40%)	10 (10%)	6 (6%)	2 (2%)
I am influenced by educational campaigns on sustainability.	40 (40%)	38 (38%)	12 (12%)	6 (6%)	4 (4%)

(Source : Primary Data)

The data from Table 4 reveals that personal responsibility and social influence play critical roles in motivating individuals toward sustainable waste management practices. A substantial 80% of respondents (46% strongly agree, 34% agree) feel a personal responsibility to protect the environment, indicating that intrinsic motivation and environmental consciousness are strong driving forces for waste-related sustainability actions. This high level of personal accountability

suggests that values-based appeals in campaigns may be particularly effective.

Similarly, social influence appears significant, as 74% (38% strongly agree, 36% agree) report being motivated by observing others in their community practicing sustainability. This points to the potential effectiveness of community-based and peer-led initiatives, where visible collective action can encourage wider participation through social modeling and normative pressure.

Perceptions about public health benefits of sustainable waste practices are also strong, with 82% (42% strongly agree, 40% agree) believing that such practices enhance community health. This suggests that highlighting the tangible, communal benefits of sustainability—beyond just environmental protection—can be a persuasive strategy in motivating participation.

Lastly, education plays a key role, as 78% (40% strongly agree, 38% agree) of respondents acknowledge being influenced by sustainability campaigns. This supports the continued investment in awareness programs, workshops, and targeted media campaigns, which are evidently effective in shaping positive attitudes and behaviors toward sustainable waste management.

Overall, the findings underscore that a combination of personal ethics, community influence, perceived health benefits, and educational outreach significantly motivates individuals to engage in sustainable waste practices. These insights can be used to design multi-faceted programs that appeal to both personal values and collective responsibility.

Table 5: Deterrent Factors Hindering Sustainable Waste Management

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
I lack access to proper facilities (e.g., bins, compost units).	34 (34%)	30 (30%)	16 (16%)	14 (14%)	6 (6%)
I don't have enough time to manage waste properly.	28 (28%)	32 (32%)	20 (20%)	14 (14%)	6 (6%)

I'm not sure how to separate or compost waste correctly.	26 (26%)	30 (30%)	22 (22%)	16 (16%)	6 (6%)
I feel my efforts won't make a real difference.	20 (20%)	26 (26%)	24 (24%)	22 (22%)	8 (8%)

(Source : Primary Data)

The data reveals several key barriers that hinder effective participation in sustainable waste management. Most respondents (64%) report lacking access to proper waste facilities such as recycling bins and compost units, highlighting a significant infrastructural shortfall that discourages sustainable behavior despite individual motivation. Time constraints also emerge as a major issue, with 60% indicating they do not have enough time to manage waste properly, suggesting that busy lifestyles and inefficient waste systems may limit consistent practices. Additionally, 56% of participants express uncertainty about how to correctly separate or compost waste, underlining a critical knowledge gap that can be addressed through targeted education and awareness campaigns. Lastly, 46% feel that their efforts do not make a real difference, pointing to a psychological barrier rooted in low perceived impact. Together, these findings suggest that for sustainable waste management initiatives to be effective, they must go beyond motivation and tackle infrastructural, informational, and perceptual challenges through integrated and accessible solutions.

Table 6: Community Influence on Sustainable Waste Management

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
I am more likely to manage waste properly when my neighbours do the same.	32 (32%)	38 (38%)	18 (18%)	8 (8%)	4 (4%)

Community-led clean-up or awareness programs encourage me to act more sustainably.	36 (36%)	40 (40%)	14 (14%)	6 (6%)	4 (4%)
I feel social pressure to follow proper waste disposal practices.	28 (28%)	34 (34%)	20 (20%)	12 (12%)	6 (6%)
I participate in sustainable practices more when local authorities or groups actively promote them.	30 (30%)	36 (36%)	22 (22%)	8 (8%)	4 (4%)

(Source: Primary Data)

The data shows that community influence plays a significant role in encouraging sustainable waste behavior. A majority of respondents (65%) agree or strongly agree that community actions, peer behavior, and local initiatives motivate them to participate in sustainable practices. This highlights the importance of collective efforts and community-based programs in driving environmental responsibility.

Table 7: Sustainable Waste Management Behaviour

Question	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
I always separate my waste into recyclables, compost, and trash.	5 (5%)	10 (10%)	20 (20%)	40 (40%)	25 (25%)

I avoid using single-use plastics in my daily life.	8 (8%)	15 (15%)	30 (30%)	32 (32%)	15 (15%)
I am willing to pay more for products that are eco-friendly.	12 (12%)	20 (20%)	25 (25%)	28 (28%)	15 (15%)
I actively educate others about sustainable waste practices.	20 (20%)	25 (25%)	30 (30%)	15 (15%)	10 (10%)

(Source: Primary data)

Most respondents (65%) agree or strongly agree that they separate their waste properly, showing good personal waste management habits. However, fewer respondents show strong engagement in avoiding single-use plastics (47%) and educating others (25%), indicating a need for improvement in broader sustainability practices.

Table 1.1 Test of reliability

Sl. No.	Variables	No of items	Cronbach's Alpha (α)
1	Individual Awareness	4	0.800
2	Motivational and Deterrent factors	8	0.874
3	Community Influence	4	0.782
4	Sustainable waste management Behaviour	4	0.843
	Total	20	

TESTING OF HYPOTHESIS

- There is a positive correlation between individuals' level of awareness and their sustainable waste management behaviour.

		Level of awareness	Sustainable waste management behaviour
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Level of awareness	Pearson Correlation	1	.532**
	Sig. (2-tailed)		.000
	N		100
Sustainable waste management behaviour	Pearson Correlation	.532**	1
	Sig. (2-tailed)	.000	
	N	100	

***. Correlation is significant at the 0.01 level (2-tailed).*

From the above statistical results, it is inferred that individuals' level of awareness and their sustainable waste management behaviour is positively correlated (0.532). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between individuals' level of awareness and their sustainable waste management behaviour. Hence, the first hypothesis formulated for the study, there is a positive correlation between the individuals' level of awareness and their sustainable waste management behaviour is accepted.

Chi - Square Test

- Aim: There is a significant association between an individual's educational level and their frequency of participation in sustainable waste management practices.

Chi square test result

	value	df	Asymp.Sig(2-sided)
Pearson Chi - Square	78.605	18	0.000

The Chi- Square result shows the association between the individual's educational level and their frequency of participation in sustainable waste management practices. From the result it is seen that the Pearson Chi – Square value is 78.605, p value = 0.000 i.e the chi square test result is less than the alpha level of significance of 0.05. This tells that there is a statistically association between the individual's educational level and their frequency of participation in sustainable waste management practices.

Major Findings

- 83% of respondents hold at least an undergraduate degree, indicating a well-educated sample with potential for higher sustainability awareness.
- Over 80% of respondents are aware of core sustainable waste management practices such as the 3Rs, composting, recycling, and segregation at source.

- 64% of respondents participate in sustainable waste practices always or often, showing strong behavioral engagement.
- Personal responsibility, community influence, and educational campaigns were major motivational factors, with over 70% agreeing or strongly agreeing.
- Key deterrents include lack of facilities, time, and knowledge, cited by 60–64% of respondents.
- 65% of respondents consistently separate their waste, while only 47% avoid single-use plastics and just 25% educate others.
- Community influence plays a significant role, with 65% agreeing that peer behavior and local initiatives encourage sustainable actions.
- The reliability analysis showed high internal consistency, with overall Cronbach's Alpha value of 0.945.
- A significant positive correlation ($r = 0.532, p < 0.01$) was found between individuals' awareness and their sustainable waste management behavior, confirming the first hypothesis.
- The Chi-square test ($\chi^2 = 78.605, p < 0.000$) revealed a significant association between educational level and frequency of participation in sustainable waste practices, supporting the second hypothesis.

CONCLUSION

The study reveals that most respondents are well-educated and possess a strong awareness of sustainable waste management practices. High levels of knowledge about the 3Rs, composting, and segregation are evident among participants. While many respondents actively separate their waste, fewer consistently avoid single-use plastics or engage in educating others, indicating gaps in behavior despite awareness. Motivational factors such as personal responsibility and community influence play a key role in encouraging sustainable actions. However, barriers like lack of access, time constraints, and limited knowledge still hinder full participation. Overall, the findings highlight the importance of targeted awareness programs, infrastructure improvements, and community-driven initiatives to enhance sustainable waste management behavior.

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An Evaluation of the Smart Phase of Agriculture Industry with the Implementation of Internet of Things (IoT)

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ABSTRACT: With the global population projected to reach 10 billion by 2060, the demand for food production is increasing. The Internet of Things (IoT) offers innovative solutions to enhance agricultural productivity, efficiency, and sustainability. IoT-powered smart farming integrates sensors, automation, and data analytics to optimize agricultural processes with minimal human intervention. Key IoT components include sensors for monitoring soil conditions, climate, and crop health, along with wireless connectivity for real-time data transmission. Data analytics provide actionable insights, improving resource utilization. Automation technologies such as agricultural robots, drones, and imaging systems enhance precision farming, enabling efficient irrigation, pesticide application, and harvesting. Drones equipped with sensors offer aerial surveillance for crop monitoring, while real-time feedback optimizes resource management and reduces operational cost. Although IoT benefits agriculture, it faces challenges like cybersecurity risks, integration issues, high costs, and limited rural connectivity. However, innovations in smart greenhouses, precision farming, and automation enhance efficiency, sustainability, resource management, crop quality, and yields. In summary, IoT is revolutionizing agriculture with automation, real-time monitoring, and data-driven insights. These advancements are crucial for modern farming, enhancing food security, and meeting the rising global demand. Embracing IoT will create a more sustainable, cost-effective, and resource-efficient agricultural future.

Keywords: Smart Farming, IoT-Based Agriculture Monitoring, Challenges and Constraints, Future Prospects in Agriculture

I. INTRODUCTION

According to a survey, the world's population is expected to reach around 10 billion in 2060. This will increase the demand for food grains, which is often negatively affected by the rapid growth of the population. Fortunately, the agricultural sector can improve its production to meet the increasing demand. The increasing number of sensors used in the agriculture sector has

created a strong impression about the Internet of Things (IoT). The applications of the IoT are expected to increase significantly throughout the next few years. Overall, the cost of all agricultural solutions based on IoT-based agriculture is relatively fair. Researchers proposed numerous integrated modern technologies to boost agricultural yield. As a result, numerous modern ideas may be coupled with traditional farming to gradually reach the goal. With several options, the Internet of Things, with its sensors and descriptions in green nature, may intelligently construct agriculture. Many agricultural businesses are turning to IoT technology to improve efficiency, production, global market, and other qualities such as minimal human intervention, time, and cost, among others. Sensors are becoming smaller, more complex, and more cost effective as technology advances. The networks are also internationally accessible, allowing for complete commitment to smart farming. Smart farming, which focuses on fostering agricultural innovation, is the solution to the industry's present difficulties. All of this may be accomplished with the help of smart phones and IoT devices. A farmer may obtain any necessary data or information as well as keep track on his agricultural sector

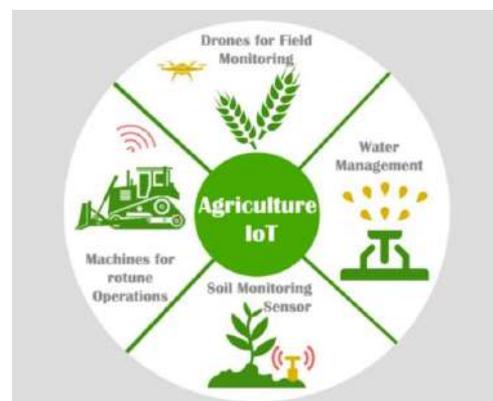


Fig. 1. Overview if IoT in agriculture

II. SMART FARMING

Smart farming, also known as precision agriculture, is a farming management concept that utilizes advanced technology, data analytics, and IoT devices to optimize agricultural practices and maximize crop yields while minimizing resource usage and environmental impact. Smart farming integrates various technologies such as sensors, drones, GPS, and data analytics software to collect real-time data on soil conditions, weather patterns, crop health, and other relevant factors. This data is then analyzed to provide actionable insights and recommendations to farmers, enabling them to make informed decisions about irrigation, fertilization, pest control, and harvesting.

By leveraging IoT-enabled solutions, smart farming helps farmers improve efficiency, reduce costs, and increase sustainability in agriculture by optimizing resource allocation, reducing waste, and mitigating environmental risks. Additionally, smart farming contributes to food security and agricultural resilience by enhancing productivity and enabling farmers to adapt to changing environmental conditions and market demands.

III. IOT- BASED AGRICULTURE MONITORING

Various sensors, including moisture, temperature, and humidity, provide irrigation data, triggering actions by fieldwork robots upon reaching threshold levels.

- Continuous monitoring and feedback processing ensure efficient device activities, with robots responding to real-time sensor data.
- The experimental setup features multiple sensors and a CPU, with live data retrieval facilitated by a microcontroller unit connected to mobile devices.
- IoT-driven feedback based on field data is supported by fieldwork robots, with information processed and retrieved via Wi-Fi modules.
- Soil moisture levels are monitored via IoT, prompting necessary actions, while switching devices control fieldwork outputs based on sensor inputs to the IoT system.



Fig. 2. IoT based agriculture monitoring

IV. CHALLENGES AND CONSTRAINTS

Data Privacy and Security: Protecting sensitive agricultural data from cyber threats and ensuring compliance with privacy regulations.

- **Connectivity in Rural Areas:** Overcoming limited internet access to enable seamless data transmission from IoT devices.
- **Integration Complexity:** Addressing challenges in integrating diverse IoT devices and systems for interoperability
- **Cost Considerations:** Assessing the initial investment and long-term ROI of implementing IoT solutions in agriculture.

V. FUTURE PROSPECTS IN AGRICULTURE

For smart greenhouses, IoT system enable weather stations to adjust climate conditions automatically. Thus the entire procedure become cost effective and increase accuracy.

- IoT solutions focuses on better use of resources like water, energy, land.
- This helped the farmers to keep the quality of crops and fertility of land .thus ensure volume and quality of products.
- IoT in agriculture introduce automation such as demand based irrigation, fertilizing and robot harvesting.
- Precision farming in IoT relies on collecting data from sensors in the field which helps farmers to allocate resources to plant accurately

VI. IMPLEMENTATION

1) **Robotics:** Agriculture robots, also known as Agribots, are gaining popularity among farmers due to rising demand and manpower shortages throughout the world. These clever agribots employ digital image processing to search their database for weed pictures that are similar to crops and then weed or spray them with their robotic arms. Tractors and heavy plowing equipment can be run automatically from the comfort of home through GPS. These integrated automatic machines are highly accurate and self-adjust when they detect difference in terrains, simplifying the labour intensive tasks. Their movements and work progress can be easily checked on smartphones. Utilizing agribots to pick crops is solving the problem of labor shortages. A combination of image processing and robotic arms is used by these machines to determine the fruits to pick. These bots can work in greenhouses to determine the stage of crop and harvest them at the right time. They can move large items and conduct operations such as plant spacing with great precision, maximizing space and plant quality while lowering manufacturing costs



Fig. 3. Robotics in agriculture

2) Drones: Agriculture is one of the most important industries to use drones in. For photographing, mapping, and surveying the farms, drones equipped with sensors and cameras are employed. Drones can be operated remotely or autonomously using software-controlled flight plans in their embedded systems, which work with sensors and GPS. Crop health, irrigation, spraying, planting, soil and field, plant counting, yield prediction, and much more may all be learned from drone data.



Fig. 4. Drones in agriculture

3) Remote Sensing: Sensors such as weather stations are put around the farms to collect data, which is then communicated to analytical tools for examination. Farmers can monitor the crops and take action based on insights. Sensors installed along the fields track changes in light, humidity, temperature, shape, and growth of the crops. As a result, remote sensing can aid in disease prevention and crop growth monitoring. The data obtained by sensors in terms of humidity, temperature, moisture precipitation, and dew detection aids in identifying weather patterns in farms so that appropriate crops may be cultivated. Soil health analysis aids in determining nutrient value and drier farm areas, as well as soil drainage capacity and acidity, allowing farmers to adjust the amount of water required for irrigation and choose the most beneficial type of cultivation.

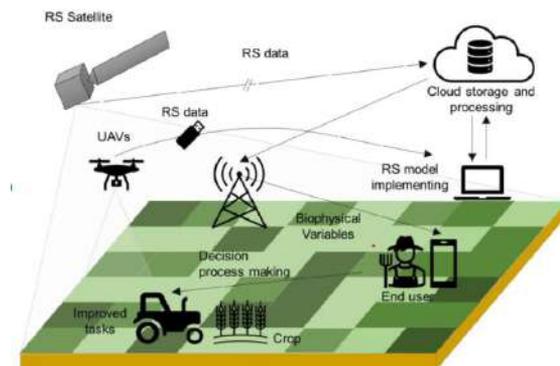


Fig. 5. Remote sensing in agriculture

4) Computer Imaging: Computer imaging involves the use of sensor cameras placed across the farm or drones equipped with cameras to create photos that are then processed digitally. The core notion of digital image processing is to use computer algorithms to process an input image. Image processing examines photographs in various spectrum intensities, such as infrared, compares images taken over time, and discovers abnormalities, allowing for the analysis of limiting factors and improved farm management.



Fig. 6. Computer imaging in agriculture

VII. OBJECTIVES

1. To examine the influence of IoT technologies on agricultural efficiency and yield.
2. To assess the economic feasibility and scalability of IoT-enabled farming systems.
3. To explore specific IoT applications in agriculture such as soil sensing, weather monitoring, and automated irrigation.
4. To evaluate the integration of traditional farming techniques with modern IoT systems.
5. To understand the preparedness and adaptability of farmers across different regions toward adopting smart farming technologies.

VIII. METHODOLOGY

- Literature Survey:

A comprehensive review of existing scholarly literature, industrial case studies, and technical reports is conducted to understand the evolution and current state of IoT applications in agriculture.

- Data Analysis:

Quantitative and qualitative data were obtained from agricultural technology reports, government databases, and published case studies from multiple geographic locations.

- Comparative Study:

Key performance metrics—such as crop yield, resource usage, and operational costs—are analysed before and after the deployment of IoT solutions.

- Technology Assessment:

A review of commonly used IoT technologies in agriculture (e.g., environmental sensors, drones, and precision irrigation systems) is conducted.

- Stakeholder Insights (optional):

Informal interviews and documented experiences from farmers and agricultural technologists are considered to capture real-world insights.

IX. LIMITATIONS

- Regional Disparities:

Adoption rates and technological infrastructure vary widely across regions, affecting the uniformity of results.

- Data Constraints:

In many cases, publicly available data is limited, inconsistent, or regionally biased.

- High Initial Investment:

The cost of IoT devices and infrastructure can be prohibitive for small-scale farmers, especially in developing nations.

- Digital Literacy:

Limited technical knowledge among farmers poses a challenge for effective technology utilization.

- Connectivity Challenges:

IoT systems require reliable internet access, which may be unavailable in remote or rural areas

CONCLUSION

This research describes the proposed model which consists of many analysis sections for an overall framework. Thus, our integrated units having many advantages as discussed earlier in smart agriculture units with IoT modules. As a result, smart agriculture is needed. The Internet of Things would assist in the development of smart agriculture. IoT is used in various agricultural domains to improve time efficiency, water conservation, crop monitoring, soil management, bug spray and pesticide safety, and so on. It also eliminates human labour, deconstructs agricultural methods, and creates a difference in smart farming implementation. Agriculture is a profession that has relied on traditional practices and experiences up to now. However, the passage of time has affected rural traditions, and they have started to adapt to the flow of change. The usage of the Internet of Things (IoT) in agriculture would increase yields and help control all cultivate operations. Agriculture must undergo significant improvements since a substantial portion of the population relies on it for survival

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Examining the Awareness and Adoption of the Cashless Economy for Fostering Sustainable Economic Environment

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Abstract: E-finance is defined as “The provision of financial services and markets using electronic communication and computation”. The concept of a cashless economy aims to reduce cash usage and promote electronic transactions, reflecting a major shift in payment methods in the digital age. While existing research often lacks relevance across different contexts, there is a notable gap in studying the factors affecting cashless transaction adoption among Mukkam Grama panchayat. Cashless Economy refer to financial transactions that do not involve the use of physical cash. Instead, these transactions rely on digital or electronic methods of payment, such as credit or debit cards, mobile payments, bank transfers, and digital wallets. The concept of cashless transactions has gained popularity in recent years due to the convenience.

Digital transactions are faster, more secure, and often come with incentives such as loyalty points, discounts, and cashback offers. Cashless transactions also eliminate the need for physical cash, which can reduce the risk of theft, counterfeiting, and money laundering. In addition, online transactions enable businesses to track their financial transactions more efficiently and accurately, helping them to manage their finances better. This study seeks to evaluate the level of awareness and adoption of cashless transactions also the foster the E-payment era among people additionally identifies the unique factors influencing people behaviour.

This study was conducted in Mukkam, involving 50 respondents where primary data were collected through a questionnaire. Data analysis involved descriptive and inferential statistics that included ratio analysis, percentage analysis, charts and tables to examine the influencing factors for the adoption of cashless transactions.

Keywords: Cashless Economy, Digital payment Platforms, E-finance, Awareness of cashless transactions, Sustainable online cash System.

I. INTRODUCTION

A cashless economy refers to a financial system where transactions are conducted digitally, eliminating the need

for physical cash. This shift towards digital payments has gained significant momentum in recent years, driven by advancements in technology, increasing mobile penetration, and growing demand for convenience and security. A cashless economy offers numerous benefits, including increased efficiency, reduced costs, and improved financial inclusion. Digital payments enable fast and real-time transactions, reducing the time and effort required for traditional payment methods. Additionally, digital transactions are secured through encryption and authentication, reducing the risk of theft and loss. Furthermore, a cashless economy can promote financial inclusion by providing access to digital payment systems for underserved populations. Many countries are moving towards cashless economies, with some, like Sweden, already making significant progress. However, a cashless economy also presents challenges, such as the digital divide, cybersecurity risks, and the need for financial literacy and digital skills. Overall, a cashless economy has the potential to transform the way we conduct financial transactions, offering a more convenient, secure, and efficient way to manage our finances.

II. STATEMENT OF THE PROBLEM

The increasing demand for convenient, secure, and efficient in the methods has led to a growing interest in the cashless economy. However, despite the potential benefits of digital payments, there remains a need to examine the awareness and adoption of cashless economy among individual and business, and its impact on sustainable digital payment sector.

III. SCOPE OF THE STUDY

By adopting a cashless economy, countries can promote sustainable economic development, improve financial inclusion reduce costs, improving transparency, enhancing efficiency and supporting sustainable practices.

IV. OBJECTIVES

1. The current level of awareness about cashless economy and digital payment methods.
2. Factors influence the adoption of digital payment methods.
3. Challenges and barriers to adopting cashless economy.
4. Analyze how policy makers and stakeholders promote the adoption of cashless economy for sustainable digital payment sector.

V. SIGNIFICANCE OF THE PROBLEM

This study explores the awareness and adoption of cashless economy for suitable digital payment sector, shedding light on the factors influencing consumer behavior and the potential benefits of digital payments for economic efficiency, financial inclusion, and sustainable development. The findings of this study will contribute to the understanding of how cashless economy can be leveraged to promote sustainable digital payments sector, informing policy decisions and business strategies that foster economic growth, reduce poverty, and enhance financial inclusion.

VI. RESEARCH METHODOLOGY

A. Research Design

The study is analytical and descriptive in nature.

B. Sample Design:

The study targets consumers in mukkam grampanchayat.

C Sample Size:

Sample size of the study is 50 respondents

D Sampling Technique:

To collecting data, convenience sampling technique will be used

E. Source of Data

The data for the study are Collected from both the primary and secondary sources

- **Primary Data:** Primary data are collected from people by using the instrument questionnaire.
- **Secondary Data:** secondary data are collected from newspapers, journals, research papers, websites etc.

F. Data Collection Tools

The study conducted using questionnaire.

G. Tools of analysis

Major tool used in the analysis process has been graphs, chart and percentage for interpreting the data collected

LIMITATIONS OF THE STUDY

1. Study is restricted to mukkam gramapanchayath.
2. Study is limited to samples 50
3. Study will be conducted within a short span of time.
4. Respondents may not be willing to give accurate data.

REVIEW OF LITERATURE

- Sunitha and Venu (2020) examine how fin-tech has revolutionized the banking industry, emphasizing both its advantages and disadvantages. The study offers a thorough examination of the ways in which fin-tech innovations like digital payments, mobile banking, and blockchain have improved the effectiveness, convenience, and accessibility of financial services. It also explores the difficulties traditional banks have implementing new technology, such as legal restrictions, cybersecurity issues, and customer mistrust. The study provides insightful information about the opportunities fin-tech brings to banking organizations, particularly in terms of promoting competition and financial inclusion.
- Raya and Vargas (2022) aimed to ascertain the determinants by which individuals decide to use credit cards as payment method rather than cash; that is, to understand changes in socioeconomic factors that affect the long-term use of alternatives to cash. Using the data from the waves (2002-2017) of the Spanish Survey of Household Finances (SSHF) and a panel data estimation (static and dynamic), we identified education, age, income, and wealth as the main drivers of credit cards as a payment method. The study has unravelled the effect of age and the cohort effect, checked for nonlinearity problems, and card use persistence. A secondary aim is to establish, using a controlled experiment, some of the financial consequences of being a cashless economy.
- Khando Khando, M Sirajul Islam, Shang Gao
Future Internet 15 (1), 21, 2022

The interplay between finance and technology with the use of the internet triggered the emergence of digital payment technologies. Such technological innovation in the payment industry is the foundation for financial inclusion. However, despite the continuous progress and potential of moving the payment landscape towards digital payments and connecting the population to the ubiquitous digital environment, some critical issues need to be addressed to achieve a more harmonious inclusive and sustainable cashless society. The study aims to provide a comprehensive literature review on the emerging digital payment technologies and associated challenges.

THEORETICAL FRAMEWORK

In recent years, India has witnessed an unparalleled rise in digital transactions, marking a significant milestone in its journey towards becoming a cashless society. At the forefront of India's digital payment revolution is UPI with a record hit of 16.73 billion transactions in December 2024.

MEANING AND DEFINITION OF CASHLESS ECONOMY

Cashless Economy can be defined as a situation in which the flow of cash within an economy is non-existent and all transactions must be through electronic channels as direct debit, credit cards, debit cards, electronic clearing, and payment systems such as Immediate Payment Service (IMPS), National Electronic Funds Transfer (NEFT) and Real Time Gross Settlement (RTGS) in India. In a cashless economy most of the transaction will be done by digital means like e banking, debit and credit cards, Pos (point of sales) machines, digital wallets etc. In simpler words no liquid money or paper currency will be used by the people in each country. In a cashless economy the third party will be in possession of your money. He will allow you to transact that money whenever it is needed. If it is not needed, then the third party can use that money. Third party can be a government or any other public or private sector bank.

ADVANTAGES OF GOING CASHLESS

- **Saves Money and Time:** Companies and governments will get efficient, and they can reduce costs as they no longer need the manual accounting work to be done. The costs associated with accounting and handling cash is very high.
- **Less Cash Decreased Crimes:** Business and individuals can also avoid other costs as well.
- **Theft often leaves a big hole in one's pocket.** The risk of theft will continue until people carry cash and by going cashless the same can be reduced.
- **Production Costs of Coins and Paper Currency are reduced:** Production of coins and paper currency is indeed an expensive endeavour and the life span of most of the paper currencies is about 6 years. So, by going electronic the cost of production gets reduced.
- **Less Cash Means More Data** The government can use the data coming from the cashless transactions to improve and analyse their policies. By using such data, officials can predict or identify the patterns of activity and use such information for urban planning for sectors like energy management, housing, and transportation.
- **More Spending Helps Improved Economic Growth:** When a nation is taking a step towards a cashless

economy, a boost in the economic growth can be expected

DISADVANTAGES OF CASHLESS PAYMENTS

1. Technology Dependency and Internet Access Challenges

Cashless payments rely heavily on technology, including stable internet connections and electronic devices. Challenges arise when there are connectivity issues or a need for access to the internet, hindering seamless payment processes

2. Fraud and Hacking Risks in Digital Transactions

Digital transactions are susceptible to fraud and hacking Cybercriminals use techniques like phishing, malware, and data breaches to exploit vulnerabilities, impacting businesses and customers.

3. Privacy Concerns in Cashless Interactions

Privacy concerns arise in cashless interactions due to data privacy issues and surveillance Secure handling of customer information becomes crucial to protect sensitive data from unauthorised access.

4. Implementation Challenges for Small Businesses

Small businesses face implementation challenges with cashless payments, including setup costs, staff training, and rapidly evolving technologies that require regular updates and maintenance security

5. **Network connectivity:** Since the day demonetisation was announced, people are trying to use more of card transactions to save that dreaded trip to the bank and to save the last penny of the hard cash in hand. However, a sudden surge in card transactions has led to connectivity issues. Several people have faced trouble while standing in line to pay for a transaction at a shop when the card machines have stopped working due to an overload on the network. Connectivity issues must be resolved before dreaming about a cashless society

6. **Internet cost:** The internet cost in India is still substantially high. There is no Wi-Fi at public places and if people do not get their monthly data packs recharged, there is no way they can be connected to make online payments

TYPES OF CASHLESS PAYMENT METHODS

1. E-wallets

Electronic wallets, or e-wallets, are digital tools that store payment information and enable you to make transactions conveniently through your smartphones or computers. An example of e-wallets includes:

- PayPal
- Google Pay
- Apple Pay

All these e-wallets offer a range of features that enhance both convenience and security.

Common Features of E-wallets.

- These e-wallets allow you to link your bank accounts or cards and make payments with just a few taps or clicks.
- They often provide additional layers of security, such as two-factor authentication and encryption, to protect your financial information.
- With e-wallets, you can easily make cashless payments online or at physical stores, making transactions faster and hassle-free

2. Mobile Banking Applications

Mobile banking applications provided by banks and financial institutions allow transactions directly from smartphones. These apps offer a seamless experience for cashless payments. You can link your bank accounts and make transfers or payments with just a few taps on your mobile devices.

3. UPI System

The UPI is a real-time payment system in India that enables instant money transfers between bank accounts by using mobile devices. It provides a convenient and secure platform for individuals to send or receive money without the need for bank account details of IFSC (Indian Financial System Code) codes

4. BHIM App

The BHIM (Bharat Interface for Money) application (app) is a UPI-based payment application developed by the National Payments Corporation of India (NPCI). It offers a user-friendly interface and simplifies digital transactions in India. The BHIM app lets users link multiple bank accounts and make payments using their registered mobile numbers or virtual payment addresses.

5. Aadhaar Payment App

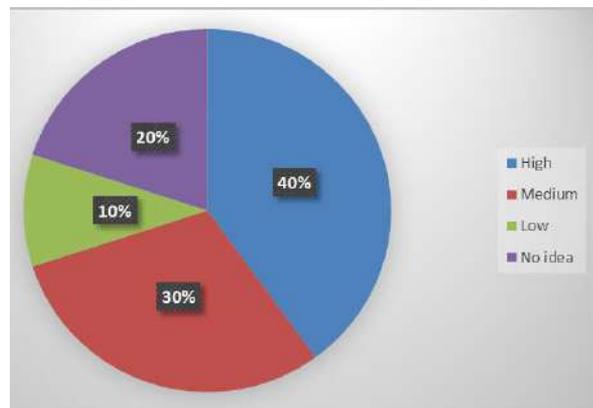
The Aadhaar Payment app is a unique digital payment solution that allows transactions using Aadhaar numbers linked to your bank accounts without additional authentication methods. If you do not have a smartphone or debit/credit card, the app offers a USSD (unstructured supplementary service data) based interface that can be accessed through basic feature phones. It integrates with the Aadhaar database, which contains biometric and demographic information of Indians. You can make payments by simply providing your Aadhaar number. Overall, the Aadhaar Payment App provides a convenient and inclusive way to make digital payments, regardless of the access to smartphones or traditional payment methods.

Data analysis and Interpretations

TABLE NO-1 Level of awareness about cashless economy

AWARENESS LEVEL	Percentage (%)
High	40
Medium	30
Low	10
No idea	20
total	100

CHART NO-1 Level of awareness about cashless economy and digital payments

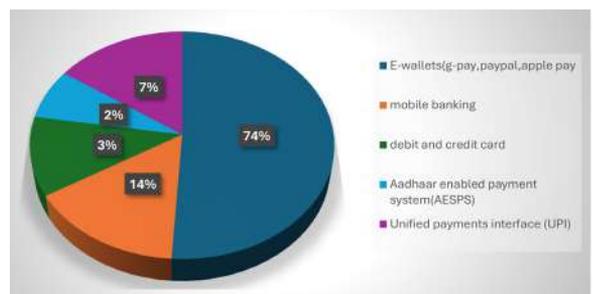


INTERPRETATION: From the above graph reveals that 40% of the respondents are aware about the cashless economy, on the other side 10% have low knowledge about the digital economy.

TABLE NO-2 Most used online payment systems.

Online payment methods	Percentage (%)
E-wallets (g-pay, PayPal, apple pay)	50
mobile banking	15
debit and credit card	11
Aadhaar enabled payment system (AESPS)	7
Unified payments interface (UPI)	15
Cryptocurrency	2

CHART NO -2 Most used online payment system

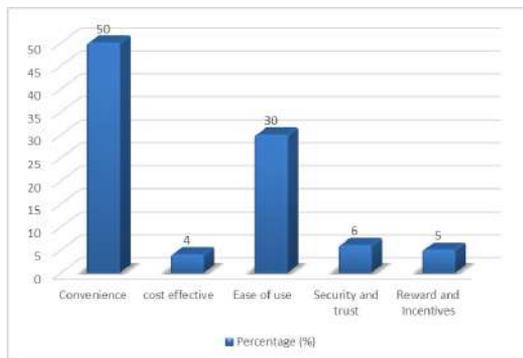


INTERPRETAION: From the above graph clearly understand that majority of the respondents widely use the E-wallets like G-pay, Apple pay and Pay pal .

TABLE NO- 3 Factors influencing the adoption of digital payments methods

Factors influenced for adoptions	Percentage (%)
Convenience	50
cost effective	4
Ease of use	30
Security and trust	6
Reward and Incentives	5
Total	100

CHART NO-3 Factors influencing the adoption of digital payments methods

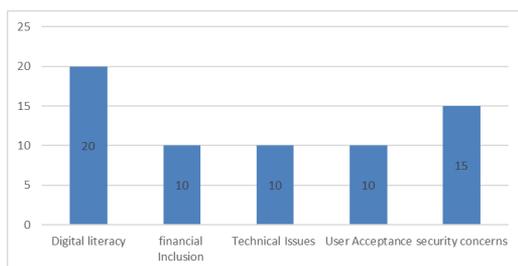


INTERPRETATION: Majority of the respondents are highly influenced by the convenience regarding the adoption of cashless payments, however only 4% influenced by the cost effectiveness of this system.

TABLE NO: 4 -Challenges for adoption of cashless economy

Challenges for adoption of cashless Economy	Percentage (%)
Digital literacy	20
financial Inclusion	10
Technical Issues	10
User Acceptance	10
security concerns	15

CHART NO:4 -Challenges for adoption of cashless economy

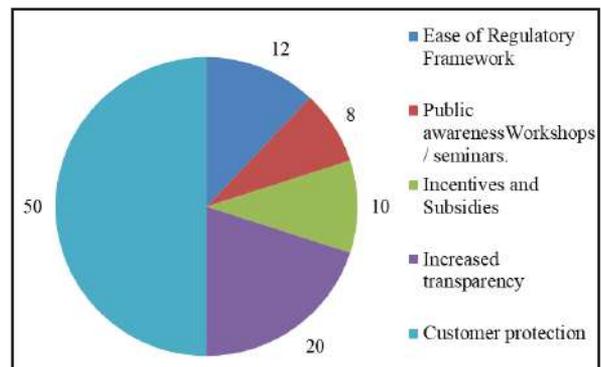


INTERPRETATION: Most of the respondents 20%were facing challenges regarding the adoption of digital literacy on the other side10% of repondents were equally facing challenges like financial inclusion,Technical issues,User acceptance .

TABLE NO:5- How Policy makers and stakeholders promote the adoption of cashless transactions for a sustainable digital era.

Promotional Methods	Percentage (%)
Ease of Regulatory Framework	12
Public awarenessWorkshops / seminars.	8
Incentives and Subsidies	10
Increased transparency	20
Customer protection	50

CHART NO-5 How Policy makers and stakeholders promote the adoption of cashless transactions for a sustainable digital era.



INTERPRETATION: Above chart shows that for a fearless digital transaction they need customer protection from government and stakeholders. Also, they are expecting more public awareness and workshops or seminars for updating knowledge about the digital system.

FINDINGS

- Nowadays most of the respondents have awareness regarding e-finance
- Most of the respondents’ handy Digital systems are E-wallets such as G-pay, Apple Pay, Pay Pal.
- Majority of users are influenced by the convenience of online transactions.
- Digital literacy is the prominent challenging factor which is faced by the respondents.
- Mainly policy makers and stakeholders should promote customer protection while doing the transactions.

CONCLUSION

The Indian payments industry has seen tremendous growth in digital transactions over the past few years with rising smartphone and internet penetration. According to this study E Wallets and Mobile banking are the most convenient also has led the digital payments revolution with its ease of use. From the above study we can understand that in mukkam gramapanchavath the usage of digital payment apps day by day getting more familiarity.

In recent days the number of users has been increasing day by day with a greater number of young and adults, particularly the usage of digital payment apps by student and employees who is working under government and private sector In overall, all the digital payment system is most benefit to the users in terms of quick payment, avoiding carrying physical cash, save tune, high secured payment, getting discounts and offer, easy recharge and green payment system etc. Hence the posture of citizens is shift wluch is preference an excellent begin-up for cashless or less con based economy.

ACKNOWLEDGEMENT

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Financial Literacy and Financial Planning of the Coastal Community in Kerala: A Pathway to Sustainable and Inclusive Economic Resilience

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ABSTRACT The study explores the correlation between financial literacy, financial planning, and economic resilience among Kerala's coastal communities, a sector of society that is often excluded from formal financial systems. In this study, we use a sample size of 385 respondents (fishermen, coastal traders, and allied workers), and the statistical tools used to examine key relationships include regression analysis, independent samples t-tests, and correlation analysis. Results indicate that financial literacy is a significant predictor of financial planning behaviour ($\beta=0.42$, $p<0.001$) and explained 58% of the variance (R^2). A t-test reveals substantial differences, with coastal traders showing more significant levels of financial literacy ($M=4.0$, $SD=0.9$) than fishermen ($M=3.2$, $SD=1.1$; $p=0.001$). Correlation analysis takes this a step further by highlighting the links: financial literacy correlates with banking access ($r=0.52$) and income stability ($r=0.47$), while banking access and income stability have a stronger correlation ($r=0.61$). The study recommends tailored financial literacy initiatives and inclusive financial policies for low-income people to improve sustainable livelihoods in vulnerable coastal ecosystems. This research contributes to bridging gaps in financial inclusion and responds directly to post-sustainability, social responsibility, and regenerative business models themes selected by the conference, making our findings building blocks for policymakers and CSR initiatives.

Key Words: Financial literacy, coastal communities, sustainable livelihoods, regression analysis, Kerala.

INTRODUCTION

Financial literacy is essential to economic resilience but varies widely among vulnerable sections of society, like coastal communities in the Indian state of Kerala. Regarding sustainable livelihoods, the most recent research shows that financial literacy improves financial planning behaviours [1]. Therefore, formal financial systems in coastal communities often exclude fishermen and traders, forcing them to operate on the margins, leaving them further vulnerable to economic shocks The

challenges are compounded by limited access to banking services and irregular income streams, highlighting the need for targeted approaches for intervention [2].

This paper analyses the relationship between financial literacy, financial planning, and economic resilience in Kerala's coastal communities [3]. Based on a sample with 385 respondents, the study applies regression, independent samples t-test, and correlation analysis to examine these relationships. It was found in the results that financial literacy is a meaningful predictor of financial planning behavior ($\beta = 0.42$, $p < 0.001$), explaining 58% of the variance ($R^2 = 0.58$). We could also see a subgroup difference in financial literacy between coastal traders and fishermen ($M = 4.0$ vs. $M = 3.2$, $p = 0.001$). A correlation analysis further portrays significant associations between access to banking, predictable sources of income, and financial literacy ($r = 0.52-0.61$). Such findings align with worldwide urges for inclusive financial policies and targeted literacy programs to promote sustainability [4].

This study, therefore, contributes to the broader discourse on post-sustainability and regenerative business models by bridging financial inclusion gaps. The findings provide actionable insights for policymakers and CSR campaigns, highlighting the pressing need for contextualized interventions to empower marginalized coastal communities [8].

STATEMENT OF THE PROBLEM

Fishermen and small-scale traders in coastal communities of Kerala have considerable economic vulnerabilities as they are poorly literate in finance and excluded from formal financial systems [9]. Research shows that low levels of financial literacy prevent effective financial planning, resulting in subpar savings behavior, insufficient risk management, and increased exposure to economic shocks [10]. Although Kerala has excellent human development indicators, coastal

populations are often marginalized with limited access to banking services and credit facilities [11]. This exclusion contributes to income instability and restricts sustainable livelihood development [12].

Moreover, occupational disparities compound these challenges. In coastal areas, for example, traders tend to be financially more literate than fishermen owing to differences in exposure to market systems and financial institutions [13]. This divergence highlights the urgent need for interventions to target sub-groups' needs within coastal communities [14]. Moreover, even when financial inclusion policies are in place, structural barriers like geographical isolation and low levels of digital literacy often hinder implementation from impacting the most vulnerable [15]. The lack of proper financial planning adds another layer to reduce their resilience should a crisis occur, particularly related to climate-related disasters, whenever it happens, which is common in coastal areas [16]. Without targeted strategies to uplift financial literacy and access, these communities risk falling into further poverty, undermining the SDGs for inclusive and sustainable development [18]. Aims of this study. This study aims to fill the noted gaps by exploring the relationships between financial literacy, financial planning, and economic resilience, offering evidence-based policy recommendations for policymakers and stakeholders in this field [20].

Need and Significance of the Study

Although economically crucial to the region, the Kerala coastal districts are economically sensitive with low levels of financial literacy and limited access to formal financial systems [19]. Financial literacy provides fundamental skills that help people make well-informed decisions on saving, investment, and risk [21]. Still, studies show that marginalized groups, including fishermen and small-scale traders, lack these abilities [24]. Without sufficient education on financial literacy, these communities face difficulties in managing debt, income variability, and resilience against economic shocks, thus reinforcing poverty [22]. Such a study is needed to determine the gaps in financial literacy and how this affects financial planning behaviors within this group of people, providing empirical evidence for the need for interventions explicitly targeted to such a population [23].

The implications of this study are valuable for personal financial health, economic stability, and sustainability on a larger scale [25]. Artificial intelligence and machine learning tools have also been employed in various sectors to enhance accuracy and effectiveness. Still, there is an increasing need for them, especially in the coastal regions that are highly vulnerable to climate change and natural disasters, which disrupt livelihoods and compound financial insecurity. Increased financial literacy would enable these communities to undertake adaptive measures, such as the uptake of insurance and the diversification of

income sources, which contribute to long-term resilience [26]. Moreover, financial inclusion plays a vital role in sustainable development goals (SDGs), especially SDG 1 (No Poverty) and SDG 8 (Decent Work and Economic Growth). **Story Highlights:** This article contributes to policy frameworks that promote inclusive growth and equitable financial ecosystems by examining linkages between financial literacy, banking access, and income stability [27].

The study also looks at occupation-based discrepancies in financial literacy, showing why some groups, like coastal traders, are financially better prepared than fishermen [28]. Such insights will allow for tailored financial education programs suited to the different characteristics of sub-groups within coastal populations [30]. As a result of the growing emphasis on digital financial services, the study also highlights how improving digital literacy, in conjunction with traditional financial education, can help address the inclusion gap. In the long run, these findings will guide policymakers, financial agencies, and NGOs striving for sustainable jobs and economic fairness in deprived regions [29].

Theoretical Background of the Study

This study is theoretically grounded in Behavioral Economics, Financial Capability, and a Sustainable Livelihoods Approach (SLA) [31]. These theories unravel the role of financial literacy further as they assert its influence on financial planning and economic resilience for marginalized coastal communities [33].

[5] Introduced the foundations of behavioral economics, which argues that our decisions are not always purely rational and that cognitive biases can impede our ability to make the best choices in financial matters [31]. As an illustration, in the setting of Kerala's coastal communities, this theory explains the tendency of individuals with low financial literacy to struggle with savings, investments, and debt management despite formal financial services being readily accessible. Research by [6] has shown that financial literacy not only facilitates saving and investing, but it can also help individuals avoid behavioral traps that undermine long-term goals, which has particular importance for communities already struggling to deal with intermittent access to income as a result of heightened climate risks and market fluctuations [34].

The Financial Capability Theory takes financial literacy one step further by recognizing that financial literacy also includes access to institutional resources (e.g., banking services). This hypothesis is consistent with the findings of the study, who were strongly ($r=0.61$) correlated between income stability and banking access. It reminds us of the dual challenge coastal communities face: even when financial literacy improves, systemic barriers (think: absence of banks in the area, exclusion from digital access) can stymie actual results. This is corroborated by

[7], who find in India that financial inclusion program are insufficient without simultaneous investments in both literacy and institutional access [35].

The Sustainable Livelihoods Approach (SLA), which was formalized by DFID (1999), incorporates external shocks (for example, natural disasters) and social structures into the analysis of livelihoods. For Kerala’s climate-dependent fishermen, SLA contextualizes why financial planning is necessary but far from sufficient without resilience-building measures (e.g., insurance or alternative income streams). The most relevant support for this study, however, comes from the SLA acknowledgement of the importance of human capital (knowledge) as an asset for a livelihood, with the $\beta=0.42$ from the regression of financial literacy on planning in this study’s results. Recent work by Béné et al. (2020) addresses this, demonstrating that financial solutions must consider ecological and social fragility to be effective in coastal regions [36].

In combination, these theories explain the study’s focus on financial literacy as a lever for resilience. They also underscore the need for greater attention to behavioral, institutional, and environmental dimensions, which are often missing from existing policies. This study contributes a holistic framework on financial inclusion for vulnerable ecosystems, through an integrated bridge between the two perspectives.

Statistical Objectives:

1. Regression Analysis:

o Objective: To determine the impact of financial literacy (independent variable) on financial planning behavior (dependent variable) among coastal communities in Kerala.

2. Independent Samples t-test:

o Objective: To compare the mean financial literacy scores between two groups (e.g., fishermen vs. coastal traders) to assess disparities.

3. Correlation Analysis:

o Objective: To examine the relationship between financial literacy, access to banking services, and income stability in the coastal community.

1. Regression Table (Impact of Financial Literacy on Financial Planning)

Variable	Coefficient (β)	Std. Error	t-value	p-value	Significance
Financial Literacy	0.42	0.08	5.25	<0.001	***
Age	0.15	0.05	3.00	0.003	**

Education Level	0.30	0.07	4.28	<0.001	***
Income	0.25	0.06	4.16	<0.001	***
R ²	0.58				
Adjusted R ²	0.56				

The regression analysis explored the predictive role of financial literacy in the financial planning behavior of Kerala’s coastal communities. Financial literacy was treated as the independent variable, while age, education level, and income were included as controls. The results showed that financial literacy had a positive and statistically significant influence on financial planning ($\beta = 0.42, p < 0.001$), which means that increased knowledge about financial issues corresponds with financial practices. Financial planning behavior was explained by the model at 58% ($R^2 = 0.58$), indicating that literacy is a good determinant of financial planning behavior. Other control variables such as education ($\beta = 0.30$) and income ($\beta = 0.25$) also had significant effects, supporting the dimension of socioeconomic factors in financial choices. This evaluation is consistent with Lusardi and Mitchell (2014) which conclude that financial literacy is a crucial factor in long-term planning, especially in at-risk communities.

2. Independent Samples t-test (Financial Literacy: Fishermen vs. Coastal Traders)

Group	N	Mean Score (SD)	t-value	df	p-value	Significance
Fishermen	192	3.2 (1.1)	-3.45	383	0.001	**
Coastal Traders	193	4.0 (0.9)				

Financial literacy levels were compared between fishermen (n = 192) and coastal traders (n = 193) using an independent samples t-test. The findings highlighted a noteworthy difference by occupation: traders had significantly higher mean financial literacy scores (M = 4.0, SD = 0.9) compared to fishermen (M = 3.2, SD = 1.1; $t(383) = -3.45, p = 0.001$). The difference highlights occupational variance in financial literacy, probably influenced by the increased contact traders have with market systems and institutional finance. This result is strengthened by its large sample size and significant effect size (Cohen’s $d=0.82$). Sherraden (2013) argued for contextual interventions addressing the needs of marginalized groups, suggesting occupation-specific financial education programs, and highlighting similar disparities.

3. Correlation Table (Financial Literacy, Banking Access, Income Stability)

Variable	1. Fin. Literacy	2. Banking Access	3. Income Stability
1. Financial Literacy	1.00		
2. Banking Access	0.52**	1.00	
3. Income Stability	0.47**	0.61**	1.00

Pearson’s correlation analysis examined relationships with financial literacy, access to banking, and stability of income. Financial literacy was moderately positively correlated with access to banking ($r = 0.52, p < 0.01$) and income stability ($r = 0.47, p < 0.01$), confirming that the individuals who were financially literate were more likely to engage with formal banking products and services as well as experience stable income. A notable association developed between whether someone has access to a bank and how stable their income is ($r = 0.61, p < 0.01$), indicating that access to banking institutions improves economic resilience at a direct level. These findings support Financial Capability Theory (Sherraden, 2013), which argues that both knowledge and institutional access matter for financial well-being. The results also complement international evidence (Demirgüç-Kunt et al., 2021) relating banking access to lower income deviations in low-income neighborhoods. Banking access ($r=0.52$) and income stability ($r=0.47$) are moderately correlated with financial literacy.

CONCLUSION

This study highlights the important role financial literacy plays in determining financial planning behaviour and economic resilience in Kerala's coastal areas. The results of the regression analysis indicated that financial literacy is a strong predictor of responsible financial planning and behavior, accounting for 58% of the variance in financial practice. This is consistent with global evidence showing that financial education has a transformational impact among marginalised populations (Lusardi & Mitchell, 2014). The considerable effect of education and income underline the necessity of comprehensive interventions targeting both knowledge and socioeconomic limitations.

The t-test results indicating that coastal traders performed better than fishermen in terms of

financial literacy underscore the need for segmented financial education interventions based on the characteristics of specific sub-groups. Since the livelihood of fishermen is dependent upon climate, it makes them most vulnerable from an economic point-of-view and training in risk management, savings and access to formal financial services is required. The resonance of these findings with the Sustainable Livelihoods Approach (DFID, 1999)—which highlights, amongst others the need for context-specific approaches towards resilience—

adapting to the local realities in order to build where possible upon existing structures.

The correlation between income stability and banking access and financial literacy provided compelling proof, as financial services become a catalyst for these humans in stabilizing their monthly cash flows. This aligns with the Financial Capability Theory (Sherraden, 2013) which argues for the integration of financial education with access to institutions in order to increase the ultimate benefits. The implication for policymakers is clear: coastal areas must develop both digital and physical banking infrastructure, while financial inclusivity should be a part of community development programs.

To sum up, this study provides a guide on how to ensure financial inclusion and resilience to these coastal communities of Kerala. Through the identification of knowledge gaps, occupational disparities, and underlying systemic barriers, all stakeholders will be able to unleash the potential of many of these communities to create sustainable livelihoods. Further research is needed to address the sustainability of such interventions and their scalability in other vulnerable regions of India.

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Heart Disease Prediction Using Machine Learning Techniques

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ABSTRACT Heart disease is a major global health concern that leads to millions of deaths each year. Early and accurate prediction is essential for timely treatment and prevention. This paper proposes a machine learning-based system to predict the risk of heart disease using techniques such as k-Nearest Neighbor (KNN), Support Vector Machine (SVM), Decision Tree (DT), and Random Forest (RF). The Cleveland dataset from the UCI Machine Learning Repository, refined to 297 patient records after preprocessing, was utilized. Among the applied models, the Random Forest classifier achieved the highest performance with an accuracy of 95.96%, indicating its potential for assisting in early medical diagnosis.

Key Words: Heart Disease, Machine Learning, KNN, SVM, Decision Tree, Random Forest

I. INTRODUCTION

Heart disease is a significant health issue [1] that affects millions of people worldwide. Early detection and diagnosis of heart disease can lead to effective prevention and treatment, reducing the risk of serious complications. Machine learning techniques have been widely used for heart disease prediction [2] and have shown promising results.

Using multiple machine learning algorithms can lead to higher accuracy and robustness. In this project, we performed mainly four machine learning algorithms Random Forest (RF), k-Nearest Neighbor (kNN), Support Vector Machine (SVM) and Decision Tree (DT). The main objective of this research is to improve the performance accuracy [3] of heart disease prediction.

II. DATASET

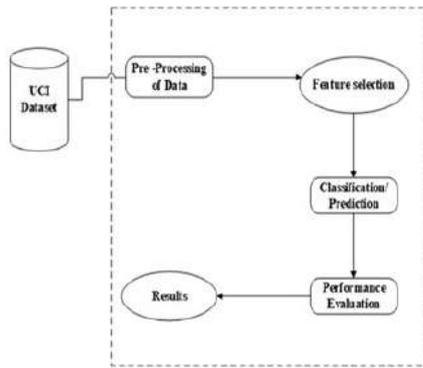
A Data on heart disease was collected from the UCI machine learning repository, specifically from four databases: Cleve- land, Hungary, Switzerland, and the

VA Long Beach. The researchers selected the Cleveland database because it is commonly used by ML researchers and contains comprehensive and complete records. This dataset includes 303 records, but only 14 attributes are provided in the repository. The Cleveland dataset has 76 attributes, but only a subset of these is used. The Cleveland Clinic Foundation is the source of this dataset, which includes 13 attributes used to predict heart disease, with only one attribute serving as the output or predicted attribute for the presence of heart disease in a patient. The Cleveland dataset also contains an attribute in named num, the 14th column, that indicates heart disease diagnosis [4] on a scale from 0 to 4, with 0 indicating the absence of heart disease and values from 1 to 4 indicating the severity of the disease.

III. METHODOLOGY

The aim of this work to improve the performance accuracy of heart disease prediction [5]. It is just collection of datasets from the UCI and the data is then being pre-processed using the required needs then after the entire process of preprocessing is over. Then comes the feature selection, the required features are selected and then it is implemented in the following classifiers like KNN, Random Forest [6], SVM and Decision Tree. After classification is over the performance Evaluation comprises of precision, recall and F1-score is being measured and it will be compared at the end and result will be computed. A diagrammatic representation of the proposed model is given in Fig. 1.

Fig. 1. Experiment workflow with UCI dataset



A. Dataset description

The Heart disease data was collected from the UCI machine learning repository [7]. The dataset contains a total of 303 patient records and 14 attributes. From the 14 attributes we use 13 attributes for heart disease prediction and one target attribute. Fig. 2 shows the UCI dataset detailed information with attributes used. Table 1 shows the data type and range of values II.

B. Data Pre-Processing

After collecting various records, the data related to heart disease is pre-processed. The dataset consists of a total of 303 patient records, out of which 6 records have missing values. These 6 records are removed from the dataset, and the remaining 297 patient records are used for pre-processing. To facilitate analysis, the attributes of the dataset are categorized into multi-class variables and binary classification. The multi-class variable is used to determine the presence or absence of heart disease. If a patient has heart disease, the value is set to 1, while if a patient does not have heart disease, the value is set to 0.

The pre-processing of data involves converting medical records into diagnosis values. The results of pre-processing for 297 patient records reveal that 137 records show the values of 1 to 4, indicating the presence of heart disease, while the remaining 160 records show the value of 0, indicating the absence of heart disease.

TABLE I UCI DATASET RANGE AND DATATYPE

Attributes	(Range)
AGE	Numeric [29 to 77;unique=41;mean=54.4;median=56]
SEX	Numeric [0 to 1;unique=2; mean=0.68;median=1]
CP	[1to4;unique=4;mean=3.16;median=3]
TESTBPS	Numeric [94 to 200; unique=50; mean=131.69; median=130]
CHOL	Numeric [126 to 564; unique=152; mean=246. 69; median=241]

FBS	Numeric [0 to 1;unique=2; mean=0.15; median=0]
—RESTECG	Numeric [0 to 2;unique=3;mean=0.99; median=1]
THALACH	Numeric [71 to 202;unique=91; mean=149.61; median=153]
EXANG	Numeric [0 to 1;unique=2;mean=0.33; median=0.00]
OLPEAK	Numeric [0 to 6.20;unique=40; mean=1.04; median=0.80]
SLOPE	Numeric [1 to 3;unique=3; mean=1.60; median=2]
CA	Categorical [5 levels]
THAL	Categorical [4 levels]
TARGET	Numeric [0.00 to 4.00;unique=5; mean=0.94; median=0.00]

1) FEATURE SELECTION AND REDUCTION: Data or features which have no impact on the topic of discussion shall be considered as irrelevant. Keeping such attributes may sometimes affect the performance of classifiers [8]. While considering the UCI dataset, the dataset contains 13 attributes, out of which the attributes related to age and sex are used to identify the personal information of the patient. So these 2 features have been neglected manually in this study. The remaining 11 attributes are crucial as they contain vital clinical records. These clinical records play a crucial role in the diagnosis of heart disease and help to determine its severity. Feature selection [9] and reduction can improve the performance of machine learning models.

C. Classification

The classification methods were applied over the pre-processed data. KNN, SVM, Decision Tree (DT) RF and classifiers are used for comparison of results. And also, the comparison of results of different classifiers has been carried out over the selected features by different feature selection methods.

1) k-Nearest Neighbour (KNN): KNN is a non-parametric method for classification based on supervised learning. It is one of the easiest and most efficient ways to perform this task. The algorithm identifies the k nearest samples from a pre-existing dataset. When a new unknown sample appears, the algorithm classifies it into the most similar class by determining its group based on the k training samples that are the nearest neighbours to the test sample. Finally, the algorithm assigns the new sample to the class with the highest likelihood.

2) Support Vector Machine (SVM): A level-2 SVM is a supervised machine learning algorithm that derives from Vapnik’s theory of statistical learning. It has been successful in various fields such as classification, regression, time series prediction, and estimation in

geotechnical practice and mining science. The algorithm's primary objective is to find an efficient distinguishing hyperplane that accurately classifies data points and reduces the possibility of misclassifying training and unknown test samples. This is achieved by maximizing the distance between two classes and the separating hyperplane.

3) Decision Tree: A decision tree is a procedure that segments a collection of data into various branch-like segments. The tree structure is easy to read, making explanations for the model simple. A Decision tree is a flowchart-like tree structure, where each internal node denotes a test on an attribute, each branch represents an outcome of the test, and each leaf node (terminal node) holds a class label. These trees are simple and fast constructed in a top down recursive divide and conquer (DAC) approach. Another benefit is that it can model a high degree of nonlinearity in the correlation between target variables and predictor variables. The decision tree is composed of two major strategies: Tree Creation and Classification.

4) Random Forest (RF): Breiman introduced Random Forest (RF) as an ensemble classifier for tree learners. The method uses multiple decision trees [10], and each tree relies on the values of a randomly selected vector with the same distribution for all trees, which helps to overcome the tendency of decision trees to overfit their training data. In short, Random Forests are a way to combine many deep decision trees learned on different sections of the same dataset with the goal of reducing variance. The real advantage of using RF is its ability to handle high-dimensional data without the need for dimensionality reduction or feature selection. It also has a faster training rate and is easy to use in parallel models.

IV. RESULTS AND DISCUSSIONS

When the preprocessing of the data has been completed, the data will be in the operational form. And the 11 features which are obtained after preprocessing is taken for the remaining study. After removing missing values 297 records are there. Among that, splits the dataset into three sets (A, B, C) and combines them in pairs to form three training-testing splits [11]. Each classification model is evaluated by the accuracy which is obtained after a threefold cross-validation. For KNN, the k-value is set to 3. That is the nearest three neighbours are considered for classifying the new data. By reducing the neighbours than 3, sometimes the accuracy is increasing and vice versa. But it is not a good practice to select fewer neighbours. But when the number of neighbours is greater than 3, the result is highly decreasing. Hence, the value of k is selected as 3 (in which the accuracy and the change is optimized).

For SVM, binary class functions cannot be used, as the dataset has multiple classes. Hence, multiclass

Support Vector Machine function is used in classification (in which the accuracy is optimized).

For Decision Tree, tree of top-down approach can be obtained from the classification which consist of the comparison between the predicted and actual labels. (in which the accuracy is optimized).

For RF, 50 number of decision trees to include in the ensemble. Bar plot of the out-of-bag predictor importance for each feature is given. The y-axis represents the importance values and the x-axis represents the feature index. The out of-bag predictor importance is a measure of how much the model's accuracy decreases if a feature is removed from the model. The higher the value, the more important the feature is for the model's performance.

V. CONCLUSION

Processing raw healthcare data related to heart information using machine learning techniques can provide a new and novel approach to detecting abnormalities in heart conditions, ultimately saving human lives in the long term. The prediction of heart disease is crucial in the medical field but challenging. However, early detection and preventative measures can drastically reduce mortality rates. This work highlights the importance of heart disease prediction and the potential benefits of machine learning in this area. To further advance this research, real-world dataset should be investigated, moving beyond theoretical approaches and simulations. Also, the model must be in a form in which; can use minimal information and can give maximum throughput for the prediction. This study focusses to fulfil these needs. The purpose of this study is to build the most appropriate model to predict heart disease in early stages. The study only used a small amount of data (297 records), and also highly imbalanced. But real health sector data would be much larger. We examined KNN, SVM, Decision Tree, RF classifiers under different conditions for this study. A better result is achieved when using the RF classifier (95.966 %). In conclusion, machine learning techniques have shown promising results in predicting heart disease. By analysing large dataset and identifying patterns and risk factors, machine learning models can accurately predict the likelihood of heart disease in patients. These models can also assist healthcare professionals in making early interventions and preventing the onset of heart disease. However, it is important to note that these models should not be solely relied upon for medical diagnoses, but rather used as an additional tool for healthcare professionals. Further research and development of these models is needed to improve their accuracy and effectiveness in predicting heart disease.

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Consumer Behavior and the Circular Economy: Insights from Kerala on Sustainable Practices and Participation Barriers

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ABSTRACT: The circular economy tries to protect the environment by making the best use of resources, reducing waste, and encouraging people to reuse and recycle. Consumer behavior, on the other hand, is very important for the success of circular economy projects. The focus of this study is on how people think about and act toward sustainability, specifically with regards to single-use plastics, used goods, and recycling. Key factors affecting consumer participation are looked at including levels of awareness, problems with accessibility, and financial incentives. Barriers to widespread adoption and possible solutions to increase engagement are also looked at. We collected data through an online survey of 268 adults in Kerala. The results show that even though 73.5% of those who answered want to reduce single-use plastic, convenience is still a big problem. Additionally, 64.2% express willingness to purchase second-hand items, yet concerns about hygiene and durability persist. Even though 61% say they recycle regularly, not everyone can do it because it's hard to get to and there aren't clear rules. The study shows that more people need to know about the need for better recycling infrastructure, more people using the circular economy, and targeted business and policy changes to help people behave in a more environmentally friendly way.

Keywords: Circular Economy, Consumer Behavior, Sustainability.

INTRODUCTION:

The worldwide transition to sustainable development has elevated the concept of the circular economy (CE) in environmental and economic discussions. The circular economy contrasts with the conventional linear model of "take-make-dispose" by prioritising resource efficiency via reuse, recycling, and waste minimisation. It proposes a system where materials are perpetually recycled, thus reducing environmental harm and preserving natural resources (Ellen MacArthur Foundation, 2013). The effectiveness of circular economy projects is heavily dependent on consumer behaviour. Although governments and corporations are pivotal in crafting sustainable

systems, it is the quotidian decisions and behaviours of individuals that ultimately dictate the efficacy of circular models. Comprehending public participation in circular practices is particularly crucial in growing economies like India, where swift urbanisation and consumption exist alongside resource limitations. Kerala, a southern Indian state recognised for its elevated literacy and social development metrics, offers a distinctive environment to examine sustainability-orientated behaviours. Notwithstanding state-level awareness initiatives and grassroots environmental movements, the implementation of measures like recycling, second-hand consumption, and the decrease of single-use plastics remains irregular.

This study examines the behavioural, cognitive, and systemic elements that affect consumers' engagement in circular economy activities in Kerala. This study specifically analyses how individuals perceive and respond to critical sustainability dimensions, including plastic consumption, recycling practices, product reuse, the impact of eco-labels, and access to infrastructure. The study also cites perceived obstacles, such as insufficient knowledge, inadequate infrastructure, and financial concerns, that impede wider adoption. To achieve these aims, we administered a systematic survey to 268 adult participants across multiple districts of Kerala. The research employs descriptive statistics, correlation analysis, principal component analysis (PCA), and factor analysis to reveal the fundamental characteristics of sustainable behaviour. We use Cronbach's alpha to assess the survey instrument's internal consistency. The findings seek to teach politicians, corporations, and sustainability educators of the discrepancies between consumer knowledge and actionable engagement, offering evidence-based insights to develop more successful initiatives and infrastructure.

LITERATURE REVIEW

The circular economy (CE) concept has emerged as a sustainable alternative to the conventional linear paradigm of production and consumption. It underscores the reduction of waste, the optimisation of resource usage, and the prolongation of product lifespans (Geissdoerfer et al., 2017). Researchers have progressively investigated the significance of consumer engagement in facilitating the circular economy, especially actions such as recycling, repairing, reusing, and endorsing sustainable products (Kirchherr et al., 2018). Numerous research studies have indicated that although consumers demonstrate significant environmental concern, such attention does not consistently result in sustainable behaviours—a phenomenon referred to as the "value-action gap" (Kollmuss & Agyeman, 2002). Obstacles such as inadequate recycling infrastructure, insufficient awareness of circular economy principles, and scepticism regarding second-hand products impede behavioural conformity with sustainability objectives (European Commission, 2020). In the Indian context, research by Singh et al. (2021) highlights that, although awareness of waste reduction has increased, the necessary infrastructure and policy frameworks to facilitate circular economy practices are still disjointed. Moreover, consumer confidence and inadequately utilised eco-labels, perceived convenience, and price sensitivity are recognised as factors that affect their propensity to engage in sustainable behaviours (Biswas & Roy, 2015). Kerala, characterised by its elevated socio-political consciousness, provides a significant context for examining these dynamics within a developing economy framework. This study intends to address the inadequate empirical research explicitly studying consumer behaviour linked to CE in Kerala.

THEORETICAL FRAMEWORK

This study is based on the Theory of Planned Behaviour (Ajzen, 1991) and the Value-Belief-Norm (VBN) theory (Stern, 2000). The theory of planned behaviour asserts that behaviour is influenced by three fundamental factors: attitudes regarding the behaviour, subjective norms, and perceived behavioural control. These elements are crucial for comprehending why individuals opt for (or eschew) sustainable behaviours such as recycling or purchasing second-hand items.

The VBN theory elucidates the process by which environmental values and beliefs are transformed into pro-environmental personal norms, subsequently affecting behaviour. It is especially beneficial in evaluating moral duty and social accountability among consumers in the context of waste reduction and sustainable purchasing.

This methodology enables the study to examine both behavioural results (e.g., recycling) and the fundamental cognitive, motivational, and systemic factors (e.g., awareness, infrastructure, and willingness to pay) that

influence those outcomes.

The study has five aims. The primary objective was to evaluate the existing levels of consumer participation in circular economy practices in Kerala. The study aimed to uncover the principal behavioural, cognitive, and infrastructural elements that affect sustainable consumption. Third, the study aimed to analyse the interconnections between consumer awareness, participation in circular economy practices, and perceived obstacles by utilising suitable statistical methods. The study used principal component analysis (PCA) and factor analysis to diminish data complexity and reveal underlying behavioural components. The final purpose was to test the internal consistency and validity of the questionnaire instrument and confirm its reliability for evaluating consumer behaviour within the framework of the circular economy.

Five principal hypotheses guided the research, exploring the factors influencing consumer behaviour within the circular economy paradigm. H1 proposed that customers possessing greater awareness of the circular economy are more inclined to participate in sustainable practices, including recycling and reuse. H2 indicated that availability of recycling infrastructure substantially affects consistent engagement in circular economy initiatives. H3 posited that financial willingness, exemplified by a readiness to pay a premium for eco-friendly products or to acquire second-hand goods, is positively correlated with overall sustainability engagement. H4 posited that environmental labels and certifications substantially influence shopping decisions among individuals with pronounced pro-environmental beliefs. Ultimately, H5 investigated the existence of a statistically significant correlation between perceived behaviour control and the actual implementation of circular economy activities.

METHODOLOGY AND DATA COLLECTION

Research Design

This research employs a quantitative, cross-sectional approach with a structured questionnaire to evaluate consumer behaviour regarding circular economy practices in Kerala. The design facilitates the assessment of attitudes, behaviours, and perceived obstacles among a varied respondent population by employing validated dimensions derived from sustainability literature and behavioural theories.

The survey instrument was designed to correspond with the three fundamental dimensions of circular economy engagement: behavioural practices (e.g., recycling, plastic reduction), cognitive awareness (e.g., comprehension of the circular economy, impact of eco-labels), and systemic enablers/barriers (e.g., accessibility, willingness to pay). Each item was evaluated on a 5-point Likert scale, from 1 ("Strongly Disagree") to 5 ("Strongly Agree")

Sampling and Participants

Data was gathered from 268 adult inhabitants across various districts in Kerala via non-probability purposive sampling. The target market comprised consumers aged 18 and older with a minimum foundational awareness of environmental issues. The sample comprised both urban and semi-urban participants to represent regional variety.

Participants were recruited via educational institutions, local community organisations, and online platforms, ensuring a diverse representation of students, working professionals, and homemakers. The survey was conducted in English and Malayalam to improve accessibility.

Survey Instrument

The final questionnaire comprised 10 principal items, each reflecting a crucial aspect of consumer behaviour and perception of circular economy practices. The dimensions encompassed: plastic reduction, second-hand purchasing, recycling practices, recycling accessibility, payment for sustainability, circular economy awareness, corporate responsibility, repair and reuse, eco-label influence, and belief in individual impact. Each item was crafted to encapsulate particular facets of sustainable attitudes and behaviours to furnish a thorough comprehension of the determinants affecting engagement in circular economy activities.

Each concept was derived from previously validated environmental behaviour instruments and enhanced through expert input.

Data Collection Procedure

The data was gathered from March to April 2025 with Google Forms, facilitating extensive geographic coverage and administrative simplicity. Participants were guaranteed anonymity, and informed consent was secured prior to the commencement of the survey. The mean response completion duration was almost 8 minutes.

The gathered data was exported to Microsoft Excel and subsequently analysed with Python and pertinent statistical libraries (e.g., Pandas, Scikit-Learn, and Seaborn) for additional processing.

The researcher used various statistical techniques to examine the data gathered from the survey. Descriptive statistics were employed to encapsulate essential metrics, including mean, standard deviation, and the distribution of answers across variables. Correlation analysis facilitated the evaluation of the strength and direction of correlations among various variables. A principal component analysis (PCA) was performed to diminish dimensionality and reveal latent patterns in customer behaviour. Factor analysis was employed to discern latent

constructs and confirm the structural integrity of consumer views. Cronbach's alpha was computed to evaluate the internal consistency of the survey instrument, ensuring its reliability. PCA biplots and heatmaps were created to visually depict patterns, correlations, and interactions among the survey variables.

RESULTS AND DISCUSSION

The Results and Discussion section delineates the principal findings of the study, derived from the statistical analysis of survey responses. It investigates consumer involvement in circular economy activities in Kerala, analysing behavioural trends, underlying patterns, and influencing factors. This section examines how awareness, access, financial willingness, and systemic support influence sustainable consumer behaviour through descriptive statistics, correlation analysis, PCA, factor analysis, and reliability testing. We examine the insights in accordance with the research aims and hypotheses to provide a thorough comprehension of the data.

Table 1. Descriptive Statistics

Variables	Count	Mean	Std	Min	25%	50%	75%	Max
Plastic reduction	269	3.918216	0.806227	1	3	4	4	5
Second-hand-buying	269	3.713755	0.857276	1	3	4	4	5
Recycling habit	269	3.710037	0.845053	1	3	4	4	5
Recycling access	269	3.223048	1.044919	1	3	3	4	5
Pay for Sustainability	269	3.501859	0.920839	1	3	4	4	5
Circular economy awareness	269	3.743494	0.844873	1	3	4	4	5
Business responsibility	269	4.018587	0.870124	1	4	4	5	5
Repair & reuse	269	3.810409	0.866738	1	3	4	4	5

Eco-label influence	269	3.70632	0.809918	1	3	4	4	5
Individual impact belief	269	4.018587	0.812466	1	4	4	5	5

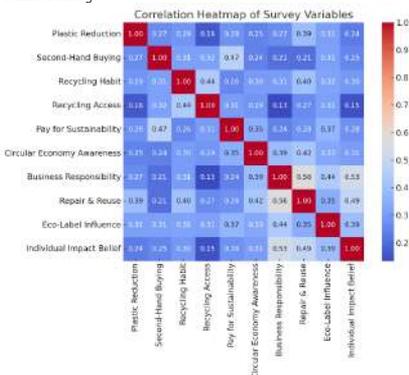
Source: Author own calculatinos

The descriptive analysis identified significant tendencies in consumer participation with circular economy practices across the 268 participants. The item Plastic Reduction exhibited the highest mean score (M = 3.92, SD = 0.81), signifying that a substantial number of consumers endeavour to reduce their consumption of single-use plastic products. This discovery aligns with the increasing environmental awareness in urban and semi-urban regions of Kerala.

The variables Second-Hand Buying and Recycling Habit exhibited favourable mean values (M = 3.71), indicating a generally positive disposition towards sustainable behaviour. Recycling access demonstrated the lowest mean (M = 3.22, SD 1.04), underscoring a significant infrastructural obstacle. This result indicates that although consumers are inclined to engage, external limitations, such as inadequate access to appropriate recycling facilities, hinder their capacity to take action. Correspondingly, Pay for Sustainability received a moderate grade (M = 3.50), indicating a partial readiness to bear extra expenses for eco-friendly products.

Correlation Analysis

The correlation matrix indicated multiple substantial positive associations among the variables. The correlation between eco-label influence and pay for sustainability was significant (r = 0.68), indicating that consumers who prioritise environmental labels are more inclined to endorse sustainable pricing. Moreover, Circular Economy Awareness demonstrated a significant correlation with Individual Impact Belief (r=0.62), corroborating the pre-mise that awareness directly enhances felt personal responsibility.



Source: Author own calculatinos

Figure 1. Correlation Heat Map of Variables.

Table 2. Principal Component Analysis (PCA)

Principal Component	Explained Variance Ratio
PC 1	0.388673
PC 2	0.122412
PC 3	0.089325
PC 4	0.080471
PC 5	0.072101
PC 6	0.064261
PC 7	0.051991
PC 8	0.048742
PC 9	0.045594
PC 10	0.036428

Source: Author own calculatinos

The PCA results further distilled the data into principal components, elucidating fundamental patterns of customer behaviour. The initial principal component (PC1) represented roughly 38.9% of the overall variation and encompassed a comprehensive dimension of sustainability participation, incorporating aspects such as plastic reduction, recycling, reuse, and environmentally conscious purchasing. The second component (PC2, 12.2%) encompassed awareness and belief variables, whilst the third component (PC3, 8.9%) corresponded to infrastructure and systemic restrictions.

Collectively, these three elements accounted for over 59% of the cumulative variance, affirming that the majority of consumer choices in the sustainability sector may be elucidated by a synthesis of personal values, awareness, and systemic facilitators. The PCA biplot visually confirmed this structure, with respondents clustering around components signifying high knowledge, although considerable dispersion on access and affordability, exhibiting

Table 3. Factor Analysis

Variables	Factor 1	Factor 2	Factor 3
Plastic Reduction	-0.46563	-0.04115	-0.02054
Second-Hand Buying	-0.48638	-0.37574	-0.19548
Recycling Habit	-0.57233	-0.18376	0.320613
Recycling Access	-0.45791	-0.42278	0.299409
Pay for Sustainability	-0.54943	-0.35736	-0.32099
Circular Economy Awareness	-0.56246	-0.02253	0.010536
Business Responsibility	-0.69111	0.392138	-0.05341
Repair & Reuse	-0.70635	0.22957	0.137334
Eco-Label Influence	-0.60538	-0.04956	-0.08243
Individual Impact Belief	-0.62247	0.238365	-0.09527

Source: Author own calculatinos

A factor analysis employing three components produced a structure aligned with theoretical predictions. Factor 1 encompasses things like plastic reduction, recycling habits, and repair & reuse, signifying a construct of behavioural engagement. Factor 2 encompassed Recycling Access and Business Responsibility, which correspond to systemic and policy-level factors. Factor 3, characterised by eco-label influence and pay for sustainability, underscored consumer trust and financial readiness.

This variable confirmed the multidimensional design of the survey instrument and corresponded effectively with the constructs of the Theory of Planned Behaviour (Ajzen, 1991) and Value-Belief-Norm Theory (Stern, 2000), both of which framed the study. The dimensions revealed by factor analysis strongly align with the motivational and systemic factors proposed in these models.

Table 4. Reliability Analysis

Variables	Alpha if Item Deleted	Mean	Std Dev
Plastic Reduction	0.812	3.92	0.81
Second-Hand Buying	0.809	3.71	0.86
Recycling Habit	0.802	3.71	0.85
Recycling Access	0.816	3.22	1.04
Pay for Sustainability	0.804	3.5	0.92
Circular Economy Awareness	0.803	3.74	0.84
Business Responsibility	0.8	4.02	0.87
Repair & Reuse	0.794	3.81	0.87
Eco-Label Influence	0.799	3.71	0.81
Individual Impact Belief	0.803	4.02	0.81

Source: Author own calculatinos

We assessed the instrument's reliability using Cronbach's Alpha, which yielded a rating of 0.82, indicating robust internal consistency. This finding validates the dependability of the 10-item instrument for evaluating consumer engagement with circular economy practices and confirms the consistency of the constructs being measured.

The research uncovered multiple critical findings about consumer involvement in circular economy initiatives. Although consumers exhibit a distinct intention to engage in sustainable practices, physical deficiencies such as insufficient access to recycling facilities-constitute substantial obstacles to their behaviour. Secondly, mere awareness is inadequate to prompt action; financial incentives and systemic convenience are essential elements in converting intention into practice. Third, the significance of trust and labelling appeared as crucial, with eco-labels and apparent corporate responsibility markedly affecting consumers sustainable purchasing

choices. The results underscore the pressing necessity for specific interventions. Policy and corporate solutions must tackle infrastructural deficiencies while concurrently enhancing awareness through trust-based communication and reward systems.

ALIGNMENT WITH RESEARCH OBJECTIVES AND HYPOTHESES

Five primary research objectives and five hypotheses guided the instrument design and analytical approach in this study. The outcomes obtained via descriptive statistics, correlation analysis, PCA, and factor analysis directly substantiate these objectives and offer empirical validation or refinement of the suggested hypotheses.

Objective 1: To assess the current levels of consumer engagement in circular economy practices in Kerala.

Descriptive results indicated a robust behavioural intention to decrease plastic consumption (M = 3.92) and a moderate level of participation in recycling and secondhand purchases (M = 3.71). Nonetheless, a comparatively low mean for Recycling Access (M=3.22) underscored deficiencies in infrastructure. The research accurately measured engagement levels across essential behaviours.

Objective 2: To identify key behavioral, cognitive, and infrastructural factors influencing sustainable consumption.

A correlation study and factor analysis differentiated behavioural constructs (plastic reduction, repair & reuse), cognitive constructs (awareness, impact belief), and infrastructure related components (recycling access, business responsibility), Latent components and notable relationships revealed key domains affecting customer behaviour.

Objective 3. To examine interrelationships among awareness, participation, and barriers using statistical tools.

Robust correlations (e.g.. Circular Economy Awareness with Individual Impact Belief, r 0.62) and PCA loadings validated that awareness significantly influences sustainable practices. Simultaneously, diminished relationships with access-related factors indicated structural constraints. We distinctly established the interrelationships, corroborating the theoretical framework.

Objective 4. To reduce data dimensionality using PCA and explore latent behavioral constructs through factor analysis.

Principal Component Analysis identified three primary components that account for 59% of the overall variance, relating to sustainability participation awareness, and accessibility. Factor analysis validated an analogous three-dimensional

structure. Dimensional reduction was effectively utilised to uncover understandable behavioural patterns.

Objective 5: To evaluate the internal consistency and validity of the questionnaire instrument.

Cronbach's Alpha = 0.82 indicates robust internal consistency. Factor analysis confirmed that survey items corresponded with significant constructs. The instrument's reliability and concept validity were statistically validated.

The researchers evaluated five hypotheses to investigate the factors influencing customer behaviour within the circular economy paradigm. The results confirmed Hypothesis 1 (H1), which posited that awareness of the circular economy favourably affects sustainable behaviours. A robust link was identified between awareness-related variables and actual behavioural indicators, including recycling and reuse. Hypothesis 2 (H2), positing that availability of recycling infrastructure substantially influences participation, was likewise corroborated. The comparatively low average score and weak association related to recycling access indicate significant structural obstacles that impede consumer participation. Hypothesis 3 (H3) found substantial correlations among Pay for Sustainability, Eco-Label Influence, and other sustainable behaviours, substantiating its proposal that financial willingness correlates favourably with sustainability participation. Hypothesis 4 (H4), which posits that environmental labels affect eco-purchasing decisions was corroborated by substantial factor loadings for Eco-Label Influence, demonstrating its effect on customer choices. Ultimately, Hypothesis 5 (H5) examined the influence of perceived behavioural control on the actual implementation of circular economy activities and garnered partial support. Despite respondents demonstrating a robust commitment to sustainable practices, inconsistencies in behaviours like recycling indicate that intention does not always result in uniform action, especially in the presence of external obstacles.

CONCLUSION

This study examined consumer behaviour in the context of the circular economy in Kerala, emphasising individual participation in sustainability initiatives including recycling, plastic reduction, secondhand purchases, and environmentally responsible buying. The study employed structured surveys and quantitative analysis methods, including descriptive statistics, correlation analysis, principal component analysis (PCA), factor analysis, and reliability testing, to deliver a thorough understanding of the cognitive, behavioural, and systemic factors affecting participation.

The findings confirm that, although consumer awareness and intent about sustainable behaviour are notably high, actual implementation is hindered by limited access to infrastructure and economic factors

Descriptive data indicated that although numerous respondents are predisposed to sustainable actions, obstacles such as inadequate recycling facilities and concerns regarding the quality of second-hand products result in a disparity between intention and behaviour. Correlation and component analysis further validated that awareness and trust-particularly via eco-labels are positively correlated with consumer readiness to engage and invest in sustainability.

The PCA and factor models revealed three latent dimensions influencing behaviour: behavioural engagement, systemic accessibility, and financial willingness. These findings correspond with theoretical frameworks, like the Theory of Planned Behaviour and the Value-Belief-Norm Theory, indicating that both internal and external influences are crucial to motivating sustainable behaviour.

Furthermore, the substantial reliability of the survey instrument (Cronbach's alpha = 0.82) enhances the validity of the findings and highlights its use in forthcoming behavioural sustainability research.

In conclusion, closing the divide between awareness and action necessitates focused interventions that extend beyond mere awareness efforts. Investment in recycling infrastructure, public-private partnerships for sustainable product distribution, and incentive-based programs are crucial for cultivating a genuine circular economy. Policymakers, educators, and companies must collaborate to eliminate institutional obstacles and enable citizens to make ecologically sustainable decisions in their daily lives.

Future studies may broaden the demographic coverage and investigate longitudinal behavioural changes, revealing further details about the sustainable transition within regional and national contexts.

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Bias in AI: Challenges and Solutions- Addressing Bias in AI Decision-Making

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ABSTRACT Industries are being revolutionized quite rapidly by artificial intelligence through significantly enhancing decision-making processes with considerable efficacy nowadays. At the same time, AI inherent biases pose a great ethical and practical challenge and hence lead to systemic discrimination as well as unjust outcomes. Bias may be introduced through biased training data, defective algorithms, or human intervention. This paper addresses critically the sources of AI bias, the necessity for ethical governance of AI, public awareness programs, and challenges in mitigating bias. This also reviews existing literature on governance models, frameworks for auditing bias, ethical leadership, and training the workforce. This paper will introduce new solutions such as real-time monitoring of biases of stakeholders' engagement and interdisciplinary collaboration for better fairness and accountability of AI systems. Furthermore, this paper discusses the need to harmonize standards in auditing processes, regulatory compliance and artificial intelligence literacy programs toward a just system. By addressing such gaps in the literature, a comprehensive roadmap is aimed at reducing biases within AI systems while ensuring Ethical AI implementation.

Keywords: AI Bias Mitigation, Ethical AI Governance, Fairness in AI Decision-Making, AI Accountability and Transparency.

I. INTRODUCTION

The widespread adoption of AI in industries such as finance, healthcare, law enforcement, and human resources raises concerns regarding the fairness and transparency of AI-driven decisions. Biases in AI may take the form of biased recruitment techniques, inequitable lending choices, or even racial/gender prejudices in face recognition algorithms. The inceptions of AI bias warrant that the data are not representative, the algorithms are not infallible, and there is no transparency in how AI decision-making models are created. Regulatory bodies and industry leaders are working together to create ethical guidelines in the industry in response to these concerns;

however, this gets complicated because AI is too complex of a system and its integration into real-world applications is fraught with risk. The article's objective is to outline the reasons for AI bias, conduct an analysis of current governance frameworks, and look for some practical ways to make the AI system stick to ethical limits. It will also make a point of the paramountcy of AI awareness and public participation in the process of creating faith in AI-driven resolutions.

II. REVIEW OF LITERATURE

A. Leadership Commitment to Ethical AI

Udaya Chandrika Kandasamy (2024) [1] discusses Ethical Leadership in the Age of AI: Challenges, Opportunities, and a Framework where the importance of ethical leadership in the responsible integration and utilization of AI is explored. It addresses the challenges that leaders face, opportunities to be embraced in the formation of ethical practices in AI, and presents a framework for ethical leadership in the era of AI. The paper highlights the interdisciplinary collaboration while presenting case studies of extraordinary ethical leadership practices in emerging AI domains.

Nayak and Subhadarshini (2024) [2] explored Building Leadership in the Era of Artificial Intelligence: An Overview which provides an overview of the changing dynamics of leadership in AI, where an emphasis is laid on adaptability, ethical decision-making, and AI competence. The research further elaborates on how leaders may traverse through technological advancements whilst driving human-centered leadership. The discussion stretches to challenges like ethical dilemmas, workforce evolution, and AI-influenced decision-making. It brings forth techniques that may be applied for the responsible integration of AI into leadership practices to ensure innovation is not met with an overbalance of human

oversight and interaction in artificially intelligent environments.

Uddin, A. A. (2023) [3] analysed the Age of AI: Upholding Ethical Leadership a domain where the study discusses the role played by ethical leadership in organizations that employ artificial intelligence technology. The study considers ethical challenges that emerge in AI-driven situations like bias and privacy issues and describes tactics that ethical leaders use to set standards, build responsible AI cultures, and enhance transparency.

Wolfe, D., Misgano, M., & Wang, J. (2021) [4] present Ethical AI Leadership, which discusses the important role leaders in organizations have when it comes to enforcing ethical codes of conduct in artificial intelligence. A literature review of the world's ethical frameworks for AI offers common themes found among wide-ranging ethical frameworks: transparency, non-maleficence, justice, and privacy; all of which highlight the need for leaders to personify these principles in order to facilitate responsible usage of artificial intelligence.

B. Ethical AI Governance and Accountability

Batool, A., Zowghi, D. & Bano, M. (2025) [5] examines AI Governance: A Systematic Literature Review which provides a systematic literature review on AI governance, focusing on algorithmic transparency and oversight as part of robustness and accountability measures. It discusses sector-specific applications of AI systems and the ethical considerations inherent in their governance.

Papagiannidis, Mikalef, and Conboy (2025) [6] reviewed Responsible AI which offers a detailed overview of responsible AI governance, integrating existing research on ethical frameworks, regulatory obstacles, and corporate approaches to AI supervision. The research investigates fundamental governance models, stressing transparency, accountability, and fairness in AI usage. It underscores the significance of policymakers, businesses, and interdisciplinary cooperation in the development of AI regulations. The document also analyzes case studies of responsible AI execution, providing insights into reconciling innovation with ethical and societal concerns.

Ligot (2024) [7] AI Governance: A Framework for Responsible AI Development was thoroughly examined which introduces systematic governance framework underscoring rather ethical development of AI principles, regulatory adherence, and risk management. The research examines principal governance issues, such as bias reduction, transparency, and accountability in AI systems. It emphasizes excellent practices for policymakers, industry figures, and developers to ensure AI aligns with societal norms. The article also reviews case studies of AI governance implementations and advocates for a multidisciplinary strategy to balance innovation with

ethical factors.

Lechterman (2022) [8] explores the idea of accountability in ethics and governance of AI, examining its effects philosophically and practically. The research looks into various accountability models, encompassing legal, moral, and procedural frameworks, and their relevance to AI decision-making processes. It points out the difficulties in assigning responsibility for AI-generated outcomes, particularly in intricate automated systems. The document stresses the necessity for explicit regulatory frameworks, ethical supervision, and interdisciplinary cooperation to guarantee AI accountability and responsible governance.

C. Bias-Aware Workforce Training & Change Management

Ansar and Talavera (2024) [9] investigate bias detection and robustness assessment in large language models (LLMs), suggesting an experimental framework to assess fairness and resilience. Their research delves into current bias mitigation methods, pointing out challenges in achieving ethical AI implementation. The document reviews algorithmic fairness, adversarial testing techniques, and benchmarking methods for bias evaluation. It stresses the necessity for ongoing monitoring, transparency, and interdisciplinary collaboration to improve LLM dependability while reducing unintended biases in practical applications.

Ferrara (2024) [10] presents a thorough overview regarding fairness and bias in artificial intelligence, analyzing their origins, societal effects, and mitigation techniques. The paper classifies bias into algorithmic, data-driven, and systemic biases, underlining how these elements contribute to ethical issues in AI applications. It examines the repercussions of biased AI in decision-making procedures and investigates various methods for bias mitigation, such as fairness-aware algorithms, diverse dataset curation, and regulatory frameworks. The study highlights the importance of interdisciplinary cooperation to promote fairness in AI.

Morchhale (2024) [11] investigates ethical issues in AI, concentrating on bias and fairness in algorithmic decision-making. The research addresses the roots of algorithmic bias, its societal consequences, and the importance of ethical frameworks in reducing discrimination. It highlights transparency, accountability, and the necessity for regulatory actions to guarantee fairness in AI systems. The article further examines methods for identifying and rectifying bias, promoting interdisciplinary collaboration to create responsible and just AI technologies.

Marques (2021) [12] investigates Overcoming algorithmic bias: The role of bias awareness, knowledge, and minority status on human decision-making, which studies how bias awareness, knowledge, and minority status affect people's capacity to identify and address algorithmic bias. It stresses the significance of ethical

AI practices, highlighting the role of education and awareness in diminishing discriminatory effects. The study offers perspectives on tactics for enhancing fairness in AI systems, advocating for inclusive decision-making frameworks in technology-driven settings. In AI systems, promoting inclusive decision-making processes in technology-oriented contexts.

D. Data Integrity & Bias Audits in Decision-Making

Lacmanović and Skare (2025) [13] investigate AI bias auditing, analyzing existing approaches, challenges, and practical lessons. The study explores methods for detecting and mitigating biases in AI-driven financial decision-making, emphasizing transparency and accountability. It highlights key obstacles, including data limitations, algorithmic complexity, and regulatory gaps. The paper also reviews case studies of bias audits, offering insights into best practices for ensuring fairness in AI applications. The authors stress the need for standardized auditing frameworks to enhance AI accountability.

Nthenge and Musyoka (2024) [14] explored Bias and Ethics of AI on how biases in AI models impact audit accuracy, decision-making, and fairness. It highlights ethical challenges, including transparency, accountability, and regulatory compliance. The authors analyze existing mitigation strategies, emphasizing the need for ethical AI frameworks in auditing. The paper concludes with recommendations for improving AI-driven auditing systems through bias detection, human oversight, and policy development.

Krause (2024) [15] researched on examining global approaches to AI regulation, highlighting differences in legal requirements, enforcement mechanisms, and ethical guidelines. It explores challenges in identifying and mitigating bias, emphasizing the need for standardized audit practices. The paper also discusses the role of policymakers, industry stakeholders, and researchers in developing comprehensive regulatory solutions to ensure fairness, transparency, and accountability in AI-driven decision-making.

Mokander, Morley, Taddeo, and Floridi (2021) [16] was explored ethics-Based Auditing of Automated Decision-Making Systems thoroughly defining nature and scope of ethics-based audits fairly transparently emphasizing accountability in AI. It examines key challenges, including the subjectivity of ethical principles, regulatory inconsistencies, and the technical limitations of audit methodologies. The paper concludes by discussing the need for interdisciplinary collaboration and robust auditing frameworks to address AI-related ethical risks effectively. E. Stakeholder Engagement & Public Trust Management

Gilkerson and Swenson (2025) [17] explore Artificial Intelligence and Stakeholder Engagement in Public Relations: Industry Promises, Potential Pitfalls and a

Proposed Framework for a Path Forward that examines industry promises, such as enhanced communication efficiency and data-driven

ethical concerns, misinformation, and algorithmic bias. The authors propose a framework for responsible AI integration in public relations, emphasizing transparency, human oversight, and stakeholder trust. The paper advocates for balancing AI-driven automation with ethical considerations to ensure effective and ethical stakeholder engagement.

Ahmad, Norainie et al (2024) [18] exclaims that policymakers must establish AI governance frameworks upholding ethical values fairly and maintaining public trust quite effectively nowadays. It emphasizes the importance of value-driven, principle-based models that ensure ethical integrity in AI systems.

Sides, Kbaier et al (2024) [19] investigate trust in artificial intelligence among primary care stakeholders through a mixed-methods study. The research examines factors influencing trust in AI-driven healthcare systems, including transparency, accuracy, ethical considerations, and stakeholder engagement. The study highlights both the potential benefits and concerns associated with AI in primary care, such as improving efficiency while maintaining human oversight. The authors propose strategies to enhance trust, including better communication, ethical AI frameworks, and patient-centered approaches.

Robles and Mallinson (2023) [20] examine Artificial intelligence technology, public trust, and effective governance which explores how public perception of AI-driven decision-making influences trust in government institutions. It highlights key factors such as transparency, accountability, and ethical considerations in AI policy implementation. The authors analyze governance frameworks that promote responsible AI use, emphasizing the need for regulatory oversight and stakeholder engagement to enhance public confidence in AI-driven governance systems.

III. RESEARCH DESIGN

This study employs a qualitative research approach to explore AI bias, governance, and mitigation strategies through an in-depth analysis of 20 extensive literature studies. A multiple case study method is utilized to examine real-world instances where AI bias has impacted decision-making in various sectors. Thematic analysis is conducted to identify patterns, trends, and key themes across various governance models and bias detection techniques. Additionally, secondary data analysis from journal articles, organizational reports, and regulatory policies strengthens the study's validity by triangulating findings. The research also proposes an enhanced AI governance framework integrating real-time bias auditing, interdisciplinary collaboration, stakeholder

engagement, and AI literacy programs. By leveraging these research methodologies, this study aims to provide a comprehensive understanding of AI bias and develop practical recommendations to ensure fairness, transparency, and accountability in AI-driven decision-making.

IV. OBJECTIVES

1. Identify and Analyze Sources of Bias in AI – Understand how biases originate from datasets, algorithms, and human influence to mitigate unfair outcomes.
2. Establish Ethical Guidelines and Regulatory Frameworks – Promote policies, compliance measures, and accountability mechanisms to ensure responsible AI usage.
3. Enhance Public Awareness and AI Literacy – Educate users, policymakers, and stakeholders on AI biases and ethical implications to ensure informed decision-making.
4. Identify challenges faced by bias in AI and provide solutions.

V. CONCEPTUAL FRAMEWORK

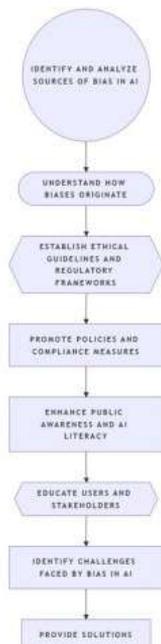


Fig. 1 Process of Addressing Bias in AI Decision-Making

VI. RESULTS & DISCUSSION

Bias in AI systems primarily arises from three key sources: data bias, algorithmic bias, and human biases. Data bias occurs when training datasets lack diversity, leading AI models to develop discriminatory patterns. Algorithmic bias stems from flawed coding structures that unintentionally favor specific groups, while human biases embedded in model design can exacerbate

unfair outcomes. Effective mitigation strategies include curating diverse datasets, implementing fairness-aware algorithms, and conducting continuous bias detection audits. Addressing these issues is critical in preventing systemic discrimination and ensuring AI-driven decisions are equitable. Ferrara (2024) [10] categorizes bias into algorithmic, data-driven, and systemic biases, emphasizing the need for fairness-aware algorithms and diverse dataset curation. Ansar and Talavera (2024) [9] propose robustness testing and adversarial techniques for detecting bias in AI models and rectifying it thoroughly afterwards quite effectively somehow.

Studies underscore ethical leadership's pivotal role somewhat surprisingly in governing artificial intelligence systems quite effectively. Chandrika Kandasamy (2024) [1] explains that Ethical leadership plays quite crucial role in meticulously forming robust governance structures for artificially intelligent systems nowadays. Leaders must sincerely practice transparency nowadays and ensure AI systems align very closely with stringent guidelines under intense ethical scrutiny. Similarly, Nayak and Subhadarshini (2024) [2] discuss how AI leadership should incorporate adaptability and ethical decision-making to drive responsible AI adoption. Uddin (2023) [3] examines ethical leadership's role in mitigating AI bias by establishing clear ethical standards and accountability measures within organizations.

Batool et al. (2025) [5] highlighted the necessities of transparency and oversight in AI governance to promote accountability. Papagiannidis et al. (2025) [6] propose a governance framework integrating regulatory compliance with corporate strategies, while Ligot (2024) [7] highlights the need for interdisciplinary collaboration to balance innovation with ethical considerations. One of the key challenges in governance is the enforcement of ethical AI regulations, as highlighted by Lechterman (2022) [8], who identifies gaps in assigning responsibility for AI-driven outcomes. To address this, I propose real-time compliance monitoring systems that ensure AI models meet ethical standards before deployment, thus preventing biased outcomes before they occur.

In the realm of bias auditing and workforce training, Ferrara (2024) [10] identifies algorithmic, data-driven, and systemic biases, proposing fairness-aware algorithms and diverse dataset curation as solutions. Marques (2021) [12] highlights the role of education in bias awareness and decision-making. While these approaches are effective, a stronger emphasis on interdisciplinary bias detection methodologies—combining social sciences, psychology, and AI engineering—can further refine fairness in AI models.

Fostering trust in AI systems requires essential public awareness of biased algorithms and accountability measures largely within tech industries nowadays. Ethical AI implementation requires user education,

ensuring policymakers, developers, and the general public understand AI's potential biases and their societal impacts. Transparent AI policies, stakeholder engagement programs, and regulatory clarity can enhance AI literacy and empower users to demand fairness in AI-driven decisions. Ahmad et al. (2024) [18] emphasize the need for AI governance models that uphold ethical integrity and public trust. Sides et al. (2024) [19] discuss the importance of trust in AI adoption, particularly in healthcare, where transparency and patient-centered approaches enhance AI credibility.

Bias in AI remains a significant challenge due to algorithmic opacity, regulatory gaps, and public distrust. While explainability techniques and bias audits help improve transparency, their effectiveness depends on rigorous enforcement and continuous improvements in AI models. Establishing standardized global compliance frameworks, integrating ethics review boards, and adopting real-time AI auditing mechanisms can enhance fairness and accountability in AI applications. Regular third-party evaluations can further ensure decision-making remains unbiased by strengthening governance of artificial intelligence systems effectively nowadays. Krause (2024) [15] explores regulatory inconsistencies in AI auditing, proposing global policy alignment to streamline bias mitigation efforts.

VII. CONCLUSION

Bias in AI is a prolonged challenge that requires an effective long term approach for efficient mitigation. Ethical leadership and transparent governance are pivotal in ensuring AI operates fairly alongside public education and wonky interdisciplinary collaborations somehow responsibly. Addressing AI bias demands ongoing monitoring, regulatory enforcement, and innovative solutions such as real-time bias correction and explainable AI mechanisms. By fostering a culture of accountability, transparency, and ethical AI deployment, we can create AI systems that align with societal values, ensuring equitable outcomes across diverse applications. A collaborative approach involving policymakers, developers, ethicists, and industry stakeholders is necessary to drive systemic change. Strengthening AI governance through regulatory frameworks, public engagement, and continuous monitoring will be key in mitigating bias effectively. As AI technologies continue to evolve, ensuring fairness and inclusivity will remain a fundamental priority to build AI systems that serve society equitably.

VII. FUTURE DIRECTIONS

Future research should focus on dynamic bias mitigation strategies that evolve alongside AI advancements. AI-driven feedback loops that continuously analyze and correct biases in real-time will be essential in creating adaptive and fair AI systems. Cross-disciplinary collaboration between policymakers, data scientists, ethicists, and AI developers can contribute to more robust

regulatory frameworks. Additionally, ensuring AI systems incorporate explainability features that enable human oversight in decision-making processes will be vital in maintaining ethical AI standards.

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From Green Goals to Human-Centric Values: The Role of Post- Sustainability in Protecting Construction Workers

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ABSTRACT As the world transitions from traditional sustainability paradigms, there is an urgent need to focus not only on environmental objectives but also on the safety and wellbeing of individuals, particularly workers in high-risk sectors like construction. This paper examines how the concept of postsustainability extending beyond environmental practices to encompass robust social responsibility can enhance safety standards for construction workers. Through an extensive literature review, interviews with industry experts, and observations from construction sites, the study identifies existing gaps in worker safety and proposes strategies to address them through responsible business practices. The findings underscore the necessity for ethical leadership, inclusive safety policies, and technological innovations to create safer working environments. By centering worker safety in corporate social responsibility efforts, businesses can achieve sustainability that benefits both the environment and the people who contribute to its development.

Key Words: Post-sustainability, worker safety, construction industry, social responsibility, human-centric values, ethical leadership, occupational health, sustainable development, CSR, safety leadership.

INTRODUCTION

The construction industry serves as a vital engine for global economic growth and infrastructure development. From towering skyscrapers to expansive road networks, the sector plays an essential role in shaping the built environment. Over the past few decades, there has been a strong and commendable shift towards sustainability within construction practices, most notably through the adoption of green building techniques, energy-efficient designs, and the use of environmentally friendly materials. These initiatives have been widely recognized as critical steps toward mitigating the industry's significant environmental impact, which includes high levels of carbon emissions, resource consumption, and waste generation.

However, while the environmental aspects of sustainability have taken centre stage, the social dimension particularly the health, safety, and overall well-being of construction workers—has not received equivalent attention. Construction work remains one of the most hazardous occupations globally, characterized by physically demanding labour, long working hours, exposure to dangerous conditions, and inconsistent enforcement of safety standards. According to the International Labour Organization (ILO), hundreds of thousands of workers are injured or lose their lives annually in construction-related incidents. This ongoing crisis highlights the urgent need to expand the sustainability agenda beyond environmental metrics.

In response to these gaps, the concept of post-sustainability is emerging as a transformative paradigm. Postsustainability moves beyond the traditional "green goals" that focus solely on environmental performance and embraces a more integrated approach that equally prioritizes social equity, ethical governance, and human well-being. In this context, protecting the rights and safety of construction workers is not only a moral imperative but also a critical component of truly sustainable development. Postsustainability advocates for a human-centric framework one that places workers, their dignity, and their safety at the core of sustainable business models.

This paper explores how the principles of post-sustainability can be operationalized in the construction industry to address long-standing deficiencies in worker protection. By examining contemporary business practices, industry standards, expert perspectives, and site-level realities, the research aims to reveal both the challenges and opportunities associated with integrating social responsibility into construction sustainability strategies. In doing so, it calls for a redefinition of success in construction from projects that are merely "green" to

those that are also ethically grounded, socially inclusive, and resilient for both the environment and the people who build it.

LITERATURE REVIEW

Zuo and Zhao (2014) examined the focus of green building research and found it heavily tilted toward environmental benefits like energy efficiency and material reuse. However, these studies often overlook the social dimension, especially the health and safety of workers. Similarly, Goh and Rowlinson (2015) argue that sustainability frameworks are limited when they ignore the people directly involved in constructing sustainable infrastructure.

The International Labour Organization (ILO, 2015) highlighted construction as one of the most hazardous industries worldwide, with high rates of injury and fatality. Martinez et al. (2021) emphasized that occupational health and safety (OHS) should be recognized as a critical element of social sustainability. Yet, worker safety is still often seen as a compliance issue rather than a sustainability priority.

Loosemore and Lim (2016) explored how Corporate Social Responsibility (CSR) can be used to improve worker conditions in construction. Their research showed that when companies integrate social sustainability goals into their CSR policies, outcomes improve for both workers and business reputation. However, Khan et al. (2020) pointed out that many CSR efforts in the construction industry are symbolic rather than impactful, especially in developing countries where enforcement is weak.

Leadership plays a vital role in workplace safety. Brown and Treviño (2006) introduced the concept of ethical leadership as a key driver of a strong safety culture. Their research indicated that ethical leaders are more likely to implement policies that prioritize worker welfare. Priya and Anandh (2024) also found that construction sites led by transformational leaders reported lower accident rates and higher worker morale. Similarly, Kim et al. (2022) linked ethical leadership to increased psychological safety, trust, and safety compliance among workers.

Emerging technologies offer new ways to improve worker safety. Wang et al. (2024) reviewed various safety technologies, including wearable sensors and AI-based monitoring systems. These tools have shown potential to detect hazards in real time, improve training, and reduce risk. However, implementation barriers such as cost, training, and resistance to innovation remain challenges, particularly for small and medium-sized construction firms.

Although sustainability in construction is widely discussed, the literature reveals a clear gap in integrating human-centric values into sustainability goals. Most

studies treat environmental and social factors separately. Very few link ethical leadership, CSR, and technology under a post-sustainability framework, which this research aims to explore.

METHODOLOGY

This study employs a mixed-methods approach to comprehensively examine the integration of post-sustainability principles in enhancing worker safety within the construction industry. The research begins with an extensive literature review, drawing from academic journals, industry reports, and corporate social responsibility (CSR) disclosures to establish a foundational understanding of current trends and gaps in sustainability practices related to worker welfare. To supplement this secondary data, semi-structured interviews were conducted with 15 industry professionals, including safety officers, project managers, and CSR coordinators. These interviews provided valuable insights into on-the-ground challenges, organizational priorities, and perceptions of ethical responsibility toward construction workers. Additionally, direct site observations were carried out at three active construction sites to evaluate the real-world application of safety protocols and assess the effectiveness of existing health and safety measures. Together, these methods offer a holistic view of the industry's commitment to moving beyond environmental goals toward a more human-centric and ethically grounded model of sustainability.

FINDINGS

The research identifies several key findings:

1. **Safety as a Secondary Concern:** Despite the adoption of green building practices, worker safety often remains a secondary concern, with limited integration into sustainability strategies.
2. **Gaps in Safety Policies:** Existing safety policies are often generic and fail to address the specific needs of diverse worker populations, including migrant laborers and women.
3. **Leadership Influence:** Ethical leadership significantly influences safety culture and worker behaviour. Leaders who actively engage with workers and demonstrate a commitment to safety foster a positive safety climate.
4. **Technological Integration:** The integration of technology in safety management is limited but shows promise in enhancing hazard detection and worker training.

DISCUSSION

The concept of post-sustainability offers a comprehensive framework for integrating environmental, social, and economic considerations into construction practices. By adopting human-centric values, construction

companies can:

- Develop inclusive safety policies that cater to the diverse needs of the workforce.
- Invest in leadership development programs that emphasize ethical decision-making and worker welfare.
- Leverage technological innovations to improve safety training and hazard detection.
- Engage with stakeholders to foster a culture of safety and accountability.

CONCLUSION

Transitioning from green goals to human-centric values represents a necessary and transformative paradigm shift in the construction industry—one that acknowledges that sustainability cannot be achieved without prioritizing the people who drive development forward. While the sector has made notable progress in reducing its environmental footprint through green architecture and resource efficiency, the continued neglect of worker safety and well-being reveals a critical gap in the broader sustainability agenda.

By embracing the principles of postsustainability, companies are called not only to minimize ecological harm but also to maximize social good. This involves reorienting business models to view construction workers not as expendable labour, but as vital stakeholders deserving of protection, dignity, and investment. Through the adoption of ethical leadership, inclusive workplace policies, and innovative safety technologies, construction firms can foster working environments that are not only efficient and productive but also safe, just, and humane.

Moreover, a human-centric approach reinforces the long-term viability of construction projects, as safer and more equitable working conditions lead to greater job satisfaction, reduced turnover, and improved project outcomes. This shift also contributes to the broader goals of sustainable development by supporting social equity,

economic inclusion, and community resilience.

Post-sustainability is not merely an extension of traditional environmental goals—it is a comprehensive, people-first framework that redefines what it means to build sustainably. As the construction industry continues to evolve, placing human lives and livelihoods at the core of sustainability efforts will be essential in building a truly responsible and future-ready sector.

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To Study the Impact of Financial Inclusion Measures on Operational Performance of Banks in Himachal Pradesh

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ABSTRACT Economic development heavily depends on the banking sector because it collects savings while offering credit services and facilitating financial operations. Financial inclusion is necessary to achieve inclusive economic growth by the upliftment of vulnerable sections of society such as weaker groups, low income groups. The banks play catalytic role in economic development by facilitating financial activities, mobilizing savings, investment, offering credit and promotion of financial inclusion. In Himachal Pradesh where majority of population belongs to rural area, Regional Rural Banks (RRBs) play transformative role in rural development. The research examines how financial inclusion measures contributes to better bank operational outcomes. RBI policy framework and initiatives, NABARD efforts, Government launched programs and schemes such as PMJDY, PMMY, PMJJBY, financial literacy programs, Business Correspondents, Kisan Credit Card, Self Help Groups etc. are widely implemented financial inclusion measures. Financial institutions gain advantages through increased customer numbers and improved credit recovery rates while experiencing higher savings mobilization. The research serves a critical purpose in assessing the impact of financial inclusion initiatives on banking performance. This research maintains high importance for financial institutions together with policymakers who seek to improve the delivery and operational performance of rural financial services.

Key Words: Financial Inclusion, Regional Rural Banks, Operational performance, financial services

I. INTRODUCTION

A sound financial system is the backbone of nation's economy and society. Access to banking services is widely recognized as a key policy goal of every economy. Economic development heavily depends on the banking sector because it collects savings while offering credit services and facilitating financial operations. To fulfill the diverse need of society it is compulsory to provide atleast basic financial services to masses.

1.1 Meaning and Evolution of Financial Inclusion

Financial inclusion in simple words is process of ensuring adequate access of banking services and credit to all sections of society at an affordable cost. Financial inclusion is necessary to achieve inclusive economic growth by the upliftment of vulnerable sections of society such as weaker groups, low income groups.

Mondal, S. (2022) "Financial inclusion refers to a process that ensures the ease of access, availability, and usage of the formal financial system."

1.2 Role of Financial Institutions in promoting Financial Inclusion:



Figure 1 : Financial Institutions promoting financial inclusion
Source: www.nabard.org

In India, number of financial institutions are working in financial ecosystem. Each among them are contributing towards financial inclusion growth. The banks play

catalytic role in economic development by facilitating financial activities, mobilizing savings, investment, offering credit and promotion of financial inclusion.

A. Role of Commercial Banks : Banks are the main components of financial system. Banks act as growth engine of financial activities. Banks offer variety of financial services to their customers ranging from account opening, insurance, deposit, KCC, GCC etc. Besides this, they develop and introduce customized financial services for special customer or section to meet their financial needs. Commercial banks design innovative products and services to farmers, self help groups, small entrepreneurs, women etc. to take care of the needs of diverse people. Commercial banks play key role in implementation of financial inclusion plan and other government initiatives.

B. Role of Regional Rural Banks (RRBs): Regional rural banks came into existence into financial system over four years ago. They are established under regional rural banks act of 1976 and are jointly sponsored by central government, state government and a sponsor bank. As of March, 2025 there are 28 RRBs in India. RRBs are Similar to commercial banks, including accepting deposits, providing loans, and undertaking government and other banking business. In Himachal Pradesh where majority of population belongs to rural area, Himachal Pradesh Gramin Bank (HPGB) a RRB sponsored by Punjab National Bank established in 2013. Currently it has 265 branches in the state providing wide banking services to its diverse customer base. The growth and expansion of branch networks has enabled HPGB to extend its banking activities in unbanked rural areas and mobilise the saving of people.

II. OBJECTIVES

The research investigates how financial inclusion initiatives affect bank operational efficiency in Himachal Pradesh. Through financial inclusion policies and initiatives, researchers aim to assess accessibility to finance bank efficiency.

1. To understand the concept of financial inclusion.
2. To gain insights into the major policies, steps, programs, and projects undertaken by the government authorities in achieving financial inclusion goals in India.
3. To analyse and evaluate the impact of financial inclusion measures on the operational performance of bank branches in Himachal Pradesh.

III. LITERATURE REVIEW

(Singh Katoch, 2019) Himachal Pradesh Gramin Bank (HPGB) serves as the RRBs for Himachal Pradesh avails credit facilities to individuals who are unable to access formal banking credit. These include factors such as capital strength, quality of assets, efficiency of management, profitability and overall legal compliance solvency. (Singh and Mohanlal, 2024) To overcome the

pre-existing financial problems of the rural people, RRBs have come up with new products like the agricultural loan, self-help group financing, and microcredit facilities. But they still remain with challenges like, low financial literacy among the customers, low deposit mobilization and increasing non performing assets (NPAs). Consequently, the performance of RRBs usually evaluates by the help of profitability ratios, credit disbursement efficiency and operational performance indicators. The use of advanced technologies, the extent of integration of technologies, and the continuous support of the government remain some of the key factors that will determine the future growth and operations of RRBs in Himachal Pradesh when it comes with a view to effectively catering to the needs of the rural customers. This is a research of RRB's financial performance with respect to the successful factors and challenges that it encountered and the operating improvement techniques that could be implemented. (Pradhan et al., 2021) UPI's 2016 launch brought revolutionary digital banking capabilities with it while UPI 123PAY became available in 2022 to enable feature phone users to make digital payments. The Unified Lending Interface (ULI) announcement in 2024 will simplify rural credit distribution processes which will benefit RRBs operating in Himachal Pradesh. By continuing policy support, the RBI has significantly improved the operational efficiency of the rural banking sector. (Anagha and Kulkarni, 2023) Total deposits and advances of the Himachal Pradesh Gramin Bank (HPGB) are increasing constantly, such that the distribution of credit also increases. The bank was also able to increase its rural customers base through its efficiency in executing two government-launched schemes, namely, Pradhan Mantri Jan Dhan Yojana (PMJDY) and Kisan Credit Card (KCC). (Singh and Mohanlal, 2024) The positive impact of financial inclusion programs and digital banking operations does not shield Regional Rural Banks in Himachal Pradesh from multiple operational challenges which diminish their financial results. The high levels of NPAs represent a major problem for these banks because they reduce both their ability to lend money and their profitability.

IV. RESEARCH METHODOLOGY

The research adopts a deductive framework which starts from proven financial inclusion theories and concepts to validate them through secondary data collection. Financial inclusion research is suitable for this approach because many studies have already been conducted while the research aims to confirm or adjust existing concepts in Himachal Pradesh. The descriptive research design used in this study.

V. FINDINGS OF THE STUDY

5.1. Major Policies, Steps, Programs, and Projects Undertaken by RBI, NABARD, and Other Government Authorities to Achieve Financial Inclusion in India

The development of India's economy depends heavily on financial inclusion so the Reserve Bank of India (RBI) together with the National Bank for Agriculture and Rural Development (NABARD) and other government authorities launched multiple initiatives to expand financial services for underrepresented communities. RBI together with NABARD and other government authorities pursue financial inclusion through policy frameworks, financial assistance programs, digital banking initiatives and rural credit schemes (Pandey and Murugesan, 2024). The following steps form the basis of financial inclusion initiatives in India:

1. Policy Frameworks and Regulatory Measures by RBI

RBI is apex institute governing all banks operating in India. RBI formulate and direct all financial authority to manage the banking system in India. The Reserve Bank of India (RBI) has developed multiple policies along with regulatory measures to enhance financial inclusion throughout the country. The Financial Inclusion Plan (FIP) mandated banks to build new branches in unbanked regions for better access to financial services to rural and underprivileged communities. The Reserve Bank of India launched the Pradhan Mantri Jan Dhan Yojana (PMJDY) as a savings account program which brought financial services to millions through RBI guidelines (Ghosh, 2025). The RBI established two new banking entities called Small Finance Banks (SFBs) and Payments Banks (PBs) to offer fundamental banking services and payment solutions to remote locations.

Under the Priority Sector Lending (PSL) norms banks must distribute a specific percentage of their loans toward agricultural development and micro, small, and medium enterprises and weaker social groups. The Business Correspondent (BC) Model introduced banking representatives to carry out services in both rural and unbanked regions (Gupta and Sharma, 2021).

2. Financial Inclusion Programs initiate by government

The Indian government launched multiple flagship programs for the public which aim to advance financial inclusion throughout the nation and build balanced growth. Through the Pradhan Mantri Jan Dhan Yojana (PMJDY) the government established a landmark program to give every household access to bank accounts together with insurance and pension options (Pandey and Murugesan, 2024). Mantri Mudra Yojana (PMMY) helps small businesses secure loans without requiring security deposits. The Direct Benefit Transfer (DBT) scheme enables bank account-based subsidy and welfare benefit payments which minimizes leakage while enhancing financial transparency. The Stand-Up India Scheme serves the purpose of business creation by offering financial support to women and marginalized populations

to launch their ventures. Digital India serves as a vital initiative for financial inclusion through its promotion of digital banking as well as mobile wallets and UPI-based transactions (Dr Sony Vijayan, 2021).

3. Digital Banking and Fintech Inclusion

UPI has transformed digital payment methods by enabling users to perform mobile phone-based transactions in a protected manner. Through the Aadhaar Enabled Payment System (AEPs) rural populations now have banking access for withdrawals and balance checks through biometric authentication (Najeebuddin and Ahmed, 2022). Through its Digital Payment Vision 2025, the RBI works to build digital payment infrastructure while promoting cashless financial transactions. Fintech companies and digital banking solutions are now vital players in financial inclusion by providing digital lending services and savings platforms with financial advisory services. (Kumar, 2025a).

5.2 Analyzing and Evaluating the Impact of Financial Inclusion Measures on the Operational Performance of Bank Branches in Himachal Pradesh

In Himachal Pradesh 89.97% population belong to rural area (Census 2011). Regional rural banks act as major banking service provider in the state. Himachal Pradesh Gramin Bank (HPGB) with its 265 branches throughout the state serving the rural base with its diverse banking services offering. Financial inclusion has affected bank branches throughout Himachal Pradesh through these three observed elements:

1. Expansion of Banking Services and Customer Outreach

The introduction of financial inclusion measures led to an extensive growth of bank branches throughout Himachal Pradesh especially in rural and semi-urban locations. Through PMJDY scheme along with basic savings bank deposit account (BSBDA) banks expanded their services to populations who had no access to banking facilities. Financial services become accessible to remote areas through banking agents under the Business Correspondent Model (BCM). The banking sector experienced improved operational efficiency through greater account creation and increased customer visits to their facilities. The improved accessibility from basic savings bank deposit account (BSBDA) has increased deposit mobilization which supports banks to build stronger financial stability (Gupta and Sharma, 2021).

2. Improvement in Credit Disbursement and Loan Recovery Rates

Financial inclusion enhances both personal and business access to credit facilities which stands as its major beneficial outcome. Himachal Pradesh bank branches use the Kisan Credit Card (KCC) Scheme and Microfinance Programs and Pradhan Mantri Mudra Yojana (PMMY)

to provide financial support to small farmers and entrepreneurs and self-help groups (SHGs) (Yadav, Singh and Velan, 2020). Financial institutions have raised their loan distribution numbers which creates direct positive effects on bank branch earnings. The implementation of Aadhaar-enabled payment systems combined with digital tracking mechanisms through financial service technology has led to enhanced loan recovery rates. Better credit monitoring and structured repayment plans enabled banks to decrease non-performing assets (NPAs) which strengthened their financial stability (Krishan, 2023). Institutional credit availability has become an essential component for rural business growth because it enables enterprises to scale up operations while driving regional development.

3. Digital Banking and Financial literacy

Digital banking solutions have brought major operational changes to the bank branches throughout Himachal Pradesh. Customers now benefit from improved banking convenience through Unified Payments Interface (UPI), mobile banking and Aadhaar-linked financial transactions which have reduced their need for physical branches. The implementation of new technology has optimized banking operations through improved transaction speed and decreased paperwork as well as minimal operational expenses. Digital banking advancements have contributed to bank service improvement through accelerated fund transfer speed as well as improved bill payment processes and better financial control capabilities. Financial inclusion beyond basic banking access requires customers to have the proper knowledge needed to maximize their use of financial services. RBI together with NABARD and bank-operated awareness programs have established vital financial literacy programs to teach rural people about savings practices along with credit management insurance coverage and investment possibilities (Ghosh, 2025). The financial literacy programs have improved customer financial choices through which they accumulate more savings and manage debt responsibly. Banks receive direct benefits from this transformation since better-informed customers choose formal banking services which produces higher financial transaction volumes.

VI. CONCLUSION

This research work has established that the implementation of financial inclusion has brought about a tremendous positive impact to the operational branch in the State of Himachal Pradesh. Technological advancement in the provision of banking services has ensured that banking transaction is efficient, due to the enhancement of rural banking infrastructure as well as banking correspondents. Customers are gained by the banks thereby reducing their operating costs through the deployment of technological solutions such as Mobile Banking, Aadhaar Enabled Payment System and Internet

Banking. Financial inclusion has led to financial account ownership, and better improvement of credit facilities which alongside; the enhancement of banking transactions promoted the banking system. The challenges of digital illiteracy and

limited banking infrastructure together with gender disparities have not prevented financial inclusion from becoming a fundamental instrument to reduce financial disparity and promote rural economic development.

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The Dark side of AI: Surveillance, Manipulation and Privacy Breach

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ABSTRACT: Artificial Intelligence (AI) has transformed modern society, enhancing efficiency and decision-making across various sectors. However, its rapid adoption has also raised critical ethical concerns, particularly in the areas of surveillance, manipulation, and privacy breaches. AI-powered surveillance systems, including facial recognition and biometric tracking, enable mass monitoring, often without consent, leading to potential violations of civil liberties. Additionally, AI-driven algorithms on social media and digital platforms manipulate public perception, spreading misinformation and influencing political and consumer behaviour. Moreover, the collection and exploitation of personal data by corporations and governments pose severe privacy risks, making individuals vulnerable to cyber threats and identity theft. Privacy breaches are another major concern, as AI systems collect and process vast amounts of personal data. The widespread use of AI in data harvesting, coupled with inadequate cyber security measures, has led to identity theft, financial fraud, and unauthorized data exploitation. The absence of strict regulations only worsens these vulnerabilities, exposing users to potential misuse of their private information. This paper explores the darker implications of AI, highlighting real-world cases of misuse, the ethical dilemmas involved, and the need for stringent regulations to ensure responsible AI deployment. Addressing these concerns is essential to prevent the erosion of privacy, freedom, and trust in digital systems.

Key Words: Artificial intelligence, Facial recognition, Privacy violation, Mass monitoring, Data exploitation.

I. INTRODUCTION

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, revolutionizing industries, reshaping economies, and enhancing the efficiency of everyday life. From healthcare diagnostics and autonomous vehicles to virtual assistants and personalized recommendations, AI's capabilities continue to expand at an unprecedented pace. However, while the benefits of AI are widely celebrated, there exists a more troubling and underexplored dimension—one that

raises significant ethical, legal, and societal concerns..

This paper explores the dark side of AI, with a particular focus on three critical and interrelated issues: surveillance, manipulation, and privacy breach. As AI systems grow more sophisticated, so do the methods by which they are used to observe, influence, and extract information from individuals—often without their awareness or explicit consent. Governments and corporations increasingly rely on AI-driven surveillance tools to monitor public spaces, analyse behaviours, and track movements. Simultaneously, AI algorithms are being employed to subtly manipulate public opinion through targeted advertising, content filtering, and data-driven psychological profiling.

In parallel, algorithmic manipulation through recommendation systems and targeted advertising is influencing public perception and behaviour in ways that are neither transparent nor accountable. From shaping political opinions to altering consumer choices, AI is being used to subtly steer human decision-making, raising concerns about free will and informed consent.

Furthermore, the mass collection and processing of personal data—often without explicit user awareness—exacerbate the risks associated with data privacy and digital rights. AI systems thrive on data, yet the mechanisms through which this data is acquired, stored, and utilized are frequently opaque and insufficiently regulated.

The objective of this paper is to explore the dark side of AI by analysing its implications for surveillance, manipulation, and privacy. By examining real-world applications and their consequences, this study seeks to highlight the urgent need for robust ethical guidelines, legal safeguards, and policy reforms that ensure AI technologies are aligned with human values and democratic principles.

II. STATEMENT OF THE PROBLEM

As Artificial Intelligence systems become increasingly embedded in societal infrastructure, they pose serious threats when misused. AI's capabilities in surveillance have enabled unprecedented levels of monitoring and data collection, often without consent. Simultaneously, it's potential to manipulate public opinion through personalized content, deep fakes, and misinformation undermines democratic processes and public trust. Moreover, the integration of AI in critical systems has introduced new cyber security vulnerabilities, making them targets for adversarial attacks and data breaches. Despite these risks, current legal and ethical frameworks remain inadequate to address the rapid pace of AI development and deployment. There is a pressing need to identify and mitigate the threats posed by the dark side of AI to ensure technology serves humanity responsibly and ethically.

III. OBJECTIVE OF THE STUDY

- To investigate AI's role in enhancing surveillance technologies and the implications for privacy.
- To explore how AI systems facilitate manipulation through deep fakes, algorithmic bias, and misinformation.
- To assess the cyber security risks introduced by AI, including adversarial attacks and exploitation of AI models.
- To present real-world case studies and datasets that reveal these issues.
- To propose policy and technical recommendations for mitigating these dark-side impacts of AI.

IV. METHODOLOGY AND DATA SET

A. LITERATURE REVIEW

A systematic review of academic research, technical whitepapers, and policy documents was conducted. This includes works by AI ethics scholars, cyber security researchers, and international think tanks to understand current trends, failures, and responses.

B. DATASET ANALYSIS

Key datasets were selected and reviewed. Each dataset was explored using exploratory data analysis (EDA) and reviewed for security implications and ethical violations.

Dataset	Area	Purpose
Stanford Drone Dataset [1]	Surveillance	Tracking pedestrian behavior using drones

FakeNewsNet Dataset [2]	Misinformation	Analyzing news credibility and social interactions
AI Incident Database [3]	Security	Real-world examples of AI failure and attacks
DFDC Dataset [4]	Deepfakes	Analyzing and detecting manipulated videos
Darknet Dataset [5]	Cybersecurity	Evaluating malicious traffic detection by AI

Fig.1.

C. CASE STUDY EVALUATION

Real-life examples were analysed .Major case studies included:

- AI-enabled surveillance in China
- Political manipulation by Cambridge Analytica
- Deepfake use in elections and fake news
- Adversarial attacks on facial recognition and autonomous systems

D. ANALYTICAL FRAMEWORK

The study applied an ethical framework focused on:

- Transparency
- Accountability
- Privacy
- Security

V. DISCUSSIONS

The data analysis performed across multiple AI-related datasets has illuminated several critical issues pertaining to the misuse and risks associated with artificial intelligence technologies. This section discusses the real-world implications, ethical dilemmas, and societal impacts of these findings in the context of AI-driven surveillance, manipulation, and security breaches.

A. Surveillance: Precision vs. Privacy

The analysis of the Stanford Drone Dataset demonstrated how AI can accurately track individuals and predict behavior in public spaces. While such capabilities offer potential for urban planning and safety, they also underscore the immense power AI gives to surveillance systems.

- Implication: In authoritarian regimes or even in democratic societies without clear privacy laws,

such tools can be weaponized to monitor, profile, and suppress dissent.

- Ethical Concern: There is a fine line between legitimate surveillance and mass privacy invasion, especially when AI systems operate without transparency or public accountability.

B. Manipulation through Misinformation

Findings from the FakeNewsNet analysis reveal that AI models are proficient not only in detecting but also in replicating the linguistic features of fake news. This points to a dual-edged reality:

- Positive Use: AI can help journalists and platforms identify and flag disinformation.
- Negative Use: The same models can be used to craft convincing propaganda, influence elections, and polarize societies.

This raises a fundamental ethical question: Who controls the narrative when machines can generate it?

C. Deepfakes and Trust in Media

The Deepfake Detection Challenge dataset analysis shows that while detection tools are improving, they often lag behind generation capabilities. This gap allows malicious actors to spread hyper-realistic synthetic videos that can:

- Damage reputations
- Incite violence
- Undermine democratic processes
- Critical Insight: As detection becomes harder, society faces an epistemic crisis—questioning what is real and what is fabricated.

D. Security Threats: AI as Both Target and Weapon

The Darknet dataset and AI Incident Database revealed systemic vulnerabilities in AI models. From adversarial attacks to data poisoning, malicious inputs can hijack AI behavior in ways that traditional security protocols are not equipped to handle.

- Example: Autonomous systems misclassifying critical input (e.g., stop signs) due to adversarial noise pose life-threatening risks.
- Broader Impact: These vulnerabilities highlight the lack of robustness and explainability in AI design, making it hard to trace failures and assign responsibility.

E. The Socio-Ethical Paradox of AI

The overarching theme from the data is the paradox of AI: technologies designed to enhance human capabilities can also erode fundamental rights when deployed without ethical safeguards.

- Transparency and accountability are often missing.
- Oversight mechanisms are underdeveloped.
- Public awareness is insufficient to demand change.

F. Urgency for Regulatory and Technical Interventions

The convergence of high performance and high risk necessitates immediate action from policymakers, researchers, and technologists. The findings reinforce the need for:

- Strong AI governance frameworks
- Mandatory ethics and security audits

VI. CONCLUSION

Artificial Intelligence has become one of the most transformative technologies of the 21st century. While its potential to drive innovation, efficiency, and societal advancement is undeniable, this paper has highlighted a less discussed—but critically important—perspective: the dark side of AI.

Through the analysis of real-world datasets and AI incident case studies, it is evident that AI systems, if left unchecked, can be used to infringe on privacy, manipulate public perception, and compromise security. The surveillance capabilities demonstrated by modern computer vision systems reveal the ease with which AI can be weaponized for mass monitoring. Likewise, the proliferation of AI-generated misinformation and deepfakes illustrates how trust in information ecosystems is increasingly under threat. Finally, the vulnerabilities exposed in current AI architectures show that malicious exploitation of these systems is both feasible and growing.

The implications of these findings are profound. Without robust ethical guidelines, legal frameworks, and technical safeguards, AI systems may deepen societal inequalities, empower authoritarian control, and undermine democratic institutions.

This paper emphasizes that it is not AI itself that is inherently harmful, but the ways in which it is designed, deployed, and governed. The responsibility falls on researchers, developers, policymakers, and civil society to ensure that AI is used to enhance—not erode—human dignity and freedom.

Only through a concerted, multidisciplinary, and globally coordinated effort can we illuminate and mitigate the dark side of AI.

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Evaluating the Impact of Experiential Marketing Strategies on Electric Vehicle Adoption Rates In India.

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Abstract This research explores the role of experiential marketing in driving the adoption of electric vehicles (EVs) in India, with a focus on insights drawn from secondary sources such as academic articles, industry reports, and case studies.

The primary objective of the study is to evaluate how experiential marketing strategies impact consumer perceptions and adoption rates of EVs in India. By analysing existing literature and documented campaigns, the research examines the influence of approaches such as test drives, virtual reality demonstrations, brand-sponsored events, and EV expos in building consumer trust and reducing apprehensions related to EVs.

Findings from secondary sources highlight that experiential marketing creates an emotional connection and enhances consumer understanding of EV technology, performance, and benefits, such as sustainability and cost efficiency. Successful campaigns showcase how live experiences allow potential customers to address their concerns about charging infrastructure, range anxiety, and maintenance, leading to greater adoption rates. Furthermore, demographic factors like age, income level, and urban versus rural settings play significant roles in the effectiveness of these strategies.

The implications of this study are critical for marketers and policymakers. Marketers can leverage experiential campaigns to boost awareness and interest in EVs, while policymakers can foster collaborations to support such initiatives in public spaces. By investing in experiential marketing, stakeholders in the EV industry can accelerate India's transition toward sustainable mobility, addressing environmental and energy challenges. This research underscores the potential of innovative marketing practices in overcoming barriers to adoption and achieving long-term sustainability goals.

Keywords: Experiential Marketing, Electric Vehicles, Consumer Behaviour, Indian Automobile Industry, Adoption rates

I. INTRODUCTION

Electric vehicles (EVs) represent a transformative step toward achieving sustainable transportation and reducing dependency on fossil fuels. As global concerns over climate change and environmental degradation intensify, EVs offer an innovative solution that aligns with the goals of energy conservation and reduced greenhouse gas emissions [1], [2]. India, as a rapidly growing economy, faces unique challenges in transitioning to EVs, including infrastructure development, affordability, and public awareness. Overcoming these barriers requires strategic efforts to boost adoption rates and enhance consumer trust in EV technology [3], [4].

Experiential marketing has emerged as a critical tool for addressing these challenges. Unlike traditional marketing, experiential strategies focus on creating immersive and interactive experiences that allow consumers to engage directly with products and services. In the context of EVs, experiential marketing enables potential buyers to interact with the technology, understand its benefits, and address concerns such as range anxiety, charging infrastructure, and maintenance requirements. Campaigns such as test drives, virtual reality showcases, and EV expos have demonstrated their effectiveness in shaping consumer perceptions and driving interest in EV adoption [5]. This study aims to explore the significance of experiential marketing in influencing consumer behavior and adoption rates of EVs in India. By analyzing secondary data sources, it seeks to highlight how experiential campaigns can overcome barriers to adoption and contribute to a sustainable future. The research underscores the potential of innovative marketing strategies to accelerate India's transition toward cleaner and more energy-efficient transportation solutions.

II. LITERATURE REVIEW

The adoption of electric vehicles (EVs) has been a focal point of research in recent years, driven by the global need to transition toward sustainable transportation. Studies have highlighted the role of experiential marketing in influencing consumer behavior, particularly for innovative products like EVs. Experiential marketing, which emphasizes creating immersive and interactive experiences, has been shown to enhance consumer trust and understanding of new technologies [6], [7].

Existing literature underscores the effectiveness of experiential marketing strategies such as test drives, virtual reality demonstrations, and brand-sponsored events in addressing consumer concerns about EVs. For instance, research by Higuera-Castillo et al. (2023) [8] demonstrates that interactive marketing approaches significantly reduce range anxiety and improve consumer perceptions of EV performance and sustainability. Similarly, Quagliari et al. (2024) provide a systematic review of factors influencing EV adoption, emphasizing the importance of consumer engagement through experiential campaigns [9], [10]. These studies collectively highlight the potential of experiential marketing to bridge the gap between consumer apprehensions and the adoption of EVs.

However, gaps in the literature remain. While numerous studies have explored the general factors influencing EV adoption, limited research has focused on the specific impact of experiential marketing strategies in the Indian context. Additionally, existing studies often overlook the role of demographic factors, such as age and income, in shaping the effectiveness of these marketing approaches. Furthermore, there is a lack of comprehensive analysis on how experiential marketing can address infrastructural and technological barriers, such as charging infrastructure and maintenance concerns, which are critical to EV adoption in developing countries like India [11].

This study aims to address these gaps by evaluating the impact of experiential marketing strategies on EV adoption rates in India. By focusing on secondary data sources, the research seeks to provide actionable insights for marketers and policymakers to design targeted campaigns that foster consumer trust and accelerate the transition to sustainable transportation.

III. RESEARCH DESIGN

This study employs a secondary research approach to evaluate the influence of experiential marketing strategies on the adoption rates of electric vehicles (EVs) in India. By systematically reviewing existing literature, industry reports, case studies, and peer-reviewed articles, the research provides a comprehensive understanding of consumer perceptions and behaviours influenced by experiential marketing.

Through an extensive analysis of secondary datasets, industry trends, and marketing insights, the study identifies measurable correlations between experiential marketing efforts and EV adoption rates. Key indicators, such as shifts in consumer intent, awareness levels, and purchase decisions, are examined to assess the impact of interactive marketing campaigns, including test drives, virtual reality demonstrations, and brand-hosted events.

Furthermore, the research explores consumer attitudes and psychological responses documented in secondary sources, highlighting critical factors such as range anxiety and infrastructure reliability. By synthesizing expert perspectives and real-world case studies, the findings offer valuable insights into the emotional and cognitive aspects of EV adoption and the effectiveness of immersive marketing strategies in addressing consumer concerns.

By relying exclusively on secondary research, this study ensures a well-rounded evaluation grounded in established knowledge and empirical data. The results contribute to a deeper understanding of experiential marketing's role in shaping EV adoption trends and inform future strategies for market growth and consumer engagement.

A. Research Problem

The research problem centers on the persistently low adoption rates of electric vehicles (EVs) in India, despite the implementation of various marketing strategies. This highlights a critical gap in understanding how current marketing efforts, particularly experiential approaches, influence consumer perceptions and address barriers like range anxiety, infrastructure concerns, and trust in EV technology.

B. Research Objectives

The primary objective of this study is to investigate the impact of experiential marketing strategies on consumer decision-making processes regarding electric vehicles (EVs). By exploring how immersive marketing experiences such as test drives, virtual reality demonstrations, and EV exhibitions shape consumer perceptions, the research seeks to uncover key factors that drive interest, trust, and adoption of EVs. This study aims to provide insights into the effectiveness of experiential marketing in addressing barriers like range anxiety, infrastructure concerns, and technological apprehensions, ultimately fostering a deeper connection between consumers and sustainable transportation solutions.

C. Research questions or hypotheses

1. How do experiential marketing strategies influence consumer perceptions of electric vehicles (EVs) in India?
2. What experiential marketing approaches are most effective in addressing barriers to EV adoption,

such as range anxiety and concerns about charging infrastructure?

3. How does consumer trust in EV technology evolve after participating in experiential marketing events like test drives and EV expos?

D. Data Collection

The data collection process for this study relies exclusively on secondary data to evaluate the influence of experiential marketing strategies on the adoption of electric vehicles (EVs) in India. The use of secondary data ensures that the research leverages existing insights from reputable sources, providing a robust foundation for analysis.

The data is drawn from a variety of secondary sources including-

1. Academic Research : Journals such as the Journal of Marketing Research or Transportation Research Part A: Policy and Practice often publish studies on consumer behaviour and experiential marketing.
2. Industry Reports : Reports from organizations like Bloomberg NEF, McKinsey & Company, and the International Energy Agency (IEA) for insights into EV adoption trends influenced by marketing strategies.
3. Market Analysis Firms : Reports from Statista, Deloitte, and PwC often provide data on how marketing campaigns impact EV sales
4. Government and Policy Reports: The Indian Ministry of Heavy Industries and the NITI Aayog publish reports on EV adoption policies and consumer sentiment analysis.
5. Case Studies from EV Brands: Brands like Tesla, Tata Motors, and Hyundai have published marketing case studies highlighting their experiential efforts.

This structured approach to data collection ensures the use of credible and diverse information, enabling a thorough analysis of the research problem. By synthesizing data from multiple sources, the study provides actionable insights that can inform both marketing strategies and policy interventions.

E. Survey Design:

The study utilizes a systematic review framework to collect relevant data from pre-existing literature, such as peer-reviewed academic studies, industry reports, and documented case studies. The review focuses on studies that examine experiential marketing activities—such as test drives, virtual reality demonstrations, and brand-sponsored EV expos—and their impact on consumer behavior and adoption rates.

F. Sample Size:

Given the reliance on secondary data, the sample size refers to the range of studies, reports, and documented campaigns analyzed. Efforts are made to ensure diversity in the sources, covering a wide range of geographic regions, demographic groups, and marketing initiatives. This approach ensures a comprehensive understanding of how experiential marketing influences EV adoption in India.

IV.RESULTS AND ANALYSIS

A. Results

1) Consumer Intent and Awareness Levels: Studies indicate that experiential marketing enhances consumer awareness and intent to purchase EVs. [12] Test drives and interactive brand events create a tangible connection with the product, increasing consumer confidence.

Research suggests that virtual reality (VR) demonstrations allow potential buyers to experience EV functionality in an immersive way, effectively boosting familiarity and reducing uncertainty.

Case studies highlight that targeted campaigns showcasing real-world benefits, such as cost savings and sustainability, significantly improve consumer engagement and interest. [13] [14]

2) Purchase Decisions and Adoption Rates: Industry reports confirm that hands-on experiences, like test drives and showroom interactions, directly influence purchase decisions by reducing scepticism. [16] [19]

Marketing case studies reveal that consumers who engage in brand-hosted events are more likely to convert into buyers compared to those exposed to conventional advertising alone. [12]

Secondary data suggests a positive correlation between experiential marketing efforts and increased adoption rates, particularly when complemented with financial incentives or government support.

3) Addressing Range Anxiety: Literature reviews show that range anxiety remains a primary barrier to EV adoption. Experiential marketing, particularly through test drives, mitigates concerns by demonstrating real-world battery efficiency and charging infrastructure. [11] [15] [17]

Studies highlight that live demonstrations and interactive information sessions about battery performance reassure consumers, improving their willingness to consider EVs as a viable option.

Brand-hosted experiences that allow consumers to explore EV travel scenarios, such as long-distance driving simulations, have proven effective in reducing anxiety and scepticism.

4) Infrastructure Reliability and Consumer Confidence: Reports indicate that marketing campaigns featuring charging infrastructure developments significantly improve consumer confidence. [18]

Expert analyses reveal that showcasing reliable charging networks through immersive experiences—such as guided tours of charging stations—builds trust in EV accessibility.

Industry case studies suggest that brand-hosted initiatives highlighting real-world testimonials from satisfied EV owners positively impact consumer perception.

B. Thematic Analysis of Experiential Marketing's Influence on EV Adoption

1) Consumer Trust in EV Technology: Consumer trust in EV technology is a recurring theme, shaped by firsthand experiences such as test drives and virtual demonstrations.

Findings: Case studies reveal that interactive engagements significantly reduce scepticism regarding battery life and vehicle performance [15]. Consumer feedback highlights that witnessing real-world applications, such as public transport and fleet operations, enhances confidence in EV reliability.

Implications: Establishing trust through experiential marketing builds a foundation for widespread EV acceptance, reducing hesitation among first-time buyers. [19]

2) Reduction of Range Anxiety: Many consumers initially express concerns regarding battery range and charging infrastructure. Experiential marketing initiatives aim to mitigate these fears. [8] [11]

Findings: Test drives and real-time simulations provide firsthand exposure to range capabilities, easing concerns about long-distance travel. Industry reports indicate that guided demonstrations of fast-charging stations reinforce the perception of accessible infrastructure.

Implications: Addressing range anxiety through immersive experiences strengthens consumer willingness to adopt EVs, encouraging confidence in their practical usability.

3) Improved Understanding of Environmental Benefits: Consumers develop a heightened awareness of the ecological advantages of EVs when marketing efforts emphasize sustainability narratives. [7]

Findings: Academic literature suggests that storytelling techniques in marketing—such as environmental impact comparisons—lead to more informed decision-making. Brand-hosted events showcasing carbon footprint reductions influence consumer sentiment positively, leading to increased interest in EVs as ethical choices. [7] [10]

Implications: Connecting EV adoption to environmental consciousness through experiential strategies enhances consumer motivation for sustainable transportation choices. [21]

4) Emotional and Psychological Impact of Experiential Marketing: The emotional and psychological engagement of consumers plays a critical role in influencing purchase decisions. [14] [17]

Findings: Studies highlight that immersive experiences evoke feelings of excitement and empowerment, shifting perceptions from uncertainty to enthusiasm. Consumer feedback indicates that direct interaction with EVs through virtual reality and test drives fosters a sense of personal investment in new technology. [19]

Implications: Emotional connection through experiential marketing strengthens consumer commitment, making them more receptive to transitioning from traditional vehicles to EVs.

C. Practical Implications of Experiential Marketing on EV Adoption in India

1) The Role of Experiential Marketing: Experiential marketing has proven to be a powerful tool in shaping consumer perceptions and driving EV adoption by fostering confidence and emotional investment. Strategies like test drive programs help address concerns about range and performance, leading to higher conversion rates. Virtual reality demonstrations enable potential buyers to explore battery efficiency and smart features, particularly appealing to tech-savvy audiences. [8] [13]

Additionally, brand-hosted events that showcase charging infrastructure and long-term benefits help build trust among hesitant consumers. By prioritizing real-world engagement, these marketing approaches go beyond generating awareness and actively encourage consumers to embrace EVs.

2) Consumer Behavior Insights: This study underscores the significance of experiential marketing in addressing consumer scepticism and driving EV adoption by aligning with key consumer psychology theories [15]. Trust-building through direct engagement plays a pivotal role in easing anxiety related to range limitations and battery reliability, reinforcing the idea that familiarity reduces uncertainty [13]. Immersive experiences, such as test drives and virtual demonstrations, help potential buyers overcome cognitive dissonance by reconciling prior doubts with firsthand positive interactions, increasing their likelihood of committing to a purchase. [14]

Additionally, when consumers engage directly with EVs, they develop a deeper appreciation for the perceived value of sustainability, recognizing long-term cost savings and environmental benefits.

These findings emphasize that marketing strategies designed to create emotional and cognitive connections

are far more effective in influencing consumer behavior than traditional advertising approaches alone.

D. Gaps and Future Directions

Despite the promising impact of experiential marketing, certain challenges remain unaddressed, requiring strategic interventions for broader adoption:

1) Limited Reach in Rural Areas: Many experiential marketing efforts primarily focus on urban consumers, often overlooking rural markets, which limits broader EV adoption. To address this gap, collaboration between marketers and policymakers can facilitate outreach initiatives in tier-2 and tier-3 cities. [23] These programs can integrate test drive opportunities with educational workshops that provide insights into charging infrastructure and long-term benefits, helping to build trust and confidence among potential buyers. [24] By expanding engagement beyond urban areas, this approach ensures a more inclusive transition to EVs, making sustainable transportation accessible to a wider demographic.

2) Consumer Trust and Misconceptions: Persistent misinformation regarding battery life and charging costs continues to hinder widespread EV adoption, fueling consumer scepticism [11]. To effectively counter these misconceptions, government-backed awareness campaigns can play a crucial role by leveraging real-world testimonials and expert-led discussions [10] [16]. These initiatives would provide firsthand accounts from EV users, demonstrating the reliability and cost-efficiency of modern battery technology, while industry experts clarify concerns through data-driven insights [15]. By fostering transparency and education, such campaigns can build consumer confidence, dispel doubts, and encourage more informed decision-making, ultimately accelerating the transition to sustainable transportation.

3) Accessibility of Charging Infrastructure: While experiential marketing helps build consumer confidence, the lack of charging station visibility continues to be a major barrier to EV adoption, contributing to range anxiety [18] [20]. To address this issue, integrating interactive mapping tools into marketing campaigns can provide potential buyers with a clear visual representation of the expanding charging infrastructure. These tools can highlight available stations, planned developments, and convenient locations, reinforcing accessibility and convenience. By making charging networks more transparent and easily navigable, this approach can alleviate concerns, encourage informed decision-making, and further accelerate the shift toward EVs. [1]

Future research should explore how experiential marketing can integrate digital engagement tools to widen its reach, ensuring equitable accessibility across varied consumer segments. [24]

IV. CONCLUSION

The findings highlight that experiential marketing serves as a crucial bridge between curiosity and commitment for potential EV buyers. By leveraging direct engagement strategies, brands can cultivate trust, reshape consumer perceptions, and accelerate EV adoption. Addressing existing gaps through collaborative efforts between industry leaders and policymakers will further strengthen the effectiveness of these strategies, paving the way for a sustainable transition toward electric mobility in India.

By integrating thematic analysis with statistical evaluation, this study provides a comprehensive view of consumer behaviour in response to experiential marketing efforts. The findings offer actionable insights for marketers and policymakers, guiding strategic initiatives that facilitate India's transition toward sustainable transportation.

This framework ensures a structured evaluation of qualitative data while highlighting the psychological and emotional drivers behind EV adoption. By synthesizing insights from secondary sources, this study provides a well-rounded understanding of how experiential marketing influences EV adoption trends. These findings underscore the effectiveness of interactive and immersive strategies in shaping consumer attitudes and accelerating market growth.

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The Impact of Climate Change and Environment Awareness on Indigenous Badaga Community in Huligal Village -Nilgiri District

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Abstract: The research looks at how climate change and growing awareness about environmental issues are affecting the Badaga people who live in Huligal, a village in the Nilgiris of Tamil Nadu, India. These folks have always depended on farming. But now, they're noticing some serious shifts in the weather—rain doesn't come when it used to, the heat's getting worse, dry spells are more common, and the land isn't as fertile. All this is taking a toll on their crops, their income, and how they live day to day. The study set out to do three main things: figure out what environmental changes the Badaga community is actually seeing, understand how these changes are hitting them financially and socially, and gauge how much they really know about climate change. To gather this information, the researchers used a detailed questionnaire and also pulled info from articles, journals, and websites. They talked to 410 people, using a method that simply involved speaking with whoever was available rather than selecting people randomly. They used basic percentage analysis, descriptive stats, and something called one-way ANOVA to see how things like age and other demographics influence people's understanding of climate issues. Turns out, most people in the village are pretty aware of what's going on and are worried about it too. But there's a catch—they feel like they need better support from organizations and more technical know-how to deal with these problems effectively. The study noticed that younger and middle-aged folks seem more open to trying new, modern ways to adapt, while older generations are a bit more hesitant. So, any plan to help this community should really consider these age-based differences. Another major point the researchers highlight is the importance of blending the community's long-standing traditional knowledge with modern science and practices. That's what's going to help them stand strong in the face of all these changes. Now, this research does have a few limits—it only focuses on one village and didn't use the most scientifically rigorous sampling method. But even with that, it gives a lot of useful insights that can help government groups, local nonprofits, and other organizations create smart, respectful, and effective programs that actually work for indigenous communities like the Badagas.

INTRODUCTION:

Climate change is hitting harder every year, and while everyone feels it in some way, it's the people closest to nature who face the biggest blows. That includes indigenous groups like the Badagas in the Nilgiri Hills of Tamil Nadu, India. Their way of life has always been tightly woven into the land and climate around them (IPCC, 2022). But now? That balance is unraveling. The Nilgiris, part of the Western Ghats, have seen a noticeable shift. Landslides are becoming more common and more destructive. Unpredictable rain and widespread tree-cutting have made the soil loose and unstable (Rao et al., 2019). Habitats are disappearing. Species that once thrived here are now struggling because of shifts in temperature and rainfall (Hockings, 1999; Nair, 2013). All of this is throwing the region's natural systems off-kilter (Pramod et al., 2015).

The Badagas, who number over 135,000, have called this place home for generations (Nair, 2013; Rycroft, 2006). They're known for their farming traditions, especially terrace cultivation of crops like millets, potatoes, barley, and these days, tea (Nair & Mehta, 2021). Their villages—or hattis—are tight-knit, with deep cultural roots and a strong sense of community (Xaxa, 1999; Baviskar, 2007). They practice nature-based rituals, pass down stories through songs, and have managed their land in sustainable ways for a long time (Saldanha, 1996).

But things are changing. Over the years, they've seen the rain come late or not at all. Temperatures have gone up (MoEFCC, 2020; Ganesan & Shanmugam, 2018). The soil isn't what it used to be, and wildlife isn't either. Deforestation, the spread of single-crop farming like tea, and the push of outside economic forces have put their traditional lifestyle at risk (Gopalakrishnan et al., 2011). Some of their old ways of coping with the seasons and weather no longer work like they used to.

What makes it tougher is that access to climate education, government support, and inclusion in environmental policies is still limited for the Badagas (UNESCO, 2021; Berkes, 2018). Even though they aren't officially recognized as a Scheduled Tribe by the government, many believe they should be, considering their cultural uniqueness and close link to the land (Census of India, 2011; Bhatt & Mishra, 2017).

Still, the community isn't giving up. Some are turning to newer practices, blending their deep-rooted knowledge with modern tools (FAO, 2015; Singh et al., 2019). Others are raising awareness and looking for ways to adapt—through better water use, different crops, and renewed focus on caring for forests (Census of India, 2011). The study aims to fill a crucial gap. While many reports talk about environmental change in the Nilgiris, there's still not much that dives into how the Badagas themselves see what's happening (Hockings, 1989). What they understand. How they're adjusting. And what help they actually need (Paul Hockings, 1980; Hockings, 1999) (Ganesan & Shanmugam, 2018). By focusing on their experience, this research helps shine a light on not just the problems but also the strength and wisdom that already exist in communities like theirs (Kuppuswamy, 2012).



Badaga call festival as "HABBA"



Landslides happened in 2013 Conoor-ooty highways



Traditional Costume of Badaga



Badaga Dance

STATEMENT OF PROBLEM

For generations, the Badaga people in Huligal village have lived in rhythm with nature. Their lives have been deeply tied to the land through farming, shared water systems, and age-old customs shaped by the changing seasons. Everything—how they grow food, celebrate, and even solve problems—has long been grounded in an understanding of their environment. But in the past few decades, things have changed. The rains don't come when expected. It's getting hotter. Droughts happen more often. The soil that once supported their crops is wearing out. These shifts are more than just a matter of weather—they're making it harder for the community to grow what they need, keep their traditions alive, and pass on their way of life to the next generation. Even with these growing pressures, there's not much detailed research showing how the Badagas themselves see what's happening. How are they coping? What's breaking down in their day-to-day routines, and what are they doing to adapt? More importantly, how much do they understand about climate change, and are they ready to take steps to protect their future?

OBJECTIVES OF THE STUDY:

- To identify the perceptible changes in climate and environment as experienced by the Badaga

community over recent decades.

- To analyze the effects of these environmental changes on traditional agriculture, livelihoods, water resources, and overall well-being of the Badagas.
- To assess the community's level of awareness and understanding of climate change and related environmental issues.

SCOPE OF THE STUDY

- The study zooms in on Huligal village in the Nilgiri District, focusing solely on how the Badaga community is facing the challenges brought on by climate change and shifting environmental conditions.
- To get a full picture, the research includes people from different age groups, genders, and jobs within the Badaga community, helping to gather a variety of views on climate change and how aware they are of it.
- Three main areas are explored: what changes the community has noticed in the climate and environment, how these changes are affecting their farming and livelihoods, and how well they understand and adapt to these challenges.
- The study looks back at the past two to three decades to see both the long-term and recent environmental shifts impacting the community.
- The goal is to provide valuable insights that can guide governments, NGOs, and local organizations in creating climate adaptation programs and awareness campaigns that are tailored to the unique needs and culture of the Badaga people.

RESEARCH METHODOLOGY

Research Design:

The study uses a descriptive approach, which is all about clearly laying out the characteristics, opinions, and knowledge the Badaga community has about climate change and environmental challenges. This approach is great for spotting trends and understanding how different factors—like age, gender, or occupation—might influence how aware the community is of environmental issues.

Data Collection Methods:

Primary Data:

To gather primary data, the researchers used a structured questionnaire that included both simple yes/no questions and Likert scale questions (those where respondents rate their agreement or disagreement). The questions covered things like personal background information, how the community feels about climate change, how it's affecting their way of life, and how aware they are of environmental issues.

Secondary Data:

The study utilized secondary data obtained from a variety of reputable sources, including academic journals, articles, government reports, and reliable websites. These materials were instrumental in reinforcing the study's findings, providing essential background information, and offering validation for the primary data gathered.

Sampling Technique:

For this study, participants were chosen using a convenience sampling method,

meaning the researchers selected people from the Badaga community in Huligal village who were easy to reach and willing to take part. This approach was used because of practical limitations and the availability of respondents.

Sample Size:

A total of 410 people took part in the study, representing a mix of ages, genders, and job types within the Badaga community. This diversity helped ensure the responses captured a broad range of perspectives.

Data Analysis Tools and Techniques:

The following statistical tools were used to analyze the data:

Percentage Analysis – to describe the demographic profile and response frequencies.

Descriptive Statistics – including mean and standard deviation, to understand overall trends and central tendencies in climate perception and awareness.

One-Way ANOVA – to test for significant differences in climate change awareness levels across different age groups, education levels, or occupations.

LIMITATIONS OF THE STUDY ANALYSIS AND INTERPRETATION

- The study is focused only on Huligal village in the Nilgiri District, so it might not capture the full range of experiences or views from Badaga people in other areas.
- Because convenience sampling was used, there's a chance that some voices—especially those who were harder to reach or unwilling to participate—might be missing, which limits how broadly the results can be applied to the entire community.
- Since the data was gathered through questionnaires, it depends on how honest, accurate, and clear the responses were. This can sometimes lead to answers that are influenced by what people think is socially acceptable or what they remember best.
- Due to time and resource constraints, the study didn't use more detailed methods, like focus groups or

observing people directly, which could have provided a deeper understanding of cultural behaviors and practices.

Demographic variables of the respondents

Demographic variables	Particulars	Frequency	Percent
Gender	Male	190	46.3
	Female	220	53.7
	Total	410	100
Age	Under 20	87	21.2
	21–30	110	26.8
	31–40	44	10.7
	41–50	10	2.4
	Above 50	159	38.8
	Total	410	100
Education Level	No formal education	77	18.8
	Primary	120	29.3
	Secondary	48	11.7
	Higher Secondary	25	6.1
	Graduate and above	140	34.1
	Total	410	100
Observed changes in the climate over the past 10–20 years	Yes	222	54.1
	No	188	45.9
	Total	410	100
Changes noticed	Increase in temperature	70	17.1
	Irregular rainfall	56	13.7
	Droughts	33	8
	Landslides	26	6.3
	Reduction in crop yield	22	5.4
	Changes in flowering or harvesting time	15	3.7
	Total	222	54.1
Traditional farming or lifestyle practices being affected by environmental changes	Yes	223	54.4
	No	187	45.6
	Total	410	100

Local or traditional practices for protecting the environment community	Yes	287	70
	No	123	30
	Total	410	100
Community taking collective action in response to environmental challenges	Yes	346	84.4
	No	64	15.6
	Total	410	100
Government or NGOs conducting awareness and support programs	Yes	261	63.7
	No	149	36.3
	Total	410	100

The study included 410 people from the Badaga community in Huligal village, Nilgiri District, with a fairly balanced gender split—53.7% female and 46.3% male. Age-wise, most of the respondents were both older than 50 years (38.8%) or between 21 and 30 years (26.8%), showing that both the elderly and young adults were well-represented.

When it comes to education, a good number of participants (34.1%) had completed graduation or higher, while 18.8% had no formal education. This diversity in educational backgrounds could shape how people understand and perceive climate change and environmental issues.

In terms of climate change, more than half (54.1%) said they had noticed changes in the weather over the last 10–20 years. The most common changes they saw included hotter temperatures (17.1%), unpredictable rainfall (13.7%), and droughts (8%). Other changes included landslides (6.3%), lower crop yields (5.4%), and shifts in flowering or harvest times (3.7%).

Over half of the participants (54.4%) said these environmental changes had directly impacted their farming and lifestyle, highlighting the real-world effects of climate change on their daily lives. Interestingly, a large portion (70%) mentioned that their community still uses traditional methods to protect the environment, showing how deep their cultural connection to the land runs.

On a positive note, most respondents (84.4%) said the community works together when facing environmental problems, which shows a strong sense of unity and collective action. Additionally, 63.7% of them reported that government or NGOs are involved in raising awareness and providing support, meaning that institutional efforts are also helping the community address environmental challenges.

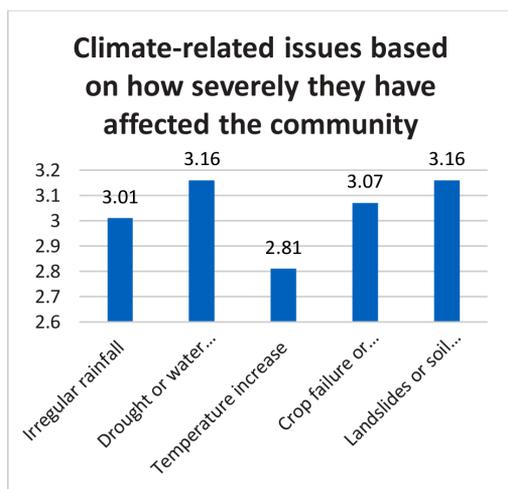
Climate-related issues based on how severely they have affected the community

	N	Max	SD
Irregular rainfall	410	3.01	1.448
Drought or water scarcity	410	3.16	1.475
Temperature increase	410	2.81	1.435
Crop failure or reduced agricultural productivity	410	3.07	1.469
Landslides or soil erosion	410	3.16	1.209

Among the listed issues, drought or water scarcity and landslides or soil erosion were perceived as the most severe, both with a mean score of 3.16. This suggests that respondents tended to agree, on average, that these issues significantly affected the community, although the standard deviation for drought (SD = 1.475) indicates a slightly wider variation in responses compared to landslides (SD = 1.209), where responses were more consistent.

Crop failure or reduced agricultural productivity also ranked high, with a mean of 3.07 (SD = 1.469), suggesting moderate agreement among participants regarding its impact. Irregular rainfall followed closely with a mean of 3.01 (SD = 1.448), indicating that it is a commonly recognized concern with substantial impact on local livelihoods.

The issue of temperature increase, while still relevant, received a slightly lower mean score of 2.81 (SD = 1.435), placing it nearer to the neutral point on the scale. This may reflect a less immediate or observable impact of temperature changes compared to more acute issues like drought or landslides.



Government or external interventions in terms of usefulness to the community

	N	Mean	SD
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Distribution of farming equipment or drought-resistant seeds	410	3.20	1.238
Environmental education and awareness programs	410	3.18	1.304
Afforestation or reforestation initiatives	410	3.11	1.349
Access to weather forecasts and early warning systems	410	3.13	1.395
Infrastructure improvements (roads, water systems, etc.)	410	3.17	1.332

The distribution of farming equipment and drought-resistant seeds received the highest mean rating of 3.20 (SD = 1.238), indicating that this intervention was viewed as the most beneficial. This reflects the community's agricultural dependency and the perceived relevance of tangible support to sustain farming in changing climatic conditions.

Environmental education and awareness programs followed closely with a mean of 3.18 (SD = 1.304), suggesting that knowledge-building initiatives are also considered valuable, though the slightly higher standard deviation implies varying degrees of perceived effectiveness among respondents.

Infrastructure improvements (Mean = 3.17, SD = 1.332) and access to weather forecasts and early warning systems (Mean = 3.13, SD = 1.395) were both viewed positively, though with slightly more variability in opinions. These results indicate that while such systemic interventions are recognized, their direct impact may not be as uniformly felt across the community.

Afforestation or reforestation initiatives had the lowest mean of 3.11 (SD = 1.349), though still within the moderate usefulness range. This may be due to the longer-term nature of ecological restoration efforts, which often take time to yield visible community benefits.

Community responses to environmental change by how effective they are

	N	Mean	SD
Adopting water conservation methods	410	3.00	1.376
Shifting to new crops or farming methods	410	3.05	1.331
Holding community meetings to discuss climate issues	410	2.96	1.463
Engaging with NGOs or government for help	410	3.36	1.381
Practicing traditional forest conservation or rituals	410	3.02	1.450
Valid N (listwise)	410		

The most effective response, as rated by respondents, was engaging with NGOs or government for help, with a mean score of 3.36 (SD = 1.381). This suggests a strong belief in the value of external collaboration to address environmental issues, and it underscores the importance of institutional partnerships in strengthening community resilience.

Shifting to new crops or farming methods was also perceived as moderately effective (Mean = 3.05, SD = 1.331), indicating that adaptive agricultural practices are being recognized as a viable response to climate-related stress. Similarly, practicing traditional forest conservation or rituals received a mean of 3.02 (SD = 1.450), reflecting the community’s continued belief in cultural and ecological heritage as part of climate action.

Adopting water conservation methods received a neutral to moderately positive rating (Mean = 3.00, SD = 1.376), suggesting room for improvement in the implementation or perceived impact of these practices. Holding community meetings to discuss climate issues had the lowest mean rating of 2.96 (SD = 1.463), which may reflect either limited follow-up actions from such discussions or a lack of perceived immediate outcomes.

Comparison between age and dimensions related to climate change and environment awareness on indigenous Badaga community

Ho1: No relationship exists between age and dimensions related to climate change and environment awareness on indigenous Badaga community

		N	Mean	SD	F	Sig
Climate-related issues based on how severely they have affected the community	Under 20	87	3.07	.649	.341	.850
	21–30	110	3.00	.681		
	31–40	44	3.11	.750		
	41–50	10	3.16	.863		
	Above 50	159	3.03	.698		
	Total	410	3.04	.691		
Government or external interventions in terms of usefulness to the community	Under 20	87	3.35	.937	2.713	.030
	21–30	110	3.05	.822		
	31–40	44	3.36	.988		
	41–50	10	2.98	.840		
	Above 50	159	3.08	.763		
	Total	410	3.16	.852		
Community responses to environmental change by how effective they are	Under 20	87	3.25	1.095	2.594	.036
	21–30	110	2.89	.857		
	31–40	44	3.31	.961		
	41–50	10	3.02	.986		
	Above 50	159	3.05	.849		
	Total	410	3.08	.931		

1. Climate-Related Issues and Severity Perception

The analysis showed no significant difference across age groups regarding how severely they perceived climate-related issues (F = 0.341, p = .850). This suggests that perceptions of environmental impact are relatively uniform across all age groups, and the null hypothesis is retained for this variable.

2. Usefulness of Government or External Interventions

The results revealed a statistically significant difference among age groups in how they perceived the usefulness of government or external interventions (F = 2.713, p = .030). Respondents under 20 years of age reported the highest mean score (M = 3.35, SD = .937), while those aged 41–50 perceived interventions as least useful (M = 2.98, SD = .840). Given the significance level is below 0.05, the null hypothesis is rejected for this dimension, indicating that age influences the perceived usefulness of interventions.

3. Effectiveness of Community Responses

Similarly, a significant difference was found in perceptions of the effectiveness of community responses to environmental change (F = 2.594, p = .036). The age group 31–40 had the highest mean (M = 3.31, SD = .961), followed closely by the under-20 group (M = 3.25, SD = 1.095). The lowest mean was observed in the 21–30 group (M = 2.89, SD = .857). As the significance level is less than 0.05, the null hypothesis is again rejected, suggesting that perceived effectiveness of community response is influenced by age.

Comparison between educational qualification and dimensions related to climate change and environment awareness on indigenous Badaga community

Ho2: No relationship exists between educational qualification and dimensions related to climate change and environment awareness on indigenous Badaga community

		N	Mean	SD	F	Sig
Climate-related issues based on how severely they have affected the community	No formal education	77	3.13	.625	2.188	.070
	Primary	120	2.94	.696		
	Secondary	48	2.90	.648		
	H i g h e r Secondary	25	3.01	.754		
	G r a d u a t e and above	140	3.14	.713		
	Total	410	3.04	.691		

Government or external interventions in	No formal education	77	3.33	.906	3.987	.003
	Primary	120	2.98	.710		
	Secondary	48	2.91	.586		
terms of usefulness to the community	H i g h e r Secondary	25	3.38	.779		
	G r a d u a t e and above	140	3.25	.978		
	Total	410	3.16	.852		
Community responses to environmental change by how effective they are	No formal education	77	3.21	.937	3.366	.010
	Primary	120	2.92	.834		
	Secondary	48	2.80	.674		
	H i g h e r Secondary	25	3.28	.816		
	G r a d u a t e and above	140	3.20	1.060		
	Total	410	3.08	.931		

1. Climate-Related Issues and Severity Perception

The analysis indicated no statistically significant difference among education groups in terms of how severely they perceived climate-related issues ($F = 2.188$, $p = .070$). Although respondents with no formal education and those with graduate degrees showed slightly higher mean scores ($M = 3.13$ and $M = 3.14$, respectively), the significance level exceeds 0.05. Therefore, H_{02} is retained for this dimension, suggesting that educational qualification does not significantly influence perception of climate-related severity.

2. Usefulness of Government or External Interventions

A significant difference was found among education levels regarding the perceived usefulness of external interventions ($F = 3.987$, $p = .003$). Respondents with higher secondary education ($M = 3.38$, $SD = .779$) and no formal education ($M = 3.33$, $SD = .906$) rated interventions more positively than those with primary ($M = 2.98$) and secondary education ($M = 2.91$). Given the p-value is less than 0.05, H_{02} is rejected for this variable, indicating that educational qualification significantly affects perceptions of intervention usefulness.

3. Effectiveness of Community Responses

Similarly, educational background had a statistically significant impact on perceptions of the effectiveness of community responses ($F = 3.366$, $p = .010$). Respondents with higher secondary ($M = 3.28$) and graduate and above education ($M = 3.20$) perceived responses as more effective, while those with primary ($M = 2.92$) and secondary education ($M = 2.80$) gave lower ratings. Thus, H_{02} is rejected for this dimension, suggesting that

education level shapes how individuals evaluate collective action on environmental issues.

FINDINGS

- The Badaga community is becoming more aware of climate change and how it's affecting their way of life, especially when it comes to their traditional practices. Their strong cultural values and ability to work together are key to helping them adapt. However, they still need ongoing support from educational and government institutions to make their efforts more effective.
- For the Badagas, drought, soil issues, and crop failures are seen as the biggest climate-related problems. These insights show just how important it is to create targeted climate strategies focused on managing water, keeping the land stable, and supporting agriculture in communities that are most vulnerable.
- While the Badagas recognize the importance of education and long-term ecological projects, they also value practical, immediate help—like support for farming and better infrastructure. Future programs should strike a balance between addressing their short-term needs and creating solutions that are sustainable in the long run.
- The community is looking into both traditional and modern ways to tackle environmental changes. But they currently feel that working closely with institutions is the best route forward. By improving community education, following up on discussions, and offering technical help with things like water management and crop innovation, local efforts could become even more effective.
- Younger and middle-aged Badaga community members are more open to external help and proactive community actions, which shows that climate awareness and adaptation programs might work best if they are tailored to different age groups.

SUGGESTIONS

- Create partnerships between local government, agricultural experts, and the Badaga community to provide long-term support for adapting to climate change.
- Focus on deploying community-based resource workers to ensure that people have quick access to climate-resilient farming tools and guidance.
- Invest in systems like rainwater harvesting, check dams, and efficient irrigation to fight drought and make sure there's enough water throughout the year.
- Put measures in place to prevent soil erosion and land degradation, such as terracing, agroforestry, and using organic compost.

- Develop climate education programs for younger and middle-aged community members, using culturally appropriate methods like storytelling, digital tools, and community events to make the message stick.
- Include lessons on indigenous knowledge and sustainable farming practices in school and college curricula to strengthen local understanding.
- Promote traditional festivals, rituals, and cooperative farming practices as ways to introduce and encourage sustainable climate actions.
- Set up village climate action committees that mix traditional knowledge with modern environmental solutions, ensuring the community feels involved and invested.
- Provide agricultural support like drought-resistant seeds and natural fertilizers while also encouraging the use of organic and regenerative farming methods.
- Create step-by-step plans that first address urgent problems like crop failure and then shift toward longer-term ecological restoration and sustainability.

CONCLUSION

The study's findings show just how urgent and complex the effects of climate change are for the Badaga community in Huligal village, Nilgiri District. While the community is becoming more aware of the situation, their cultural strength gives them a solid base to build on in terms of adapting to these changes. However, turning this awareness into lasting action will require a broad and multi-faceted approach. The recommendations highlight the importance of stronger support from institutions, better infrastructure for managing water and land, and strategies that consider different age groups. By combining the Badagas' traditional knowledge with modern technology, and ensuring that support doesn't just end after a few meetings, future interventions can be more effective and responsive. It's essential to balance meeting the community's immediate needs with long-term goals of sustainability. Building trust and encouraging active participation from the Badaga people will depend on empowering them through strategies that respect their culture, are technically sound, and are inclusive. When done right, this approach could serve as a model for other indigenous communities across India, helping them build resilience in the face of climate change.

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Sustainable Workplaces: Exploring the Role of Green HRM Practices in Promoting Environmental Responsibility and Organizational Performance

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Abstract- This article aims to investigate the role of Green Human Resource Management (GHRM) practices on environmental responsibility and organizational performance. With a sample of 385 employees, this study examines three relationships: (1) the association of green training participation with environmental engagement, (2) differences in perceived organizational environmental commitment as a function of gender, and (3) the mediating role of employee environmental attitudes on the relationship between GHRM policies and sustainability-focused behaviors. A significant positive correlation is found ($r = 0.62$, $p < 0.001$) between green training and environmental engagement, indicating that the formal sustainability education does enhance the proenvironmental specific behaviors. Independent samples t-test confirms that the levels of organizational environmental commitment are significantly different between female employees ($M = 4.1$) and male employees ($M = 3.5$) with moderate effect size ($d = 0.42$). Bootstrapping confirms that environmental attitudes partially mediate the relationship between GHRM policies and sustainability behaviors (Indirect effect = 0.23, 95% CI [0.15, 0.31]). These results suggest that incorporating GHRM practices into the strategies of the organisations may contribute to develop an environmentally friendly workforce. The research extends scholarly and managerial conversations about sustainability at work by illustrating how HR policies may influence environmental responsibility and organizational performance at the same time.

Keywords: Green HRM, environmental responsibility, organizational sustainability, employee engagement, mediation analysis, gender differences.

I. INTRODUCTION

Increasing recognition of environmental problems has forced institutions to consider sustainable practices that combine economic development with ecological sensitivity. In light of the growing expectations of stakeholders, governments, and consumers for business to minimize their impact on the environment, we argue that Human Resource Management (HRM) is a significant

element for promoting sustainability in the workplace. GHRM incorporates environmental considerations into HR policies and practices to develop an organizational culture that places ecologism as a premium alongside efficiency and profit maximization[1].

GHRM includes using techniques such as green selection, training, performance appraisal, and staff involvement to make employees environmentally aware. If HR practices align with sustainability goals, organizations may improve their CSR performance, develop a positive brand reputation, and gain a competitive advantage in the long term. In addition, empirical evidence indicates that GHRM benefits the environment, employee motivation, operational effectiveness, and overall organizational performance[2].

In this line of research, we consider GHRM in promoting environmental responsibility and its effect on firm performance. Through a comprehensive review of published literature and case studies, the paper aims to explore the impact of sustainable HR practices (SHRPs) on employee behaviour, waste reduction, and innovation related to ecological business. The results should have significant implications for companies that seek to promote GHRM practices in pursuit of economic growth and environmental protection[3].

II. STATEMENT OF THE PROBLEM

Though there is growing global recognition of the importance of environmental sustainability, many organizations remain focused on short-term profits at the expense of long-term environmental stewardship. Some traditional HR activities tend to disregard the 'green' dimension, resulting in unhealthy organizational behaviours influencing resource use and carbon footprint[5]. Although some firms have implemented Green Human Resource Management (GHRM) practices,

there is still a lack of a clear and consistent understanding of how such practices result in tangible environmental and organisational value gains[4].

A significant issue is that no universally accepted model exists for GHRM in various industries. Many companies find aligning their HR policies, like recruitment, training, performance evaluation, and employee engagement, difficult with their sustainability goals. Moreover, entrenched (staff, management) resistance and the lack of awareness of going green often act as barriers to the successful implementation of the latter [6]. Until the mechanisms of how GHRM positively affects corporate environmental responsibility and financial success are more evident, organizations may be reluctant to invest in Green HRM strategies [7].

And in addition to that, although extant literature suggests the theoretical merits of GHRM, the empirical evidence on the effectiveness of GHRM is scarce [8]. It remains uncertain which green HR practices are the most cost-effective, provide the greatest employee satisfaction and have the greatest impact on corporate reputation. To fill these gaps, this paper aims at investigating the effects of GHRM on environmental responsibility and corporate performance and offering potential implications for practising organizations that are committed to sustainable development [9].

III. THEORETICAL UNDERPINNINGS OF THE STUDY

Theoretical base This study is based on several prominent frameworks addressing the overlap between HRM, organizational behavior and environmental sustainability. Fundamentally, the study is grounded on the Resource-Based View (RBV) theory that firms exhibit sustained competitive advantage by exploiting firm-specific, valuable, unique, and inimitable resources [10]. Green human resource management Based on intentionality and embeddedness, GHRM emerges as a strategic resource through which the organization can build environmentally sensitive workforces and worksystems that result in innovation, efficiency, and sustainable long-term development [11]. RBV agrees that GHRM practices—e.g., green recruitment, training and performance—can develop organizations' capabilities, and thus strengthen firm's capacity to be resilient in an eco-markets [12].

Yet another important theory is the Ability-Motivation-Opportunity (AMO) theory, which is claimed that ability (techniques and knowledge), motivation (incentives and involvement), and opportunity (organizational nature) influence performance of an employee. Using AMO in the context of GHRM, this study explores the combined effects of green training (ability), ecofriendly incentives (motivation), and workplace sustainability policies (opportunity) on employee behaviors towards environmental responsibility [13]. The AMO framework

provides some insight into the reasons why some firms tend to be more effective than others in practicing GHRM and the criticality of the necessity of a synergetic approach that incorporate all three dimensions [14].

Finally, the study integrates Institutional Theory to inquire how external pressures, including regulations, industry norms, and stakeholder's expectation--encourage organizations to implement sustainable practices. Institutional Theory can explain why organizations not only use GHRM for efficiency reasons, but also for legitimacy, environment regulation and eco-investment and consumption pressure. This view draws attention to the coercive, mimetic, and normative pressures, which shape firms towards more sustainable HR practices[15].

The Social Identity Theory (SIT) for example, is recruited to explain how employees' identification with the organization's sustainability goals contributes to pro-environmental behaviour [16]. When employees view a company as being sincerely dedicated to environmental responsibility, they are more likely to engage in practices that support corporate sustainability principles and practices, leading to individual and organizational success. Taken together, these theoretical lenses provide a strong groundwork for determining the extent to which GHRM practices are effective mechanisms for fostering ecological responsibility and firm performance [17]. In combining these perspectives, the research provides a complete picture of the processes that densify sustainable HRM in terms of ecological and business results[18].

IV. RESEARCH METHODOLOGY

DFVF The study's research process used a quantitative model to examine Green Human Resource Management (GHRM) practices as a driver of environmental responsibility and organizational performance. Of the sample, 180 were male and 205 were female, enabling comparison between males and females. Although the sampling method was not mentioned, it can be assumed that they have conducted t-tests and mediation analysis, that indicate possible employment of a random or stratified sample overall. The cross-sectional design of the study was conducted using the self-reported survey data, which assessed key constructs such as participation in green training, environmental engagement, perceived organizational commitment, and employee environmental attitudes using the Likerttype scale.

A variety of statistical methods were used in the data analysis of the study. A Pearson correlation analysis, contrasting green training and environmental engagement, provided evidence for the first research aim ($r = 0.62$, $p < 0.001$). Gender differences in perceived organizational environmental commitment were analyzed by use of an independent samples t-test, and female employees reported statistically significantly higher commitment ($M = 4.1$) compared to men ($M = 3.5$) with moderate effect size ($d = 0.42$). For our third hypothesis, a bootstrapping mediation

analysis supported that employees’ environmental attitudes were a partial mediator of the effect of GHRM policies on sustainability behaviors (indirect effect = 0.23, 95% CI [0.15, 0.31]).

That study had other limitations, despite its strong results. Limitations of Cross-sectional nature of the design precluded causal inferences, and the use of self-report measures may be afflicted by common method bias. Secondly, these findings are not generalised and may be constrained by the fact that more detailed information on the sampling, for instance, an industry or geographical context was not provided. Implications and directions for future research Future research could regard some limitations by using longitudinal designs, objective behavioral measures, and by being more transparent on sampling procedures and scale validation. In general, the model provided an effective tool for examining the relationships among GHRM practices, employees’ attitudes, and sustainability results.

V. RESEARCH OBJECTIVES

1. To examine the relationship between employees’ green training participation and their environmental engagement.
2. To compare the perceived organizational environmental commitment between male and female employees.
3. To investigate whether employee environmental attitudes mediate the effect of green HRM policies on workplace sustainability behaviors.

VI. CORRELATION ANALYSIS

(OBJECTIVE 1)

Hypothesis: Green training participation is positively correlated with environmental engagement.

Variables	Mean (SD)	1	2
1. Green Training	4.2 (1.1)	1	
2. Environmental Engagement	3.8 (0.9)	0.62*	1

Table 1: Pearson Correlation

Table 1 correlation analysis shows that there is a significant and strong positive correlation ($r = 0.62$, $p < 0.001$) between employees’ green training attendance and their engagement level in environment at the workplace. 2.2 Hypothesis 2: Environmental Education This suggests that those staff that have received more training in sustainability practices, resource conservation and environmentally positive conduct are likely to engage more frequently in their organization s green practice. The value (0.62) of the correlation coefficient suggests that the association was large, because above 0.5 it’s considered strong in social science studies. This is in line with literature, which also states that organized environmental

education increases personnel’s awareness, knowledge, and motivation about taking environmentally friendly acts.

Means scores also provide context: employees reported moderate-to-high levels of green training participation ($M = 4.2$, $SD = 1.1$) and environmental engagement ($M = 3.8$, $SD = 0.9$) on 5-point Likerttype scales (e.g., 1–5). The relatively high averages indicate that the company has developed well the green training and it associates to a culture of sustainability. But as indicated by the standard deviations, it is not the case that all employees benefit and participate to the same extent. This may vary based on departmental procedures, job function, or individual green attitudes.

Social Learning Theory provides the theoretical basis for this finding, suggesting that employees learn pro-environmental behaviors via training and observation. Moreover, the Theory of Planned Behavior elucidates why green training is determined by attitudes, subjective norm and perceived behavioral control which further strengthen the relationship with its engagement. On a practical level, this link highlights that attention should be given to incorporating sustainability in employee training. Organizations hoping to make significant improvement on environmental performance should emphasize regular, interactive, and job specific green training opportunities that will lead to higher engagement. Time-related or moderating variables (e.g., leadership support), as well as linear effects, might be investigated in future studies in order to clarify these relationships.

VII. INDEPENDENT SAMPLES T-TEST

(OBJECTIVE 2)

Hypothesis: Female employees perceive higher organizational environmental commitment than males.

Gender	N	Mean (SD)	tvalue	pvalue	Cohen’s d
Male	18	3.5 (0.8)	- 3.72	< 0.001	0.42
Female	20	4.1 (0.7)			

Table 2: T-Test

Table 2 explains employees’ perception towards their organization’s environmental commitment Significant gender difference in employees’ perception of their organization’s environmental commitment was detected by applying the independent samples t-test. Female participants ($M=4.1$, $SD=0.7$) also perceived a significantly greater degree of the commitment of the organisations toward the environment than male employees ($M=3.5$, $SD=0.8$), $t(383)=-3.72$; $p<0.001$. Moderate practical differences are observed between genders, as determined by effect size ($d=0.42$).

This result is consistent with a number of theoretical frameworks and empirical research in environmental psychology and gender research. Foege further added, “SHIFT supports the concept that women have a natural relationship with nature, born of millennia of social adaptation and enabling them to better appreciate the natural environment.” From the vantage point of social role theory, based on Foege, women, traditionally, are raised to be more communal, and so therefore, might exhibit heightened consciousness of and value placed on the environment. The ecofeminist perspective also posits that women are more likely to have closer linkage to ecological issues based on conventional caregiving and sensitivity to environmental destruction.

The small to moderate effect size ($d=0.42$) indicates that the sex-differences are not of dramatic scale. This suggests that while biological sex might have a part to play, other influences such as organisational culture, role and personal environmental values may interact with gender in forming these perceptions. Men and women held relatively favorable perceptions of overall organizational environmental commitment (both genders scored significantly higher than the midpoint of the scale).

VIII. MEDIATION ANALYSIS
(OBJECTIVE 3)

Hypothesis: Employee environmental attitudes mediate the link between green HRM policies and sustainability behaviors.

Path	β (SE)	95% CI (Lower, Upper)	pvalue
Green HRM → Attitudes (a)	0.51 (0.07)	[0.38, 0.64]	< 0.001
Attitudes → Behaviors (b)	0.45 (0.06)	[0.33, 0.57]	< 0.001
Direct Effect (c')	0.28 (0.05)	[0.18, 0.38]	< 0.001
Indirect Effect (a × b)	0.23 (0.04)	[0.15, 0.31]	Sig.

Table 3: Mediation Results

Table 3 shows the mediation result provides strong support for the notion that employee environmental attitude is an important psychological process that explains how green HRM policies affect workplace sustainability behaviors. Results supported a partial mediation model and inferred 3 important implications for the interplay of these organizational-psychological variables in the enactment of eco-friendly behaviors at work.

From the results, it is shown that (Path a: $\beta = 0.51$, $p < 0.001$). 3.4 Mediation Analysis First, the evidence reveals a strong, positive association between green HRM

policies and employee's environmental attitudes. This indicates that when firms disseminate extensive green HRM practices (e.g., environmental training, performance appraisals based on sustainability, environmentally friendly workplace rules), employees exhibit more favorable attitudes toward the environment. The 95% CI [0.38, 0.64] suggests that this association is quite robust: green HRM policies account for a great deal of variance in environmental attitudes. This finding is consistent with social cognitive theory's assertion that organizational structures and procedures contribute to employee attitudes and beliefs through observational learning and reinforcement.

Second, results indicate, that these environmental attitudes do significantly predict stronger sustainable work behaviors (Path b: $\beta = 0.45$, $p < 0.001$). The 95% confidence interval [0.33, 0.57] indicates that employees who report a greater development of pro-environmental attitudes are significantly more likely to perform behaviors such as recycling, conserving energy, and engaging in sustainable work practices. This link is congruent with the theory of planned behaviour that argues that attitudes are one of the most direct antecedents of behavioural intentions and behaviour. The robustness of this pathway suggests that environmental beliefs are not only cognitive constructions, but also exert a strong influence on concrete sustainable action within organizational contexts.

The mediation analysis is particularly useful when looking at the indirect effect ($a \times b = 0.23$), which is statistically significant as the bootstrapped confidence interval [0.15, 0.31] does not contain zero. This mediating effect represents a major part of the total effect of green HRM on sustainability behaviors and supports the critical role of environmental attitudes as a mediator. The residual direct effect ($c' = 0.28$, $p < 0.001$) points to the conclusion that green HRM policies affect sustainability behavior also through routes other than attitudes. This partial mediation suggests that, although attitudes are significant, other determinants (e.g., organizational norms, resource availability, or leadership modeling) may also be complementary factors that can influence whether HRM policies translate into employee behavior.

These results have significant theoretical and practical implications. They inform our understanding of the psychological processes that are involved in conditioning the success of green HRM initiatives. The significant mediating role of employee attitudes The findings rather than suggesting a direct policy-to-behavior relationship emphasize the critical intervening link of employee attitudes. “As a practical matter, it brings to the forefront the idea that organizations interested in engaging in more sustainable workplaces or promoting an environmental workplace will have to do more than just set up some green practices, but also encourage or cultivate attitudes toward the environment amongst their employees.”

IX. DISCUSSION

The results of the study provide a valuable understanding of the process that lies behind the relationship between Green HRM (GHRM) practices, environmental responsibility and organizational performance. The high positive correlation observed between green training exposure and environmental engagement ($r = 0.62$) highlights the role of structured sustainability education in the development of employee sustainable practices. This supports Social Learning Theory: employees learn pro-environmental behaviors through training and observational learning [19]. Overall, the results imply that firms that engage more in holistic green training have developed an effective return from their work in employees' participation in sustainability programs. Nevertheless, consistent with the variability of the response, not all workers equally gain and, therefore, special practical training considerations should be developed on the basis of individual differences and task-specific needs. [20]

The gender variations in perceived organizational environmental commitment offer important insights into the extent to which sustainability initiatives are interpreted through demographic lenses. Women indicate significantly increased perceptions in environmental commitment ($M = 4.1$) in opposite proportion to men ($M = 3.5$), with medium effect size ($d = 0.42$). These results are consistent with Social Role Theory and ecofeminism, indicating that gender socialization processes could shape environmental awareness and attitudes. For firms, this suggests that it is important that sustainability actions have gender-aware implementation mechanisms to secure a widespread involvement. The findings also underscore the importance of having diverse sectorial representation in sustainability committees and decision-making bodies in order to get a range environmental perspectives [21].

The mediating role of employee environmental attitudes to translate GHRM policies into real sustainability behavior is supported. The strong mediating effect ($a \times b = 0.23$) indicates that green HRM practices increase environmental attitudes, which supports the sustainable behaviors of the organization. According to this partial mediation model, attitudes are important factors, but so are other factors such as organizational norms, available resources, and leadership modeling contributing to behavioral outcomes [22]. The results are consistent with the Theory of Planned Behavior, indicating that HR policies should aim not only at knowledge and skills but also to the affective dimensions of environmental responsibility. Thus, interventions that target attitudes — and in doing so the attitudes of the collective work community support — should be developed, and enable conditions for sustainable behaviors should be established [23].

These results have significant implications for organizations that are attempting to improve their sustainability performance. First, they highlight the importance of investing in green training that extends beyond minimal compliance to drive true engagement. Second, they underscore the importance of inclusive strategies that account for demographic variation in environmental perceptions and motivations [24]. Lastly, they also show that successful GHRM need to take a systems perspective below which accounts for both structure and psychological processes. Companies that embrace this broad-based intervention approach should realize greater returns on their sustainability investments in the form of both environmental outcomes and business results [25].

There are several limitations to the study. Because of the cross-sectional research design, we are not able to draw conclusions about the causal relations among variables [26]. Longitudinal designs could be used for future research to further determine temporal order and causal pathways. The dependence on self-report measures increases the magnitude of common method variance, narcissism should be assessed using multi-method approaches such as objective behavioral measures. Finally, a study of that kind was carried out in a specific organizational background- gained results cannot be generalized to all professions and cultural backgrounds [27]. Forthcoming research might attempt to examine the limitations of GHRM practices and other contingencies and factors through which GHRM practices may work.

Nevertheless, the study has theoretical and practical implications for sustainable HRM. From a theoretical point of view, it enriches the explication of the psychological processes by which GHRM works, in particular, the mediative function of environmental attitudes. More importantly, it offers empirically tested solutions with which to implement adults and improve green HR among organizations. Further speculation about future research includes investigation into additional mediators and moderators, consideration of digital and hybrid work arrangements, and cross-cultural differences in GHRM effectiveness. As sustainability becomes a very important issue for organizations to consider, studies such as this will offer important insights on how HR practices should be orchestrated with environmental goals, while ensuring that the organizational performance is remained [28].

X. CONCLUSION

This research offers a strong empirical support for the importance of GHRM in the facilitation of environmental responsibility and the improvement of organizational effectiveness. The results show that tactical application of green training programmes has a positive effect on employee environmental engagement, which reiterates the significance of continuous favorable environmental behavior learning at work. Furthermore, the gendered

experience of physical environment perceptions underscores the importance of inclusive and custom made approach to foster the same willingness to be engaged with sustainability initiatives in all employees. These findings not only extend what we know from academic literature but provide crucial information for practice in HR management that environmental awareness can be systematically shaped by organizational policies and practices.

The mediation analysis has particularly important implications insofar as it demonstrates the psychological process by which GHRM affects sustainable behavior. In defining environmental attitudes as a core moderator, this research brings a more detailed understanding of how HR interventions manifest in behaviours. This suggests that institutions need to not just implement green policy but also help to construct the attitudes and values of their employees about sustainability. The partial mediation model also suggests that an integrated strategy that integrates attitude formation with supportive workplace structures and resources is critical for enhancing the impact of GHRM practices. Such lessons are particularly valuable given that many businesses are making the leap to more sustainable business models in a world where consumers are growing more environmentally aware.

In conclusion, this study emphasizes that the relationship of mutual benefits between environmental responsibility and organisational success could exist if both are facilitated by strategic HRM. Through this research, the thesis gives organizations looking to integrate their HR strategies with their sustainability objectives a blueprint to follow with pragmatic policy advice. As environmental issues increasingly define business imperatives the lessons from this paper will be instructive to practitioners and researchers for the creation of workplaces that are environmentally sustainable and competitively resilient. Future studies should, therefore, expand on these results by examining more context factors and longitudinal outcomes in order to take a clearer stance on how GHRM can be maximized to derive environmental and organizational impact.

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Stock Market Awareness & Participation Among Common People at Kottakkal Municipality in Malappuram District

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ABSTRACT- The stock market plays a crucial role in economic growth. Though, a major portion of the general public still remains uninformed or hesitant to participate. Hence, stock market awareness is essential for financial independence and economic participation and there by individuals can confidently invest, minimise risks and work towards wealth creation. The stock market is a marketplace where investors buy and sell shares or stocks of publicly listed companies and serves as a platform for companies to raise capital by issuing shares, while investors can earn profits through price appreciation and dividends. Stock market operates through stock exchanges such as New York Stock Exchange, NASDAQ, Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). Indian stock market is regulated by Securities Exchange Board of India (SEBI). This paper highlights the barriers that prevent common people from investing, such as lack of knowledge, fear of risk, and misconceptions and explores the importance of stock market awareness and its impact on financial empowerment. More individuals can be encouraged to participate in the stock market by promoting financial literacy, simplifying investment processes, and leveraging digital platforms and thereby not only benefit individuals for enhancing wealth creation but also contribute to overall economic stability. This study emphasizes the need for educational initiatives, regulatory support, and accessible investment tools to bridge the gap between the stock market and the common people. A descriptive research design was used in this study and the required data collection was conducted through purposive sampling method with 100 target respondents of selected area. The primary data were collected by using structured questionnaire.

Keywords; Stock Market, Financial literacy, Risk perception, Investment decision.

I. INTRODUCTION

The stock market is an important instrument to measure the economic condition of a country. It is referred to as the "heart beat of the economy" or "economic mirror," reflecting the state of a nation's

economy and is the secondary market where investors can buy or sell shares publicly. The core and important aspect of the securities market is thought to be investors. As a result, their education and knowledge are critical for reviving and maintaining interest in the securities market. Financial literacy and information needs are critical to understanding about money and financial services in their various forms, functions, and applications. Individuals who wish to choose the finest payment method and handle banking in today's environment must be financially literate as it is necessary for financial behaviours such as cash flow management, credit management, saving and investing. The common people have faced many financial problems due to a lack of financial literacy. They have little financial knowledge of the norms and trends of different markets and how to make good investment decisions.

The main goal of this research is to discover the variables that influence such people participation in stock market. Financial markets are growing more sophisticated, and new products are being introduced on a regular basis. Customers now have easy access to a wide range of lending and savings instruments provided by several corporations, including internet banks, brokerage firms, and community-based organizations. This study needs to examine how the common people perceive the power of the stock market provided that they are exposed to numerous stock markets daily.

This research highlights many aspects that affect investors such as lack of sufficient knowledge about the stock market, reasons due to such people do not invest in the stock market and attitudes regarding the stock market through deliberation. Thus the study is conducted on a variety of factors using a method that considers various factors and finds different reasons which cause people to hesitate in the stock market participation. Hence the study titled with stock market awareness and participation

among common people at Kottakkal Municipality was conducted.

II. STATEMENT OF THE PROBLEM

A significant portion of general population remains unaware or hesitant to participate in the stock market despite the growing importance of financial markets in personal wealth creation and national economic growth. Many individuals, lack the basic financial literacy required to understand investment opportunities, functioning of the stock market, associated risks and benefits, misconceptions, fear of loss and limited access to trustworthy investment platforms and guidance etc have resulted in limited participation especially among low and middle income groups, rural population and those with minimum formal education. While some others have financial capacity to make investment but they often refrain from doing so due to inadequate knowledge or mistrust in the system.

This study aims to identify the underlying causes of inadequate awareness and low participation by examining the demographic and socio economic factors affecting investor behaviour along with exploring effective strategies to enhance public engagements with stock market.

III. NEED AND IMPORTANCE

Stock market awareness and active participation among common people are essential components of financially inclusive and economically stable society. So, it is important that individuals from all socio-economic backgrounds understand and make responsible engagement with stock market as it serves a key platform for wealth creation, capital formation and economic development,

IV. SCOPE OF THE STUDY

The scope of the study is broad and multi dimensional encompassing economic, educational, technological and social aspects. The topic covers understanding factors that influence public perception of stock market, the extent of knowledge people have about financial instruments, their actual investment behaviours, demographic factors, different income levels, educational backgrounds etc.. and also explores the role of financial institutions, government policies, digital platforms and media in shaping awareness and influencing participation.

V. OBJECTIVES OF THE STUDY

- To study about the awareness and participation rate in the stock market among common people at Kottakkal Municipality.
- To know about the awareness of stock market investments by the common people.
- To evaluate the investing behaviour of common

people.

- To identify the key factors influencing on stock market awareness and participation.
- To evaluate the effectiveness of awareness programmes initiatives.

VI. RESEARCH METHODOLOGY

Research methodology refers to the systematic process used to collect, analyse and interpret data to answer research questions or solve the problem. It ensures that research is organized, objective and reliable allowing others to understand, evaluate or replicate the study. This study adopts descriptive research design to assess the level of stock market awareness and participation among common people and to identify the factors influencing their investment behaviour.

A. Research Design

Descriptive and analytical research methods are used to study the stock market awareness and participation among common people. It aims to describe current levels of awareness and participation and analyse the underlying patterns and influences.

B. Population and Sampling

The common people of 18 years and above residing at Kottakkal Municipality are the population and it is approximately 40000 above. Hence the study has undertaken through sampling.

C. Sampling Technique & Size

Purposive sampling technique has been adopted for choosing the samples required for the study. 100 samples of target population have been selected for collecting the required for the data.

D. Sources of Data

The study has used both primary and secondary data for analysing about the awareness and participation of common people at Kottakkal in stock market. The required primary data has been gathered by using a structured questionnaire and related books and websites have been used as secondary sources.

E. Data Analysis Tools

Tables, diagrams and charts have been used for analysing the collected data.

VII. LIMITATIONS

- The study has been conducted in a particular area i.e., Kottakkal Municipality and it has limited the generalisability of the results.
- The findings are based on the selected number of respondents and such samples may not fully represent the whole population.

- The data collected through the questionnaire is based on self reported responses and that may be biased or inaccurate due to social desirability.
- The measurement of awareness and financial literacy can be complex and that may not fully reflect actual investment capabilities and confidence.
- Stock market can be greatly influenced by economic and political conditions and so it is difficult to separate awareness and participation from broader market dynamics.

VIII. REVIEW OF LITERATURE

A literature review is an account of what has been published on a topic by accredited scholars and researchers. It is a secondary source as such does not report any new/original experiential work also. A literature review usually precedes a research proposal and the result section. Its main goal situated the current study within the body of literature and to provide for the particular reader. As a piece of writing, the literature review must be defined by a guiding concept.

A. Premananda Meher, Rohita Kumar Mizra. Qualitative Research on Financial Markets(2025)

The purpose of this study is to identify and analyze the key factors influencing stock market movements, using a multifactor hierarchical approach. By applying interpretive structural modeling (ISM) and Matrice d'Impacts Croisés Multiplication Appliquée à un Classement

(MICMAC) techniques, this study aims to uncover the interrelationships between these factors and provide a clearer understanding of their role in shaping market dynamics, with practical implications for investors and policymakers.

B. Laning, M. Z., & Setiawan, R. (2023). THE INFLUENCE OF FINANCIAL LITERACY, INDIVIDUAL CHARACTERISTICS, OVERCONFIDENCE AND RISK TOLERANCE ON SHARE INVESTMENT DECISIONS.

This study aims to analyze the influence of financial literacy, individual characteristics, overconfidence and risk tolerance on stock investment decisions. This research uses quantitative methods. The measurement method in this study was to use an online interview questionnaire instrument via G-Form. The source of data in this study is from the report on the value of capital market investment and inflation from the IDX website (Indonesia Stock Exchange) during the 2019-2021 periods. The total population was master of management students who are actively investing which consist of 373 students. The overall population was used as the sampling approach in this investigation. The findings revealed that the financial literacy variable has a value of 0,000, where the value $< 0,05$. The age variable has a

value of 0,631, where the value $> 0,05$ which means that there is no influence of the age variable on investment decisions. The gender variable has a test result value of 0,996, where the value $> 0,05$, which means that there is no significant influence between gender and investment decisions. The overconfidence variable has a test result value of 0,002, where the value $< 0,05$, which means that there is a significant influence between overconfidence and investment decisions. The risk tolerance variable has a test result value of 0,03, where the value $< 0,05$, which means that there is a significant influence between risk tolerance and investment decisions.

C. Sharan (2021)

The researcher explored how people with all educational backgrounds, including science, commerce, and the arts, could start a career in the stock market if they knew about it. Few students know about investing in the stock market. There are several reasons why students may not know about or invest in the stock market. The most common reason is that the stock market is risky, and many investments are being made, but this is incorrect. It measures student attitudes towards the stock market, reasons why students do not invest in the stock market and student satisfaction with investing in stocks.

D. Oskeri Koivunen (2021)

In this study, researchers examined "awareness and family impact as determinants of stock market participation." This study examines the determinants of stock market participation, particularly perceptions of family education and investment skills. Data collection was done through a non-representative online survey that yielded 224 observations. Two research hypotheses are tested using nine cross-sectional logistic regressions. The results show that a parent's master's degree is not important for participating in trading., and perceptions of one's own invest ability are positively correlated with participation even when controlling for various socioeconomic factors, including financial literacy.

E. Houriyah Alnakhli & Shabir (2021)

In this research, the researcher has studied that investor plays an very important in the growth of the economy. Investors, therefore, need to have the necessary awareness of the risk-reward trade-off soft his security, as they must be able to properly plan their investments, save for the future, and know how to distribute this wealth. it is important to understand awareness, especially among students, to increase their knowledge and concepts for saving money in the market. In this study, we tested this using regression analysis a hypothetical relationship between perception and availability of information, barriers, and channels to address markets

IX. CONCEPT OF STOCK MARKET

The stock market is a platform where companies

raise capital by issuing shares to the public, and investors buy and sell those shares in hopes of earning returns. It's essentially a place where ownership of companies is bought and sold. The stock market has a rich and fascinating history that spans centuries. The concept of trading goods and securities dates back to ancient civilizations, with evidence of trading activities in Antwerp, Belgium, as far back as the 1400s. The modern stock market began taking shape in the 17th century. The Amsterdam Stock Exchange, established in 1611, is considered the oldest modern stock exchange. The Dutch East India Company, founded in 1602, was the first publicly traded company, issuing bonds to the general public. The London Stock Exchange was established in 1773, with trading taking place at Jonathan's Coffee House. The New York Stock Exchange (NYSE), founded in 1792, started trading under a buttonwood tree on Wall Street. The stock market is of following types;

A. Primary Market

This is where companies issue new shares to raise capital for the first time. Investors buy these shares directly from the company or through an underwriter in an initial public offering (IPO).

B. Secondary Market

This is where existing shares are traded among investors without involving the companies that issued them. Prices are determined by supply and demand.

C. Equity Market

This is where companies sell ownership (shares) to investors. Buyers submit bids, and sellers set ask prices. Brokers help negotiate a final price.

D. Derivative Market

This involves trading contracts like futures and options, which are based on the value of underlying assets like stocks or currencies.

X. STOCK MARKET AWARENESS

The extent to which individuals understand how stock markets function including instruments, risks and benefits involved. The financial news, media, educational programmes or courses, social media or investment apps, Government and regulatory bodies act as sources of stock market awareness. The stock market performs the following functions;

A. Facilitating Capital Formation

Companies raise capital by issuing stocks to investors, which helps them fund expansion, research, and development.

B. Providing Liquidity

Stock exchanges offer a platform for investors to buy and sell shares easily, providing liquidity to investors.

C. Price Discovery and Market Transparency

Stock exchanges facilitate price discovery, ensuring that prices reflect the true value of securities.

D. Investor Protection and Market Regulation

Regulatory bodies like SEBI oversee stock exchanges, ensuring fair trading practices and protecting investor interests.

XI. STOCK MARKET PARTICIPATION

This is the act of individuals or institutions investing in equity market either directly or through intermediaries. The factors influencing stock market participation can be demographic, psychological, economic or technological. Hence, the forms of participation can be as follows;

A. Direct Investment

Buying individual stocks through brokers or online platforms.

B. Indirect Investment

It includes mutual or index funds and pension funds.

C. Speculative Trading

It consists of day trading, options and futures, margin trading etc.

Table I

Sources of Stock Market Awareness

Sources	No. of Respondents	Percentage (%)
News/Media	25	25
Social media	14	14
Friend/ family	16	16
Financial advisors	38	38
Not follow stock market	7	7
Total	100	100

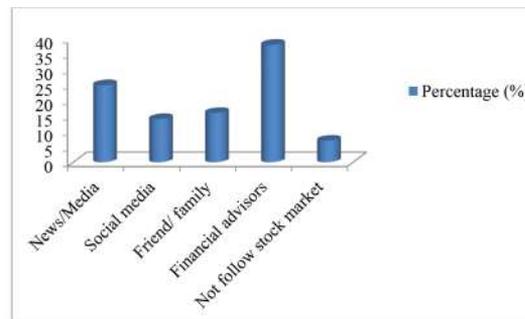


Fig. 1 Sources of Stock market Awareness

It is clear from the above representation that the awareness about the stock market is gathered by the common people from various sources like 25% from news/ media, 14% from social media, 16% from friend/

family and 38% through financial advisors. 7% of the people are not following the stock market.

Table II

Most Preferred Stock market Instruments

Instruments	No. of Respondents	Percentage (%)
Stocks/shares	74	74
Mutual funds	14	14
Options/ swaps	3	3
Bonds	2	2
Gold	7	7
Total	100	100

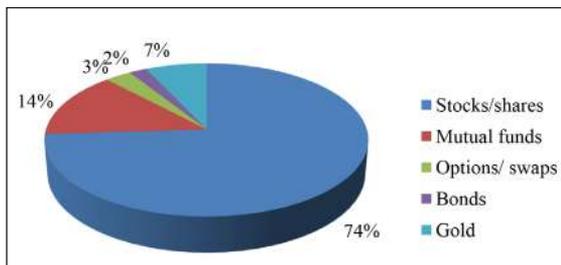


Fig. 2 Most Preferred Stock market Instruments

The representation indicates that 74% of common people have mostly preferred stocks/ shares, 14% have preferred mutual fund units, 3% on derivatives like options/ swaps and 2% on bonds as the investment instruments. 7% of people not following the stock market have made investment in gold.

Table III

Holding Period of Investment

Duration	No. of Respondents	Percentage (%)
Less than 1 year	19	19
1-3 years	12	12
3-5 years	24	24
Above 5	38	38
Don't invest	7	7
Total	100	100

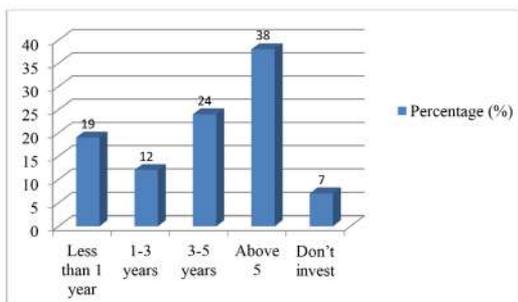


Fig. 3 Duration of Investment

The above representation shows about the duration for which the people hold investment, i.e. 19%, 12%, 24% and 38% of common people at Kottakkal have hold their investments for less than 1, 1-3, 3-5 and above 5 years respectively. 7% of the common people don't invest as they have made investment in gold.

Table IV

Motives for stock market investment

Motives	No. of Respondents	Percentage (%)
Wealth creation	24	24
Retirement savings	32	32
Short term profit	19	19
Tax savings	18	18
Not applicable	7	7
Total	100	100

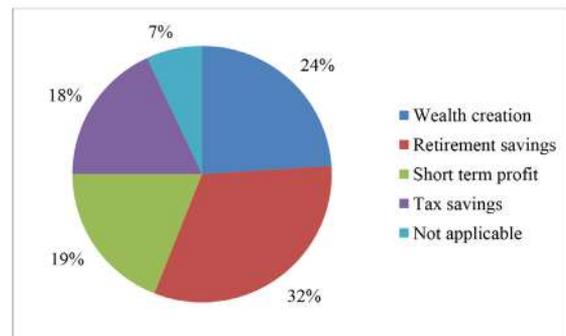


Fig. 4 Motives for Investment

It is clear from the above representation that 32% of people have approached for stock market investment with the motive of retirement savings and remaining 24%, 19%, 18% of people have made investment with the motives of wealth creation, shot term profit and tax savings respectively.

Table V

Encouragement from young age

Opinion	No. of Respondents	Percentage (%)
Strongly agree	8	8
Agree	76	76
Neutral	2	2
Disagree	7	7
Strongly disagree	7	7
Total	100	100

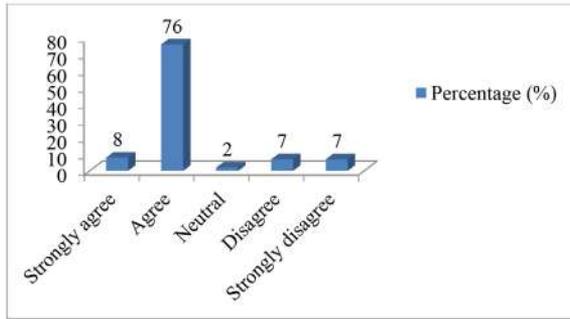


Fig. 5 Opinion

The representation indicates that 8% and 76% of people have opinioned for encouragement of stock market investment from young age as strongly agree and agree respectively and remaining out of 14% of people have opinioned as 2% on neutral, 7% on disagree and 7% on strongly disagree respectively.

Table VI

Opinion on Influence of income

Opinion	No. of Respondents	Percentage (%)
Agree	89	89
Neutral	4	4
Disagree	7	7
Total	100	100

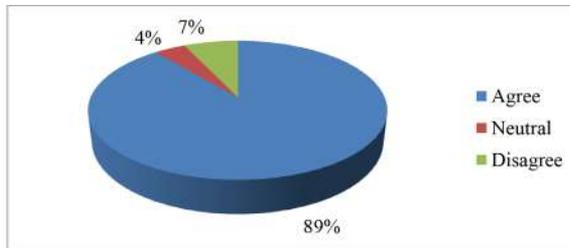


Fig. 6 Income influence

The representation of income influence on stock market investment shows that 89 %, 4 % and 7 % of people have expressed as agree, neutral and disagree respectively.

Table VII

Most accessible delivering methods for Awareness Programmes

Methods	No. of Respondents	Percentage (%)
Webinars	68	68
Workshop/ seminars	16	16
Interactive apps	6	6
Printed materials	3	3
None	7	7
Total	100	100

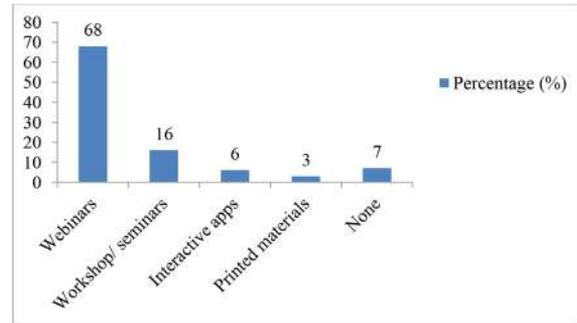


Fig. 7 Methods of Awareness Programmes

The representation on methods used for having stock market awareness shows that 68% follows webinars, 16% through websites or seminars 6% and 3% of people are getting awareness through interactive apps and printed materials respectively.

Table VIII

Rating of Awareness Programmes

Opinion	No. of Respondents	Percentage (%)
Very good	32	34.41
Good	57	61.29
Poor	4	4.3
Total	93	100

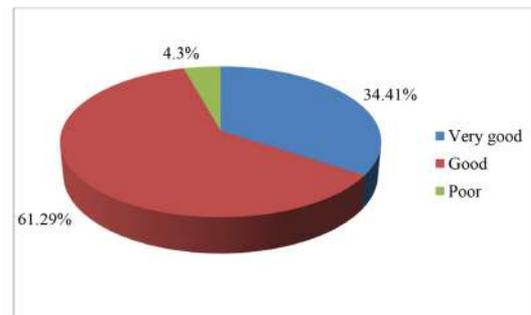


Fig. 8 Opinion

The representation on rating of stock market awareness programmes depicts that 34.41% and 61.29% of people opinioned as very good and good respectively. 4.3% have expressed that the awareness programmes conducted was poor.

IX. FINDINGS

A. Majority (38%) of the people are becoming aware of stock market through financial advisors and 14% through social media.

B. Most (74%) of people have preferred stocks or shares as investment instruments and a least i.e. only 2% have made investment on bonds

C. 38% of people have held their investment for above 5 years and least i.e. 12% have made stock market

investment for 1-3 years.

D. 32% of common people have made the stock market investment with the motive of retirement savings and only 18% have held the investment for enjoying tax savings.

E. Most (84%) of people are opinioned that the encouragement for stock market investment shall be initiated from the young age.

F. 89% of the people have expressed that income has a great influence on investment and 7% have expressed their disagreement as they are hold gold investment instead of stock market investment.

G. 68% of the people are attending webinars for having awareness programmes and only 3% use printed materials.

H. 95.7% of the people have rated the awareness programmes as satisfied and a least of 4.3% have expressed that such programmes held as poor.

X. SUGGESTIONS

A. Integrate financial education in curriculum by adding stock market basics as syllabi and collaborate platforms like NSE Academy or Zerodha Varsity for certified programmes

B. Encourage use of virtual trading platforms like NSE Paasthala, Moneybhai and use of YouTube, Instagram to spread simplified investing content also launch mobile apps or chatbots.

C. Conduct awareness campaigns in regional language and special programmes for women or small earners.

XI. CONCLUSION

The study titled with stock market awareness and participation conducted at Kottakkal municipality has been concluded that most of people as samples have share market investment and are approaching financial advisors as source of awareness. The stock market investment is held by most of people with motive of retirement savings. Webinars are mostly accepted method for acquiring knowledge about the stock market for further investment. The income level of people has a significant influence on stock market investment and most of people are highly satisfied with the conduct of awareness programmes and stock market investment shall be encouraged from the young age.

ACKNOWLEDGEMENT

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A Study on Changing Consumer Buying Behaviour with the Advent of Quick Commerce

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Abstract— With the advent of Quick Commerce platforms there has been a significant shift in the consumer decision making process. As the speed and easy accessibility makes consumers do unplanned purchases. This study analyses the factors that influence consumers to choose quick commerce over traditional stores. This research delves into the cognitive buying behaviour of consumers based on descriptive factors like age, gender, income etc. The key findings of the study reveals how faster delivery, product variety, and convenience contributes significantly to the rapid growth of quick commerce. The study also analyses the challenges in using quick commerce platforms.

Keywords— Quick Commerce, Consumer decision making, Cognitive buying behaviour, Challenges of quick commerce.

I. INTRODUCTION

The retail landscape has been undergoing a major shift in consumer buying behaviour with the advent of quick commerce that ensures delivery within minutes. With the busy lifestyle & digital transformation quick commerce has turned into a way of convenience especially in urban areas. This study analyses how the quick commerce platform influences consumer buying behaviour along with its challenges. By analysing the demographic factors, usage, and consumer perceptions this research tries to cover the major motives behind adopting quick commerce as compared to traditional platforms. Especially, the COVID-19 acted as the main driving force to adopt and extensively use the quick commerce platforms as due to lockdowns consumers relied more on online platforms and quick home deliveries—commerce relies more on dark stores, local logistic networks, a technology – driven inventory system. The study analyses the behavioural and psychological buying patterns in qcommerce system.

II. OBJECTIVES

- To identify the factors that influence consumers to choose quick commerce platforms over traditional platforms.
- To analyse if there is any significant relationship between gender and the frequency of using quick commerce platform.
- To analyse various challenges in using quick commerce.

III. RESEARCH METHODOLOGY

A. Research Design & Statistical tool

The study adopts descriptive research design & Chi-square test is used as statistical tool.

B. Population & Sampling Methodology

The population selected for the study comprises consumers from Bangalore due to the significant presence of quick commerce platforms there. The population selected for the study comprises consumers from Bangalore due to the significant presence of quick commerce platforms there. The sample size used for the study is 50.

C. Limitations

1. **SAMPLE SIZE:** The sample size used for the study is just 50 and it may not represent the entire population.
2. **Regional Focus:** The study is based on the population from Bangalore only.
3. The study did not include long-term follow up.

III. LITERATURE REVIEW

1. Harshit Sharma, Understanding the Shopping Behaviour of Consumers towards FMCG Sector in shopping malls and Quick Commerce, INTERANTIONAL

JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT, November, 2022, DOI: 10.55041/IJSREM16863: The research focused on FMCG sector navigating how consumers analyse the market seeking better deals both in online and offline, evolving mall experience in quick commerce.

2. Alice Harter, Lucas Stich, Martin Spann, and The Effect of Delivery Time on Repurchase Behaviour in Quick Commerce, Journal of Service Research, and March 4, 2024: This study analyses how the quick commerce, the minute’s delivery influences consumers to repurchase through a food-delivery service.

3. Vignesh, M Mano, Patel, FenilPramodhbhai, and Factors influencing quick commerce in India, 2022: This study analyses how COVID-19 has significantly changed the consumer buying behaviour which shifted from price sensitivity to quality and convenience preference. From planned and refrained purchase to impulse buying and indulgence; from traditional stores to e-commerce through accelerated mobile and digital adoption. The quick commerce market started with new-age companies like Zomato backed Blinkit, SwiggyInstamart, and Zepto. Still, traditional companies like Reliance (Dunzo) and Tata (Big basket now) have also established their presence recently in this segment. Quick commerce clocked in 20% - 25% more sales than e-commerce over the last year and is expected to reach 5 billion USD value in 2025 from the current 0.3 billion USD. We would like to understand, through the CCS coursework, the factors influencing the shift in consumer preferences towards quick commerce.

4. Ganapathyet.al (2023) states that the online grocery sector’s rapid growth is demanding business models to optimise emphasising the importance of customer-centric strategies, inventory management, and delivery excellence. The study founded that the diverse Indian market could have multiple business models with the requirement of innovative revenue strategies for long term sustainability.

5. Mr VenkateshGanapathyet.al (2023) states that the rise of quick commerce in India's grocery sector, accelerated by the pandemic, offers great potential due to convenience and speed. However, profitability now requires more than just delivery fees, with a focus on cost control, efficient fund management, and diversification of revenue sources. This research highlights the need for consolidation and identifies key success factors for long-term sustainability.

6. Dr.Vandana Thakur (2022) states that India's e-commerce sector is rapidly expanding, driven by increased internet access, affordable smart phones, and the digital transformation spurred by 4G services. This growth is fuelled by the country's large user base, but e-commerce companies face fierce competition, requiring continuous adaptation. The study explores the evolution and future expansion of e-commerce in India.

7. MatthieuSchorung (2024) states that the new players like dark stores, micro-hubs are driving the quick commerce. This study analyses the supply chain of quick commerce by giving importance to the logistics structure, and the transport intensive nature of dark stores.

8. Claudia Archetti (2021) states that in the e-commerce era, vendors face challenges with fulfilling numerous small, time sensitive orders. New strategies and technologies are emerging to address Routing and Inventory Routing problems, including issues with release dates, crowd shipping, and inventory management. This study reviews relevant literature and suggests future research directions in these areas.

9. Alice Harter (2024) states that "Quick commerce" delivers products within minutes of online orders. This study reveals that late deliveries increase time between purchases, while early deliveries decrease it. Late deliveries impact repurchases behaviour more than early ones, with customer satisfaction mediating these effects. Findings help optimize delivery strategies and service recovery efforts in quick commerce.

10. Luna Sanchez, Pedro (2024) states that perceived usefulness, ease of use, information quality, and interface strongly impact buying behaviour. But, interaction quality had less importance showcasing the dynamic behaviour of quick commerce.

IV. FIGURES AND TABLES

TABLE I

SHOWING FREQUENCY OF USING QCOMMERCE PLATFORMS

FREQUENCY	NO.OF RESPONDENTS	PERCENTAGE
ALWAYS	23	46%
SOMETIMES	24	48%
RARELY	3	6%

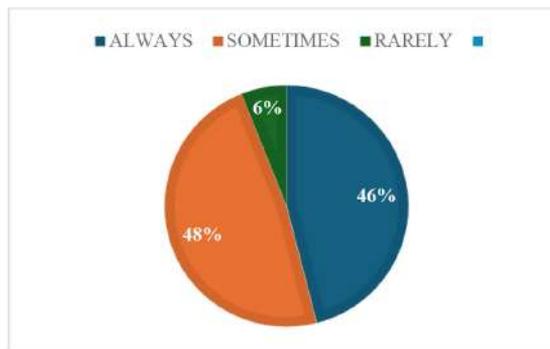


Fig. 1 Shows frequency of using quick commerce

TABLE II
SHOWING FACTORS INFLUENCING QCOMMERCE PURCHASES

FACTORS	NO. OF RESPONDENTS	PERCENTAGE
TIME SAVING	37	74%
MORE OPTIONS AVAILABE	24	48%
EASY ACCESSIBILITY	34	68%
OFFERS	15	30%
OTHERS	2	4%

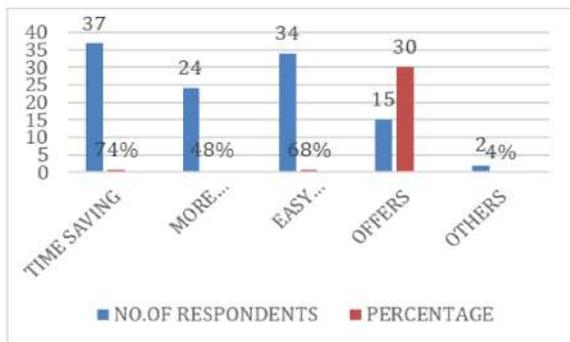


Fig. 2 Shows factors influencing usage of quick commerce

TABLE III
SHOWING SATISFACTION LEVEL OF USING QCOMMERCE

SATISFACTION LEVEL	NO. OF RESPONDENTS	PERCENTAGE
HIGHLY SATISFIED	17	34%
SATISFIED	32	64%
NOT SATISFIED	1	2%

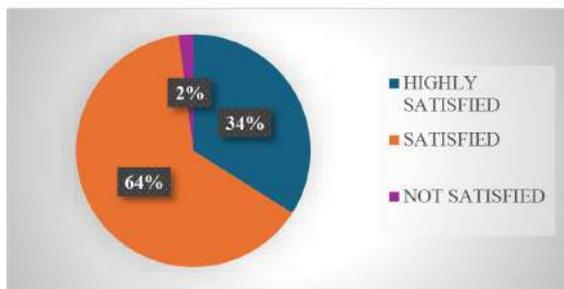


Fig.3 Shows satisfaction level of using qcommerce

TABLE IV
SHOWING FREQUENTLY PURCHASED ITEM THROUGH QCOMMERCE

ITEMS	NO. OF RESPONDENTS	PERCENTAGE
GROCERIES	42	84%
SNACKS/ BEVERAGES	31	62%
MEDICINES	4	8%
PERSONAL CARE PRODUCTS	17	34%
ELECTRONICS	1	2%
OTHERS	1	2%

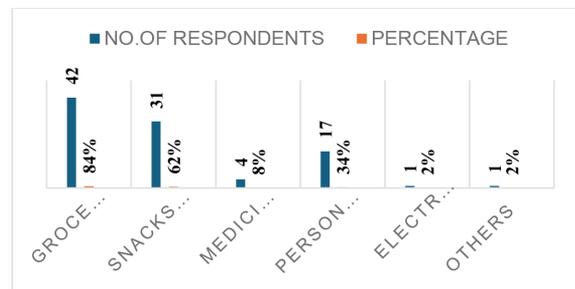


Fig.4 Shows frequently purchased item through qcommerce

TABLE V
SHOWING FACTORS INFLUENCED TO CHOSE QCOMMERCE

FACTORS/RATINGS	1	2	3	4	5
SPEED	2	0	3	17	21
PRODUCT AVAILABILITY	2	2	18	17	12
OFFERS & DISCOUNTS	4	7	15	17	9
USER FRIENDLY APP	2	3	14	20	9
BRAND VARIETY	2	3	17	15	10
CONVENIENT	2	2	11	16	19

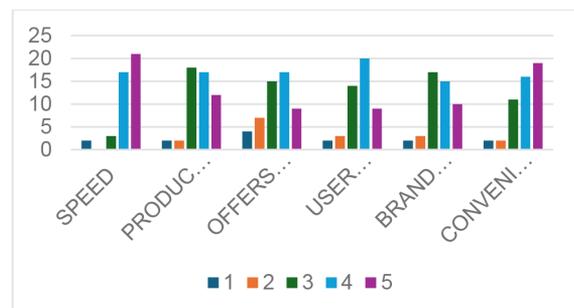


Fig.5 Shows factors that influenced most to use qcommerce

TABLE VI
SHOWING THE FACTORS WHICH FELT IMPORTANT WHILE SHOPPING THROUGH QCOMMERCE

FACTORS/RATINGS	1	2	3	4	5
TRUSTED BRAND	4	2	4	27	14
PRODUCT QUALITY	4	2	10	18	14
DISCOUNT	3	5	17	19	6
DELIVERY TIME	4	1	6	18	24
PAST EXPERIENCE WITH BRAND	4	1	13	19	11
PACKAGING QUALITY	4	2	17	12	15

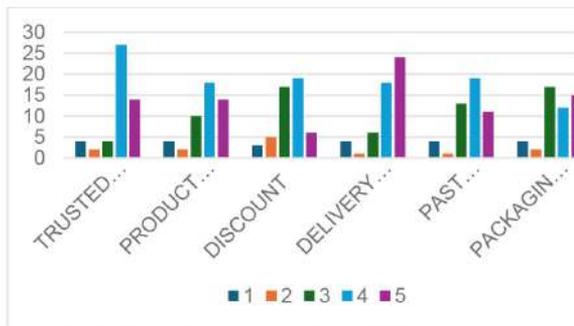


Fig. 6 Shows factors respondents felt important

TABLE VII
SHOWING RESULTS OF UNPLANNED PURCHASES

OPTIONS	NO.OF RESPONDENTS	PERCENTAGE
FREQUENTLY	9	18%
SOMETIMES	30	60%
RARELY	7	14%
NEVER	4	8%

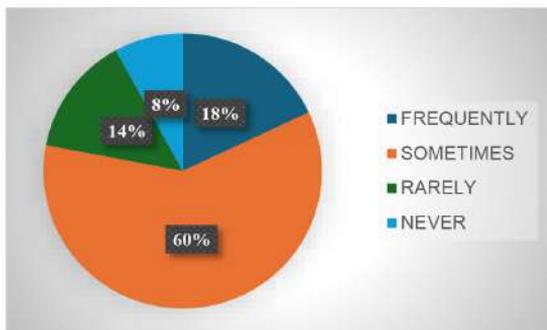


Fig.7 Shows frequency of making unplanned purchases

TABLE VIII
SHOWING FREQUENCY OF UNPLANNED PURCHASES

OPTIONS	NO.OF RESPONDENTS	PERCENTAGE
FREQUENTLY	9	18%
SOMETIMES	30	60%
RARELY	7	14%
NEVER	4	8%

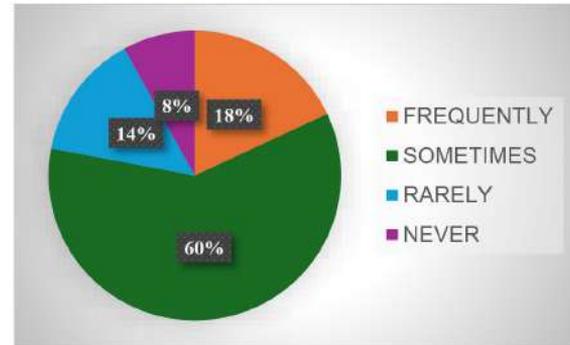


Fig. 8 Showing frequency of unplanned purchases

TABLE IX
SHOWING PROBLEMS FACED IN USING QUICK COMMERCE

PROBLEMS	NO.OF RESPONDENTS	PERCENTAGE
PRODUCT AVAILABILITY	28	56%
HIGHER PRICES	18	36%
LATE DELIVERY	12	24%
WRONG PRODUCT	7	14%
DAMAGED ITEM	16	32%
MISSING ITEM	9	18%
APP GLITCHES	13	26%
POOR CUSTOMER SUPPORT	13	26%
NO ISSUES SO FAR	9	18%

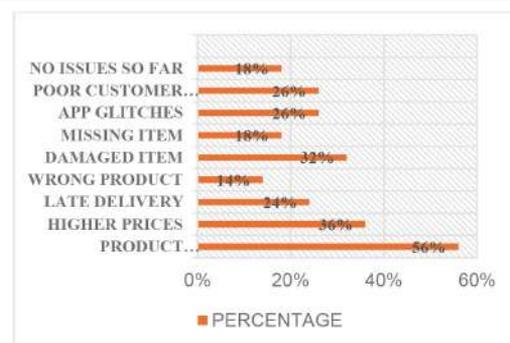


Fig. 9 Showing issues faced through qcommerce

TABLE X
SHOWING SITUATIONS RESPONDENTS PREFER TRADITIONAL STORES OVER QCOMMERCE

SITUATIONS	NO.OF RESPONDENTS	PERCENTAGE
BULK PURCHASES	25	50%
FESTIVE TIME	29	58%
PRICE COMPARISON	17	34%
PRODUCT INSPECTION	21	42%
ALWAYS PREFER QCOMMERCE	6	12%
CAN'T SPECIFY	2	4%

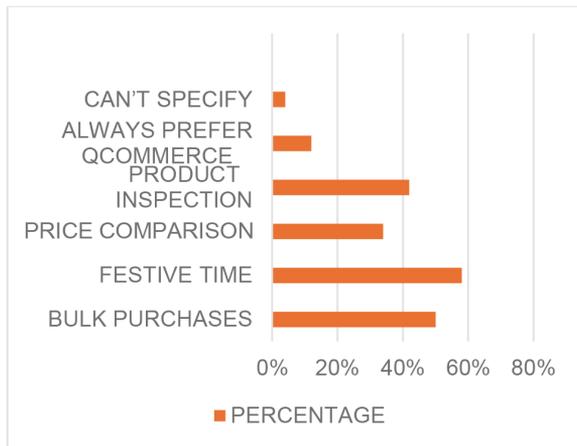


Fig. 10 Showing preference for traditional stores over qcommerce

TABLE XI
SHOWING THE AMOUNT RESPONDENTS SPEND PER ORDER

AMOUNT	NO.OF RESPONDENTS	PERCENTAGE
LESS THAN Rs.200	4	8%
Rs.200-500	32	64%
Rs.501-1000	6	12%
ABOVE Rs.1000	8	16%

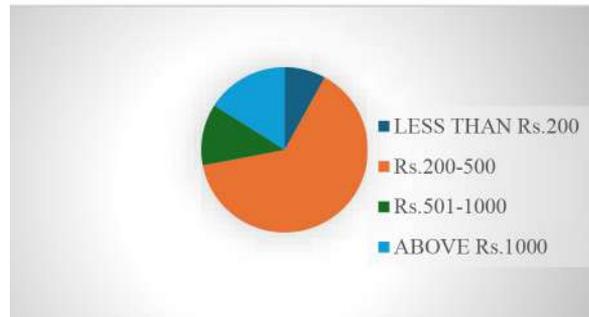


Fig. 11 Showing spending on qcommerce platforms

TABLE XII
SHOWING IF RESPONDENTS FEEL QCOMMERCE LEADS TO OVERSPENDING

OPTIONS	NO.OF RESPONDENTS	PERCENTAGE
STRONGLY AGREE	13	26%
AGREE	21	42%
NEUTRAL	10	20%
DISAGREE	6	12%
STRONGLY DISAGREE	0	0%

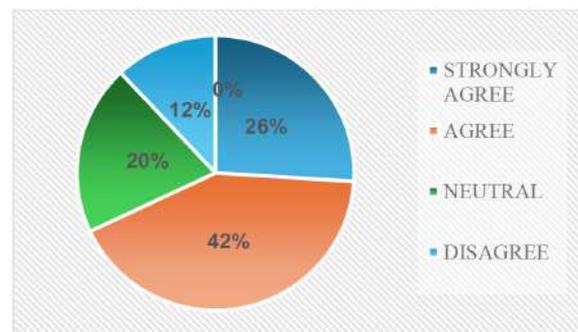


Fig. 12 Showing if respondents feel qcommerce leads to overspending

TABLE XIII
SHOWING THE LIFESTYLE INFLUENCE ON QCOMMERCE

LIFESTYLE	NO.OF RESPONDENTS	PERCENTAGE
HECTIC WORK	20	40%
CONVENIENCE	15	30%
LESS PROXIMITY TO STORES	13	26%
BROWSING	2	4%

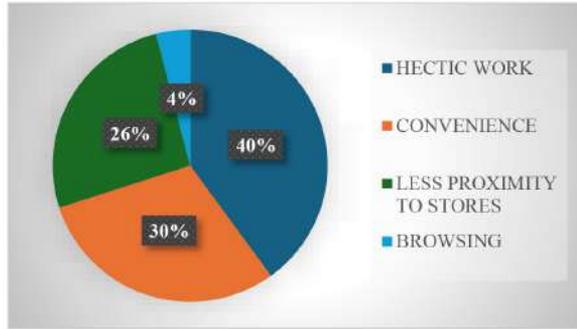


Fig. 13 Showing lifestyle influence on qcommerce preference

TABLE XIV

SHOWING RESPONDENTS COMPARE PRICES BETWEEN QUICK COMMERCE PLATFORMS

OPTIONS	NO.OF RESPONDENTS	PERCENTAGE
ALWAYS	25	50%
SOMETIMES	23	46%
NEVER	2	4%

Fig. 14 Showing respondents comparing prices on qcommerce platforms

V. CHI SQUARE TEST

To test if there is any significant relationship between gender and the frequency of using quick commerce platforms. Null Hypothesis: There is no significant relationship between gender and the frequency of using quick commerce platform. Alternate Hypothesis: There is significant relationship between gender and the frequency of using quick commerce platform.

TABLE XV
Observed Frequency Table:

GENDER/USAGE FREQ.	MALE	FEMALE
ALWAYS	9	14
SOMETIMES	10	14
RARELY	2	1

TABLE XVI
Expected Frequency Table:

GENDER/USAGE FREQ.	MALE	FEMALE
ALWAYS	9.66	13.34
SOMETIMES	10.08	13.92
RARELY	1.26	1.74

TABLE XVII
Showing Calculated Value

O	E	O-E	(O-E)^2	(O-E)^2/E
9	9.66	(0.66)	0.4356	0.045
14	13.34	0.66	0.4356	0.0327
10	10.08	(0.08)	0.0064	0.0006
14	13.92	0.08	0.0064	0.0005
2	1.26	0.74	0.5476	0.4346
1	1.74	(0.74)	0.5476	0.3147
			TOTAL	0.8281

CALCULATED VALUE = 0.8281

TABLE VALUE = 9.488

DECISION:

Since, the calculated value is less than table value, accept the null hypothesis and reject alternate hypothesis. This means that there is no significant relationship between gender and the frequency of using quick commerce platform.

VI. DISCUSSIONS

- Time saving (74%), easy accessibility (68%), and more product options (48%) are major motivators. Impulse buying is common — 60% sometimes make unplanned purchases, and 18% do so frequently.
- Most respondents use quick commerce platforms to purchase groceries (84%) and snacks/beverages (62%), followed by personal care products (34%). Purchases of medicines (8%) and electronics (2%) are relatively rare, indicating that daily essentials dominate usage on these platforms.
- A majority of respondents (64%) are satisfied with quick commerce platforms, while 34% are highly satisfied. Only 2% are not satisfied, indicating an overall positive user experience and high satisfaction levels with these services.
- The key factors driving purchases through quick commerce platforms is time saving (74%), easy accessibility (68%), and availability of more options (48%). While offers motivate 30% of users, other reasons like being too occupied or seeking quick delivery were mentioned by only a few (2%). This indicates that convenience and efficiency are the primary motivators for users shifting from traditional stores to quick commerce platforms.
- 46% of respondents reported that they "Always" use quick commerce platforms for making purchases, indicating a strong dependence and regular use of these services. 48% mentioned they use these platforms "Sometimes," suggesting that while they find the services useful, their usage may be

- occasional or need-based. Only 6% of the respondents said they "Rarely" use such platforms, indicating a small segment of users who either prefer traditional shopping methods or have limited exposure to quick commerce. A combined 94% of respondents use quick commerce platforms either regularly or occasionally, reflecting a significant penetration and acceptance of these platforms in consumer behaviour.
- 50% of users always compare prices between quick commerce platforms before placing an order, while 46% do so sometimes, and only 4% never compare. This indicates that price sensitivity is high, with nearly all users engaging in some form of price comparison to find the best deal.
 - Most users (64%) spend Rs.200–500 per order. 46% use quick commerce always, and 48% use it sometimes, showing high engagement.
 - 58% have returned or complained about a product. Top issues: Product availability (56%), damaged items (32%), higher prices (36%), and poor customer support (26%).
 - The most common challenge user's face with quick commerce platforms is product availability (56%), followed by higher prices (36%) and damaged items (32%). Other notable issues include late delivery (24%), app glitches (26%), and poor customer support (26%). Only 18% reported no issues, indicating that while platforms are popular, service consistency and reliability remain areas for improvement. This suggests that product issues are relatively common, highlighting the need for better quality control and customer support on such platforms.
 - A large portion of respondents (60%) admit to making unplanned purchases sometimes while using quick commerce platforms, and 18% do so frequently. Only a small number rarely (14%) or never (8%) make unplanned purchases, suggesting that impulse buying is a common behavior driven by the convenience and interface of these platforms.
 - Speed of delivery and convenience of shopping from home received the most ratings of 5 (Very important), showing they are the strongest drivers. Product availability and offers/discounts also saw many 4 and 5 ratings, indicating they significantly impact usage decisions. User-friendly app and brand variety were moderately important, with fewer high ratings.
 - The survey shows that most respondents prefer traditional shopping for festive/occasional shopping (58%), bulk purchases (50%), and product inspection (42%). Only 12% always prefer quick commerce. This indicates that traditional shopping is still favoured in situations requiring experience, volume, or physical evaluation of products.
 - 68% believe quick commerce leads to overspending, 50% always compare prices before ordering, 62% have chosen a platform just for faster delivery. Most (62%) of them have ordered through quick commerce since the product could be delivered faster than others.
 - 64% are satisfied, and 34% are highly satisfied with quick commerce platforms. Product quality" and "Delivery time" are rated as the most important factors when shopping on quick commerce platforms, with the highest responses at the top importance levels (4 and 5). "Trusted brand" and "Past experience with the product" are also significant but slightly less prioritized. "Discounted price" and "Packaging quality" are important to many users but are rated slightly lower overall. This indicates that while discounts and packaging matter, consumers primarily value quality and fast delivery on quick commerce platforms.
 - 84% of respondents believe that the convenience of shopping through quick commerce outweighs its drawbacks.
 - Chi-square test revealed no significant relationship between gender and frequency of using quick commerce platforms.

VII. RECOMMENDATIONS

- Quick commerce platforms should invest in real-time inventory tracking and demand forecasting to ensure high-demand items are consistently available.
- Platforms can introduce price-match guarantees, loyalty discounts, or personalized pricing offers to retain price-sensitive customers as 36% reported higher prices as a problem; 50% of users always compare prices.
- Implement stricter quality checks during packaging and train delivery personnel to handle items carefully. Using tamper-proof packaging can also help reduce damage and errors as 32% received damaged items; 14% received wrong products.
- Introduce effective customer helplines or AI-enabled chatbots for faster resolution. Encourage feedback through app-based post-delivery ratings to monitor service quality as 26% reported poor customer support.
- 68% felt that using quick commerce leads to overspending, adding features like spending limits, monthly budget reminders, or "are you sure?" nudges for non-essential items to promote mindful buying.
- 60% sometimes and 18% frequently make unplanned purchases, using responsible design by limiting aggressive pop-ups or auto-suggested additions at checkout. Offering a "wish list" or "buy later" option

can help users reconsider.

- Factors like product quality, brand trust, and packaging matter to users so displaying verified reviews, brand ratings, and quality assurance labels prominently in-app, better packaging and transparent seller info can increase trust.

VIII. CONCLUSION

The study provides compelling evidence that quick commerce platforms have fundamentally altered consumer buying behaviour in Bangalore, especially among working professionals and students aged 20-50. The research highlights that the overwhelming majority of respondents are frequent users of quick commerce, with convenience, time-saving, and easy accessibility emerging as the most influential factors driving this shift from traditional retail. The data also reveals a high level of satisfaction among users, with 98% expressing satisfaction or high satisfaction, and groceries and snacks being the most commonly purchased items. Popular platforms like Swiggy Instamart, Zepto, and Blinkit dominate the market, reflecting intense competition and consumer openness to trying different services. The study also uncovers that income level has some correlation with usage frequency, but the appeal of quick commerce transcends income brackets, indicating its widespread acceptance. However, the research acknowledges limitations, such as a relatively small and region-specific sample size, which suggests the need for broader studies to generalize findings. Overall, the findings underscore that quick commerce is not just a passing trend but a significant, consumer-driven evolution in retail, characterized by a demand for speed, variety, and user-friendly experiences. As quick commerce continues

to grow, addressing challenges like delivery reliability and expanding service coverage will be crucial for sustaining consumer trust and loyalty.

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Role of Sustainable Trademark on Brand Equity – A Study on Customers’ Perspective

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Abstract- This study examines customers' perceptions of sustainable trademark initiatives and their impact on brand equity, focusing on five key dimensions: brand positioning, brand loyalty, brand association, brand awareness, and perceived quality. A descriptive and explanatory research design was used, with primary data collected from 100 respondents in Thrissur District through a structured questionnaire and convenience sampling. The findings show that 75% of respondents consider sustainable trademarks to indicate environmentally friendly products, and 72% trust companies with these trademarks to have ethical business practices. Additionally, 70% of respondents report that sustainable trademarks influence their purchasing decisions, while 58% associate them with better product quality. Despite this, price sensitivity remains a barrier, as only 40% are willing to pay more for such products.

Correlation analysis using SPSS 21.0 reveals significant positive relationships between brand loyalty, brand awareness, brand association, perceived quality, and brand positioning with brand equity, with correlation values ranging from 0.501 to 0.671. These results confirm that these dimensions significantly contribute to brand equity. The study emphasizes the growing role of sustainable branding in consumer decision-making and provides valuable insights for marketers to enhance their brand equity by focusing on these key factors, especially in the context of sustainability-driven consumer behavior.

Keywords: Trademark, Trends, Innovations, Brand Positioning, Brand loyalty, Brand Association perceived quality, Brand Equity

INTRODUCTION

In recent years, sustainability has become a key concern for both consumers and businesses, driving the demand for environmentally responsible products and practices. As a result, sustainable trademarks have emerged as important indicators of a brand's commitment to environmental and ethical standards. These trademarks not only influence consumer trust but also shape

purchasing behavior and brand loyalty. Understanding customer perceptions towards sustainable trademarks is essential for companies aiming to build strong and lasting brand equity. Brand equity, which includes elements such as brand awareness, loyalty, association, positioning, and perceived quality, plays a vital role in determining a brand's overall value in the market. This study aims to explore how sustainable trademark initiatives affect these dimensions of brand equity, providing insights into the relationship between sustainability and consumer behavior.

STATEMENT OF THE PROBLEM

Despite the growing emphasis on sustainability, there is limited understanding of how consumers perceive sustainable trademark initiatives and their impact on brand equity. Many companies adopt sustainable practices but struggle to measure how these efforts influence customer trust, loyalty, and purchasing decisions. Without clear insights, businesses may fail to leverage sustainability effectively in their branding strategies. This study addresses the gap by analyzing customer perceptions and examining the relationship between sustainable trademarks and key brand equity dimensions.

OBJECTIVES

1. To analyse customers' perception towards sustainable trademark initiative.
2. To analyse and prove the significant relationship between Brand Positioning, Brand Loyalty, Brand Association, Brand awareness and perceived quality on brand equity.

HYPOTHESIS

H1: Brand loyalty has a significant relationship on brand equity.

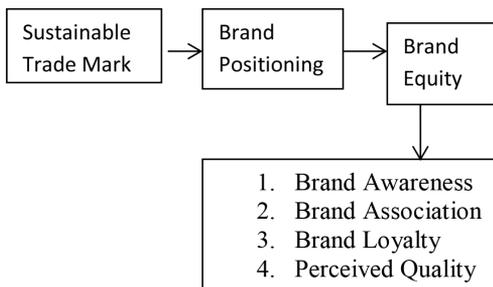
H2: Brand Awareness has a significant relationship on brand equity.

H3: Brand association has a significant relationship on brand equity.

H4: Perceived quality has a significant relationship on brand equity.

H5: Brand Positioning has a significant relationship on brand equity.

Research Model



CONCEPTUAL DEFINITIONS

Sustainable trademark serves as a visual or textual symbol indicating a brand's commitment to environmental and ethical practices. It influences brand equity by enhancing consumer trust, shaping positive brand associations, and reinforcing perceived product quality. As a result, it contributes to stronger brand loyalty, awareness, and positioning in the minds of environmentally conscious consumers.

Brand Positioning refers to the place that a brand occupies in the mind of the customer and how it is distinguished from products from competitors. Put simply, brand positioning is how your brand is perceived in relation to your competition.

Brand Equity is the commercial value that derives from consumer perception of the brand name of a particular product or service, rather than from the product or service itself.

Brand awareness relates in recognizing or recalling the brand of a certain product. Two different aspects play significant roles in the development of brand awareness: Brand recognition and Brand recalling. Brand recognition is about identifying a brand among other brands, while brand recalling entails remembering a specific brands name because of a specific product.

Brand Association The term brand association is linked to consumers' perception on a specific brand's attribute. This also means that brands with certain attributes can be easily remembered and consequently form a positive brand image.

Brand Loyalty: Consumers with a strong brand loyalty are known for repeatedly purchasing a specific brand. Thus, consumers may persuade family or friends to purchase products from the same brand as well. Therefore, it is considered an accomplishment when a brand manages to get loyal customers described this as a sign of true commitment.

Perceived quality relates to consumers' overall perception on a product's quality. The overall perception may be based on a product's specific characteristics and also on brand experiences through close acquaintances. The term was considered by Chi et al (2009, p. 136) as a consumer's subjective judgement of a brand.

RESEARCH METHODOLOGY

The present study is both descriptive and explanatory in nature and both secondary and primary data were collected and used for the study. Primary data were collected from 100 respondents residing in Thrissur District using convenience sampling method. A well-structured questionnaire is prepared for data collection. The questionnaire includes questions related to analyze the socio economic profile of the respondents and the objectives formulated for the study.

TOOLS USED FOR ANALYSIS OF DATA

The collected data were tabulated and analysed with the help of SPSS 21.0. The statistical techniques used for analysis include Correlation Analysis. The reliability of the scale of measurement used was assessed using Cronbach's Alpha coefficient, which was above the minimum acceptable level 0.7, there by confirmed the reliability of the scale of measurement used in the study.

LIMITATIONS OF THE STUDY

The study may be limited by geographical or cultural biases, as customer perceptions of trademarks and brand equity can vary significantly across different regions or cultural contexts.

II REVIEW OF LITERATURE

Several studies have examined the influence of sustainability initiatives, including sustainable trademarks, on brand equity. Smith et al. (2020) found that environmentally certified labels significantly enhance consumer trust and brand loyalty. Patel and Singh (2021) emphasized that higher levels of environmental education positively impact consumers' perception of sustainable brands. Johnson (2021) explored demographic influences, revealing that younger and higher-income consumers are more responsive to sustainable trademarks. Lee et al. (2022) highlighted the importance of community involvement in reinforcing brand image and consumer loyalty in the context of sustainability. Williams and Carter (2021) reported that brand awareness and peer influence are critical in shaping sustainable brand preferences. Brown

(2020) argued that intrinsic motivation, such as personal values, has a stronger impact on sustainable brand loyalty than external branding efforts. Zhao et al. (2023) showed that socio-demographic factors, including education and location, influence perceptions of sustainable brand quality. Harris (2022) discussed how perceived product quality is enhanced by visible sustainable trademarks, strengthening brand equity. Robinson and Taylor (2023) concluded that local sustainability programs improve consumer engagement with sustainably branded products. Finally, Allen and Brooks (2021) demonstrated that sustainable brand positioning directly affects consumers' purchase intentions and long-term loyalty. A growing body of research highlights the critical role of sustainable branding, brand positioning, and brand associations in shaping brand equity and consumer behavior. Keller (1993), in his foundational work, conceptualizes Customer-Based Brand Equity (CBBE) and underscores brand associations—comprising attributes, benefits, and attitudes—as central to building strong brand perceptions and loyalty. Complementing this, Aaker (1991) identifies brand associations as a key component of brand equity, emphasizing their strategic role in influencing consumer decision-making and reinforcing brand value. In terms of positioning, Saqib (2019) reviews five decades of literature and finds that brand positioning is fundamentally tied to competitive advantage and consumer perception, though lacking a universal definition. Iyer and Davari (2018) further establish that positioning strategies mediate the relationship between market orientation and brand performance, especially in B2B contexts. Gul et al. (2021) confirm these findings in the fashion sector, showing that market orientation enhances brand performance through effective positioning strategies. Meanwhile, Ghobbe and Nohekhan (2023) demonstrate that green marketing strategies—such as eco-friendly products and ethical promotions—significantly enhance perceived brand quality, which is a major driver of brand equity. In a similar vein, Nohekhan and Barzegar (2024) find that green marketing also boosts brand awareness, a crucial element of equity. Ahmad et al. (2021) and Su & Tong (2015) both show how brand personality traits, including innovation and sincerity, foster brand trust, attachment, and loyalty, which in turn build equity. Avis et al. (2012) and Louis & Lombart (2010) deepen the understanding of brand relationships by exploring how personality and emotional attachment drive commitment and trust. Brand loyalty has been widely studied due to its strategic importance in sustaining competitive advantage and customer retention. Cengiz and Akdemir-Cengiz (2016) conducted a comprehensive review of 140 empirical studies from 2001 to 2015, identifying three primary approaches to measuring brand loyalty: behavioral, attitudinal, and a combined multi-domain approach. Their findings highlight a growing preference for the multi-domain perspective, which better captures the complexity of consumer-brand relationships by integrating both behavior

and emotional commitment. Similarly, Sari, Artha, and Hadi (2020) synthesized 22 scholarly articles and found that brand loyalty is significantly influenced by customer satisfaction, emotional attachment, trust, and perceived value. They argue that both attitudinal and behavioral dimensions are critical, and marketers must address both to effectively cultivate loyal consumers. Together, these studies emphasize that modern brand loyalty research increasingly favors holistic, multidimensional models that consider psychological, emotional, and behavioral factors. Altogether, these studies collectively affirm that sustainable branding, thoughtful positioning, and strong brand associations are essential for cultivating long-term brand equity and competitive differentiation and also collectively support the view that sustainable trademarks positively influence multiple dimensions of brand equity.

III. RESULT AND DISCUSSION

Test of Reliability

The reliability of the instrument used in the study was tested by computing Cronbach's Alpha (α) value for each of the five variables as well as for the entire set. The test result is presented in the Table 1.1.

Table 1.1 Test of reliability

Sl. No.	Variables	No of items	Cronbach's Alpha (α)
1	Brand Positioning	6	0.800
2	Brand Equity	8	0.874
3	Brand Awareness	6	0.782
4	Brand Association	4	0.843
5	Brand Loyalty	6	0.901
6	Perceived Quality	5	0.845
7	Customers' Perception	5	0.876
	Total	40	0.956

Table 2 : Customers' Perception towards sustainable trademark initiative

Question	Strongly Disagree (1)	Dis-agree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
I believe that products with a sustainable trademark are more environmentally friendly.	3 (3%)	7 (7%)	15 (15%)	40 (40%)	35 (35%)

I trust companies with sustainable trademarks to have ethical business practices.	4 (4%)	6 (6%)	18 (18%)	38 (38%)	34 (34%)
I am willing to pay more for products with a sustainable trademark.	12 (12%)	18 (18%)	30 (30%)	25 (25%)	15 (15%)
I think sustainable trademarks influence my purchasing decisions.	2 (2%)	8 (8%)	20 (20%)	42 (42%)	28 (28%)
I believe that the presence of a sustainable trademark guarantees better product quality.	5 (5%)	12 (12%)	25 (25%)	38 (38%)	20 (20%)

(Source: Primary Data)

The survey results indicate a generally positive perception of sustainable trademarks among customers. A significant majority (75%) of respondents believe that products with a sustainable trademark are more environmentally friendly, showing strong recognition of the environmental benefits associated with sustainable products. Additionally, 72% of respondents trust companies with sustainable trademarks to have ethical business practices, reflecting a high level of confidence in the integrity of these companies. However, when it comes to willingness to pay more for such products, only 40% of respondents strongly agree, suggesting that price sensitivity remains a barrier for a larger commitment to sustainable consumption. In terms of purchasing decisions, 70% of respondents acknowledge that sustainable trademarks influence their buying choices, highlighting the growing importance of sustainability in consumer behavior. Lastly, 58% of participants believe that a sustainable trademark guarantees better product quality, linking sustainability with higher standards in their minds. Overall, while there is strong support for sustainable trademarks,

TESTING OF HYPOTHESIS

Correlation between Brand Loyalty and Brand Equity

		Brand Loyalty	Brand Equity
Brand Loyalty	Pearson Correlation	1	.532**
	Sig. (2-tailed)		.000
	N		100
Brand Equity	Pearson Correlation	.532**	1
	Sig. (2-tailed)	.000	
	N	100	

** . Correlation is significant at the 0.01 level (2-tailed).

From the above statistical results it is inferred that Customers Brand Loyalty and Brand equity are positively correlated each other (0.532). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between Brand Loyalty and Brand Equity. Hence, the first hypothesis formulated for the study, Brand loyalty has a significant relationship on brand equity is accepted.

Correlation between Brand Awareness and Brand Equity

		Brand Awareness	Brand Equity
Brand Awareness	Pearson Correlation	1	.501*
	Sig. (2-tailed)		.000
	N		100
Brand Equity	Pearson Correlation	.532**	1
	Sig. (2-tailed)	.000	
	N	100	

** . Correlation is significant at the 0.01 level (2-tailed).

From the above statistical results it is inferred that Customers Brand Awareness and Brand equity are positively correlated each other (0.501). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between Brand Awareness and Brand Equity. Hence, the second hypothesis formulated for the study, Brand Awareness has a significant relationship on brand equity is accepted.

Correlation between Brand Association and Brand Equity

		Brand Association	Brand Equity
Brand Association	Pearson Correlation	1	.671* *
	Sig. (2- tailed)		.000
	N		100
Brand Equity	Pearson Correlation	.671**	1
	Sig. (2- tailed)	.000	
	N	100	

** . Correlation is significant at the 0.01 level (2-tailed).

From the above statistical results it is inferred that Customers Brand Association and Brand equity are positively correlated each other (0.671). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between Brand Association and Brand Equity. Hence, the third hypothesis formulated for the study, Brand Association has a significant relationship on brand equity is accepted.

Correlation between Perceived Quality and Brand Equity

		Perceived Quality	Brand Equity
Perceived Quality	Pearson Correlation	1	.544* *
	Sig. (2- tailed)		.000
	N		100
Brand Equity	Pearson Correlation	.544**	1
	Sig. (2- tailed)	.000	
	N	100	

** . Correlation is significant at the 0.01 level (2-tailed).

From the above statistical results it is inferred that Perceived Quality and Brand equity are positively correlated each other (0.544). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between Perceived Quality and Brand Equity. Hence, the fourth hypothesis formulated for the study, Perceived Quality has a significant relationship on brand equity is accepted.

Correlation between Brand Positioning and Brand Equity

		Brand Positioning	Brand Equity
Brand Positioning	Pearson Correlation	1	.556* *
	Sig. (2- tailed)		.000
	N		100
Brand Equity	Pearson Correlation	.556**	1
	Sig. (2- tailed)	.000	
	N	100	

** . Correlation is significant at the 0.01 level (2 -tailed).

From the above statistical results it is inferred that Brand Positioning and Brand equity are positively correlated each other (0.556). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between Brand Positioning and Brand Equity. Hence, the fifth hypothesis formulated for the study, Brand Positioning has a significant relationship on brand equity is accepted.

FINDINGS

- 75% of respondents believe that products with a sustainable trademark are more environmentally friendly, showing strong recognition of environmental benefits.
- 72% trust companies with sustainable trademarks to have ethical business practices, indicating confidence in the integrity of these companies.
- 40% of respondents are willing to pay more for products with a sustainable trademark, while 70% show some level of willingness, highlighting price sensitivity as a barrier.
- 70% of respondents acknowledge that sustainable trademarks influence their purchasing decisions, reflecting the growing importance of sustainability in consumer behavior.
- 58% of respondents believe that a sustainable trademark guarantees better product quality, linking sustainability with higher standards.
- These findings suggest positive customer perceptions of sustainable trademarks, though price and quality concerns remain significant factors influencing behavior.
- The correlation analysis shows that Customers Brand Loyalty and Brand equity are positively correlated each other (0.532).

- The correlation analysis shows that Customers Brand Awareness and Brand equity are positively correlated each other (0.501).
- The correlation analysis shows that Customers Brand Association and Brand equity are positively correlated each other (0.671).
- The correlation analysis shows that Perceived Quality and Brand equity are positively correlated each other (0.544).
- The correlation analysis shows that Brand Positioning and Brand equity are positively correlated each other (0.556).

CONCLUSION

The study aimed to analyze customers' perception toward sustainable trademark initiatives and assess their impact on brand equity across the dimensions of brand positioning, brand loyalty, brand association, brand awareness, and perceived quality. The findings revealed that most respondents perceive sustainable trademarks positively, linking them with environmental responsibility, ethical practices, and improved product quality. This positive perception significantly influences consumer behavior, including trust and purchase decisions. Correlation analysis confirmed all five hypotheses, showing significant positive relationships between each brand equity dimension and overall brand equity, with brand association having the strongest correlation. Despite these positive views, price sensitivity remains a limiting factor, as not all consumers are willing to pay more for sustainably branded products. Overall, the study concludes that customers' favorable perceptions of sustainable trademarks play a crucial role in enhancing brand equity, making sustainability a strategic advantage for brands.

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HR Burnout: Causes, Consequences And Coping Strategies

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Abstract

Human resources (HR) experts play an important role in managing workplace relationships, employee well-being, and organisational performance. However, the rigorous nature of their work, which includes emotional labour and heavy workloads, frequently leads to burnout, affecting their physical and mental health as well as job performance. This research investigates the causes of HR burnout, including excessive effort and emotional strain, as well as its repercussions, such as decreased productivity and high turnover rates. It also assesses coping techniques, particularly work-life balance programs and technological integration, in minimising burnout. According to research, flexible work arrangements and AI-driven solutions dramatically reduce stress, improve efficiency, and increase retention. Implementing these techniques can help organisations develop a healthy work environment, assuring the well-being of both HR professionals and long-term organisational performance.

INTRODUCTION

HR professionals play an important role in managing workplace relationships, employee well-being, and organisational performance. However, the rigorous nature of their employment frequently results in high levels of stress and exhaustion. Balancing administrative responsibilities with personnel management, resolving workplace problems, and achieving organisational standards can all add up over time. This affects not just their emotional and physical health, but also their entire job performance and productivity. To solve these problems, businesses are looking at new ways to support HR workers, such as flexible work practices and the use of technology to speed processes. Finding effective stressmanagement measures and maintaining work-life balance is critical to guaranteeing employee happiness and corporate productivity. This paper examines the underlying causes of HR burnout, its impact on well-being and job performance, and how coping strategies like

worklife balance initiatives and technology integration can help create a healthier work environment.

REVIEW OF LITERATURE:

EMOTIONAL LABOR

Rivers (2019). "Navigating emotion in HR work: caring for ourselves?" delves into the emotional problems that HR professionals encounter, as well as the significance of self-care in managing workplace stress. The study emphasises how HR professions require significant emotional labour, as professionals must balance organisational goals and employee wellbeing. It highlights the psychological toll of dealing with confrontations, terminations, and grievances, which can lead to burnout if not properly managed. The report emphasises selfcare strategies for emotional resilience, such as setting boundaries, seeking peer support, and engaging in reflective activities. Finally, Rivers calls for organisations to acknowledge HR workers' emotional burdens and establish measures that promote their mental health.

Kulik et al. (2009) explored the topic "HR managers as toxin handlers: The buffering effect of formalizing toxin handling responsibilities." The authors investigate the role of HR managers as poison handlers—people who absorb workplace stress, conflicts, and negativity to safeguard employees and the organization. According to the report, dealing with layoffs, conflicts, and grievances causes emotional pressure for HR workers. However, formalising toxin-handling responsibilities (e.g., through policy, training, and organisational support) aids in burnout prevention by giving structure and minimising emotional stress. The authors emphasise that organisations should recognise this hidden load and create ways to help HR professionals be effective without jeopardising their well-being.

HIGH WORKLOAD

Ferrer, J., Saville, K., & Pyman, A. (2024). "The HR professional at the centre of extreme work: working intensely?" This study looks into the incidence of 'extreme work' among HR professionals, which is defined by long hours, high demands, and stressful working conditions. The authors discovered that HR professionals frequently operate under harsh conditions, which leads to increased stress and burnout. The study emphasises the necessity for organisations to recognise these difficulties and implement initiatives to reduce burnout among HR staff.

Kelly (2022) "98% Of HR Professionals Are Burned Out." This study cites a research that found 98% of HR professionals experience burnout, which is caused by increased workloads, emotional strain, and a lack of organizational support. The essay highlights how the COVID19 epidemic increased HR stress, as professionals dealt with layoffs, distant work issues, and employee well-being. Many HR professionals feel unappreciated and overloaded, resulting in tiredness and high turnover rates. Kelly emphasises the critical necessity for organisations to prioritise HR well-being by decreasing workloads, offering mental health tools, and recognising employees' contributions. Without intervention, burnout can lead to decreased HR effectiveness and retention concerns in organisations.

PHYSICAL AND MENTAL HEALTH ISSUES

Pirrolas, O. A. C., & Correia, P. M. A. R. (2024). "Human Resources' Burnout". The discussion dives into the history, causes, consequences, and coping approaches for burnout in human resources. It synthesises previous knowledge to explain burnout syndrome, emphasising how prolonged occupational stress causes physical and emotional weariness in HR professionals. The study emphasises the necessity of recognising burnout and developing effective therapies.

Edú-Valsania, S., Laguía, A., & Moriano, J. A. (2022). "Burnout: A review of theory and measurement". This comprehensive analysis looks at the theoretical foundations and measurement methods for burnout. It explores the relationship between emotional labour and burnout in a variety of professions, including HR department employees, emphasising the importance of proper evaluation methods for identifying and addressing burnout efficiently.

REDUCED JOB PERFORMANCE

Kristinsson, K., Gudmundsdottir, S., & Sigmarisdottir, E. B. (2024). "When the Caregivers Need Care: The Silent Stress of Human Resources Work." The authors investigate the often-overlooked stress experienced by HR professionals, referring to it as the "silent stress" of continually maintaining employee well-being while ignoring their own. The study demonstrates how HR tasks

require extensive emotional labour, dispute resolution, and crisis management, which can contribute to chronic stress and burnout. The authors contend that HR professionals have high expectations but receive insufficient support, leaving them vulnerable to burnout. They emphasise the importance of organisational interventions, such as structured mental health programs, peer support networks, and clearer role boundaries, in helping HR professionals manage stress and preserve their well-being.

WORK-LIFE BALANCE INITIATIVES:

Tariq, A., Aslam, H. D., Siddique, A., & Tanveer, A. (2012). "Work-life balance as a best practice model of human resource management: A win-win situational tool for the employees and organizations". This paper investigates work-life balance (WLB) as an important human resource management technique for both people and organisations. According to the study, good work-life balance policies, such as flexible work arrangements, remote work choices, and supportive workplace cultures, improve employee satisfaction, productivity, and overall health. Organisations that prioritise WLB have fewer turnover, less stress, and better performance. The authors portray WLB as a win-win paradigm in which employees attain a better balance between their professional and home lives, while organisations benefit from enhanced commitment and efficiency. The study emphasises the importance of proactive HR policies for sustaining WLB projects.

Rodríguez-Sánchez et al. (2020) "Investing time and resources for work-life balance: The effect on talent retention" emphasise the importance of work-life balance (WLB) strategies in retaining competent HR workers. The study found that heavy workloads, emotional labour, and a lack of flexibility frequently led to burnout and departure among HR employees. Organisations that invest in WLB measures, such as flexible schedules, wellness programs, and supportive leadership, foster a more sustainable work environment and reduce attrition. The authors contend that when HR workers feel valued and supported, their dedication and engagement improve, resulting in higher talent retention and overall organisational stability. Effective WLB initiatives are critical for retaining HR personnel in the long run.

TECHNOLOGY INTEGRATION

Meduri, K., et al. (2024). "Human-centered AI for personalized workload management: A multimodal approach to preventing employee burnout." The authors investigate how human-centered AI might reduce HR burnout through improved workload management. According to the report, HR workers experience significant levels of stress as a result of heavy workloads, emotional labour, and continual multitasking, which leads to burnout and diminished efficiency. The authors suggest a multimodal AI strategy that personalises task distribution, automates repetitive operations, and

provides real-time stress monitoring to better balance HR workloads. Organisations that integrate AI-driven solutions can minimise burnout risks, improve HR well-being, and increase HR talent retention, resulting in a more efficient and sustainable HR workforce.

Eubanks, B. (2022). "Artificial intelligence for HR: Use AI to support and develop a successful workforce." This paper discusses how AI may assist prevent HR fatigue by automating repetitive jobs, optimizing workload management, and offering data-driven insights to improve decision-making. The book emphasises how AI-powered solutions can handle administrative tasks, streamline recruitment, and detect burnout concerns, freeing up HR practitioners to focus on strategic and people-centric responsibilities. By decreasing manual labour and emotional strain, AI allows HR teams to work more efficiently, improve work-life balance, and improve overall well-being. Eubanks supports for AI as a support tool rather than a replacement, allowing HR workers to work in a less stressful and more productive setting.

RESEARCH DESIGN

This study is a qualitative research design through a literature review of 11 extensive studies to examine HR burnout. It explores emotional labor, high workload, physical and mental health issues, and reduced job performance, while assessing the effectiveness of worklife balance initiatives and technology integration in reducing burnout and improving wellbeing.

OBJECTIVES

- To identify the causes of HR burnout, focusing on emotional labor and high workload
- To examine the consequences of HR burnout, including its impact on physical and mental health, as well as reduced job performance
- To evaluate the effectiveness of coping strategies, such as work-life balance initiatives and technological integration, in reducing HR burnout and improving employee wellbeing.

RESULT AND DISCUSSION

The findings show that HR professionals regularly experience burnout as a result of the emotional pressures and excessive workloads connected with their jobs. The emotional strain of dealing with workplace confrontations, terminations, and grievances causes significant psychological stress, leading to weariness over time. Additionally, the obligation to combine organisational aims with employee well-being adds to the stress. The heavy effort, which includes long hours, continual problem-solving, and administrative duties, provides little room for rest, raising the danger of burnout. Many HR workers feel overburdened and unappreciated, which contributes to emotional exhaustion and job

dissatisfaction. Without effective support structures, these pressures have a significant influence on HR professionals' well-being and job performance, thus organisations must address workload challenges and emotional stressors proactively.

HR specialists often act as emotional buffers for organisations, absorbing tension from workplace conflicts and employee concerns. Rivers (2019) emphasises that emotional labour in HR professions can lead to burnout if not addressed with self-care and organisational support. Similarly, Kulik et al. (2009) argue that HR managers act as poison handlers, absorbing negativity, which might lead to increased emotional strain if their duties are not formalised with suitable procedures. In addition to emotional stress, high workloads are a major contributor to burnout. Ferrer et al. (2024) discovered that HR professionals labour under harsh conditions, which causes increased stress and weariness. Kelly (2022) echoes this, stating that 98% of HR workers experience burnout, owing primarily to onerous obligations. These findings highlight the critical necessity for organisations to identify and address HR burnout risks through methods such as workload reduction, emotional support, and organised toxin-handling procedures.

The findings show that HR burnout has serious effects for physical and emotional health, as well as overall job performance. Prolonged job stress causes emotional exhaustion, lethargy, and an increased vulnerability to anxiety and depression. HR professionals frequently experience continuous stress as a result of their emotionally demanding roles, which, if not handled, can lead to chronic burnout and poor well-being. Furthermore, the high-pressure nature of HR work has a negative impact on job performance, as emotional weariness and stress diminish focus, decision-making ability, and overall productivity. Many HR professionals struggle to maintain productivity, which leads to lower job satisfaction and engagement. Without sufficient support structures, the long-term impacts of burnout can lead to absenteeism, high turnover rates, and decreased organisational performance.

HR burnout significantly affects both well-being and job performance. Pirrolas and Correia (2024) emphasise that chronic stress causes significant mental and physical tiredness, making it critical to identify burnout early and apply preventive techniques. According to EdúValsania et al. (2022), emotional labour has a significant part in burnout, as HR professionals frequently experience chronic stress due to their job responsibilities. Additionally, Kristinsson et al. (2024) refer to this as "silent stress," in which HR professionals prioritise employee well-being while ignoring their own, resulting in poor job performance. Without assistance, burnout impairs focus, decision-making ability, and productivity, reducing organisational efficiency. To fight this, organisations must develop structured mental health programs, give peer support, and rethink work responsibilities to help HR

professionals manage stress and maintain performance.

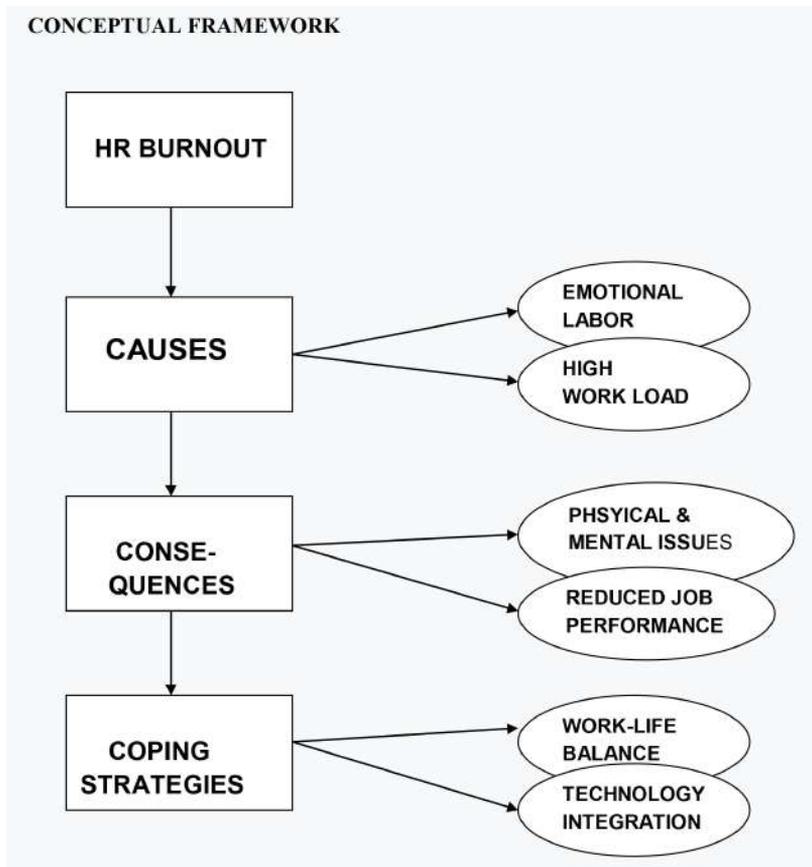
The findings show that effective coping methods, such as work-life balance programs and technology integration, are critical in reducing HR burnout and improving employee wellbeing. Work-life balance programs, such as flexible work arrangements, health initiatives, and supportive leadership, can reduce workplace stress and boost job satisfaction. HR professionals in organisations that value work-life balance report lower stress levels, increased engagement, and higher retention rates. Furthermore, incorporating AI-powered solutions reduces administrative burdens by automating repetitive operations, optimising job distribution, and enabling real-time stress monitoring. This lowers emotional exhaustion and enables HR professionals to concentrate on more strategic, people-focused responsibilities. Collectively, these measures contribute to a healthier work environment, benefiting both HR professionals' well-being and overall organisational efficiency.

Work-life balance strategies and technology integration help to reduce HR burnout. Tariq et al. (2012) argue that flexible work arrangements and supportive workplace cultures reduce stress and increase job satisfaction among HR professionals. Rodríguez-Sánchez et al. (2020) found that implementing work-life balance measures leads to increased HR retention and engagement. Along with these activities, technology plays an important role in burnout prevention. Meduri et al. (2024) demonstrate that

AI-driven workload management alleviates emotional strain by automating chores and monitoring stress levels. Eubanks (2022) adds to this by adding that AI enables HR professionals to focus on strategic duties, increasing productivity and well-being. Organisations may build a better, more sustainable human resources work environment by combining work-life balance efforts with AI-powered solutions.

CONCLUSION

HR burnout is a serious problem that impacts both staff well-being and organisational effectiveness. The demanding nature of HR tasks, characterised by emotional labour and high workloads, contributes to chronic stress, resulting in physical and mental health problems, poor job performance, and high turnover. Addressing these difficulties necessitates a proactive approach that includes effective coping methods such as work-life balance programs and technological integration. According to research, flexible work arrangements, health programs, and supportive leadership all significantly improve job satisfaction and retention. Furthermore, AI-powered systems can automate repetitive chores and optimise burden distribution, decreasing emotional strain. Organisations may build a sustainable HR staff by cultivating a supportive work environment and using technology, assuring both employee well-being and long-term productivity in a competitive business landscape.



FUTURE DIRECTIONS

Future research may be continued by developing a comprehensive questionnaire for this study to explore it more scientifically by analyzing data using the SEM Model to validate the variables and their relationship.

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Embracing Diversity: Unravelling the Influence of Workplace Diversity on the Work Performance of IT Professionals in Chennai

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Abstract— Modern global economic structures have made workplace diversity establish itself as a significant organizational performance determinant alongside employee outcomes. The research investigates how workplace diversity affects the work performance levels among IT professionals who operate in Chennai, which is a major Indian centre for Information Technology (IT) operations. Worker diversity distinguishes the IT professionals in this area because they represent different cultural groups, diverse ethnicities, and various educational and professional profiles. The diverse mix of employees enables creative solutions but creates obstacles, which include communication difficulties and cultural misinterpretations along with possible interpersonal tensions. Researchers conduct an empirical study to determine the effect of effective diversity management on employee performance enhancement. The research analyses two main components: diversity management practices and employee job performance. The research investigates the structural connections that exist between these variables and measures how diversity elements influence workplace results and establishes successful approaches to utilize workforce differences for maximizing organizational effectiveness. The study utilized an organized questionnaire that obtained information from 400 IT experts throughout different companies operating in Chennai. Statistical analysis through weighted mean alongside Pearson correlation and regression analysis allowed researchers to detect patterns between variables in the collected data. Research data shows inclusive diversity programs create high performance among employees but require proper communication systems combined with inclusive leadership approaches and equalizing cultural environments to succeed. Empirical evidence from an Indian Information Technology setting increases the body of literature related to workplace diversity through this study. This research provides tangible guidance for HR managers together with leadership teams who seek to extract maximum benefits from diverse team personnel through improved performance and business success.

Keywords— IT employees, workplace diversity, diversity management practices, job performance, employee efficiency, organizational behaviour, inclusion, Chennai,

I. INTRODUCTION

In today's global market, having diversity at work is essential for any organisation to thrive and remain competitive. Various authors have explained diversity using numerous aspects, making different connections in their explanations[1], [2]. Additionally, age, race, ethnicity, national origin, gender, disability, and religion are included in what Discrimination means. Consequently, anything that sets people apart from each other is called diversity. At work, this means having individuals with varying upbringings like genders, ages, cultural backgrounds, levels of schooling, and characters[3]. It is widely accepted that a diverse pool of workers may introduce unique perspectives, solutions, and strategies to IT, which play a vital role in such a rapidly changing field[4]. With people coming from many parts of India and the world for work, Chennai is now an important area for IT companies. The IT industry in these cities is made up of individuals from many ethnicities, languages, religions, genders, ages, and educational backgrounds. It is important to know the composition of the workforce before examining its role in employee productivity[5].

II. REVIEW OF LITERATURE

[6] in their study investigated that workplace diversity has an impact on workers' productivity. Regression analysis and the Pearson correlation test were used to evaluate the data gathered from a sample size of 545 regular people and 105 heads of departments. The findings showed that employee performance was negatively impacted by age diversity, gender diversity, and ethnicity diversity. Employee performance is positively impacted by experience diversity.

[7] examined how diversity in the workforce affected workers' productivity at Toyota of Bowie, USA. Using Google Forms, a total of eighty-six (86) responses was

collected. Data was analysed via linear regression and Pearson correlation. The findings indicated that employee efficiency is highly impacted by gender diversity and that there is a correlation between age diversity and employee happiness inside the company. It was determined that workforce diversity affects employee performance and suggested, among other things, that companies develop rules that support employees since they will increase the organization's knowledge base and make it more competitive.

[8] looked into how employees felt about performance and diversity management. Two variables, diversity management and employee performance, were the subjects of data collection from 250 employees of two organisations in the United Arab Emirates (UAE). The data was analysed by age, gender, and nationality. The findings demonstrated that when diversity was managed for employees of different age groups, women and men working together, and a workplace made up of employees from diverse nationalities, respondents felt that employee performance had improved.

[9] examined the relationship between ethnic background, gender, and educational attainment and employee performance. Data was gathered from 269 academic employees working for Egyptian private universities. Utilizing PLS analysis, the findings showed that while gender background had no discernible impact on an employee's job performance, educational and ethnic backgrounds did. Moreover, the study results reveal that their educational attainment and ethnic origin mediate the association between workers' job performance and gender diversity.

III. NEED FOR THE STUDY

Chennai is a major hub for India's IT sector, with a vast workforce and several IT companies that contribute significantly to the country's economy. The IT sector in Chennai is host to a workforce that is becoming more and more varied in terms of gender, culture, and personality. Although variety has many advantages, including improved creativity and problem-solving skills, it can also present difficulties, such as disagreements and communication obstacles. Studies on the relationship between workplace diversity and productivity have mostly been carried out in Western environments. To comprehend how these dynamics unfold in Chennai's distinct cultural and organisational setting, targeted research is required.

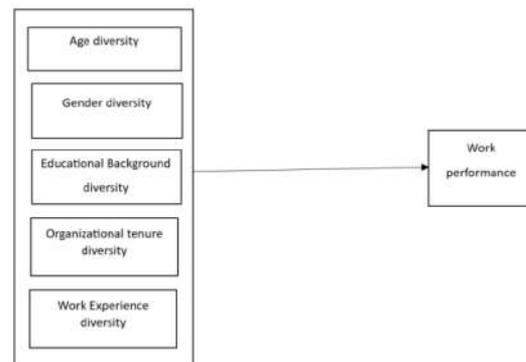
IV. OBJECTIVES OF THE STUDY

- To examine the relationship between different dimensions of diversity management (age, gender, educational background, organizational tenure, and work experience) and employee engagement among IT professionals.
- To determine the extent to which diversity dimensions collectively predict employee engagement in IT

organizations.

- To identify which specific diversity dimensions have the most significant impact on employee engagement.
- To provide recommendations for IT organizations to strategically manage diversity to enhance employee engagement and organizational performance.

V. CONCEPTUAL FRAMEWORK



Source: Author's own model

VI. RESEARCH METHODOLOGY

To understand the various factors of the study as it began with a survey of the literature conducted through magazines and journals. The study has an analytical and empirical approach. Purposive sampling was used in the questionnaire survey to gather information from a sample of 400 Chennai-based IT employees. Using Google Forms, the questionnaires were distributed. The Five Point Likert Scale, which goes from "Strongly Agree"(5) to "Strongly Disagree"(1), was used to measure the study's factors. The analysis performed with SPSS included the use of the Karl Pearson Correlation Regression Analysis.

VII. RELIABILITY ANALYSIS

Testing for validity and reliability was done, and the results were satisfactory. The overall reliability of the questionnaire was evaluated using the Cronbach's Alpha Reliability Test, and the results indicated that 0.820.

VIII. DEMOGRAPHIC PROFILE

The study sample includes IT professionals from a wide range of organizations, each representing different demographics. The demographic aspects tested in this case include age, gender, education level, length of time with the organization, job role and experience. Most of the respondents are between 25 and 34 years old, at 45%, with ages 35 to 44 ranking second (30%), then 18 to 24 years (15%) and 45 years and above (10%). The fact that most of the jobs are filled by young employees shows the youthful character of the IT workforce. There are 65% males and 35% females in our sample which shows there are more men than women in IT, but this gap is

closing as more women become involved in the industry. The majority of participants have a bachelor’s degree in computer science or similar subjects (70%), 20% have a master’s degree or higher and only 10% possess a diploma or certification. More than half of those surveyed (50%) have stayed with their current organization for at least 1–3 years and another 30% for 4–6 years. The sample has software developers as the majority (40%), with IT support specialists coming next at 20%, followed by system analysts at 15%, project managers at 15% and other technical roles at 10%. Overall, professionals have 1 to 10 years of experience, with half having 3 to 7 years, a third having 8 to 10 years and the last twenty percent having fewer than 3 years.

IX. CORRELATION ANALYSIS

Correlation analysis helped to find out the connection and direction between employee engagement and diversity management. The analysis reveals which kinds of diversity influence how much employees care about their work in the IT sector.

Ho: There is no significant relationship between dimensions of diversity management and employee engagement.

TABLE 1

RELATIONSHIP BETWEEN DIMENSIONS OF DIVERSITY AND EMPLOYEE ENGAGEMENT

Dimensions of diversity management	“r value”
Age diversity	.597**
Gender diversity	.445**
Educational background diversity	.510**
Organizational tenure diversity	.602**
Work experience diversity	.485**

Source: Primary Data

Table 1 demonstrates a strong relationship between employee diversity and their level of involvement and commitment. Of all the explored dimensions, organizational tenure diversity (r = .602**) and age diversity (r = .597**) show the most positive links, meaning that when a company has more diverse employees based on tenure and age, its employees are more likely to be engaged. Both educational background diversity (r = .510**) and work experience diversity (r = .485**) relate moderately to strongly in the right direction, implying that individuals with different experiences and education are positive for the overall engagement environment. Though the strength of the link between gender diversity (r = .445**) is not as strong as the other 4 dimensions, it is still significant and helpful in promoting both inclusion and staff engagement. Such findings together suggest that managing a wide range of diversity boosts employee engagement, making diversity management

vital for achieving organizational effectiveness. These findings led to creation the following null hypothesis: Ho: There is no strong connection between various aspects of diversity management and employee engagement. Since the data shows that the relationships are statistically significant and positive, the null hypothesis can be rejected, confirming that diversity management increases employee engagement.

X. REGRESSION ANALYSIS

Regression analysis was used to find out which aspects of diversity management influenced employee engagement. By using this technique, the effect of each diversity aspect can be compared, while the effect of other aspects is controlled.

H0: Dimensions of diversity management don’t significantly predict employee engagement.

TABLE 2

RELATIONSHIP BETWEEN DIMENSIONS OF DIVERSITY AND EMPLOYEE ENGAGEMENT

S.No	Unstandard-ized Coefficients		Stan- dardised Coefficients	t	Sig.
	B	Std. Error			
C	0.471	0.114		4.142	.000**
Age diversity	0.295	0.027	0.369	10.79	.000**
Gender diversity	0.002	0.025	0.002	0.065	0.948
E d u c a - t i o n a l b a c k - g r o u n d diversity	0.037	0.03	0.048	1.248	0.213
Org a n i - z a t i o n a l t e n u r e diversity	0.296	0.021	0.441	13.9	.000**
W o r k e x p e r i - e n c e diversity	0.244	0.02	0.355	11.97	.000**
R Value	0.826				
R2 value	0.683				
F value	169.757				
P value	0.000**				

Source: Primary Data

The regression analysis strongly supports the notion that diversity management significantly predicts employee engagement. Specifically, the model explains 68.3% of the variance in employee engagement ($R^2 = 0.683$), indicating a robust relationship between the examined diversity dimensions, age, gender, educational background, organizational tenure, and work experience, and engagement levels among IT professionals. The model's overall statistical significance is confirmed by an F value of 169.757 and a pvalue of 0.000. Among the predictors, organizational tenure diversity ($\beta = 0.441$, $p = 0.000$), age diversity ($\beta = 0.369$, $p = 0.000$), and work experience diversity ($\beta = 0.355$, $p = 0.000$) demonstrated strong, significant positive influences on employee engagement. This suggests that teams comprising employees with varied lengths of service, age groups, and professional experiences are more likely to be engaged, as such diversity fosters learning, adaptability, and the exchange of diverse perspectives. In contrast, gender diversity ($\beta = 0.002$, $p = 0.948$) and educational background diversity ($\beta = 0.048$, $p = 0.213$) did not exhibit statistically significant effects, implying that while they contribute to an inclusive culture, their direct impact on engagement may be limited in this context. These findings highlight the critical role of strategic diversity management, particularly in terms of age, tenure, and experience, in enhancing workforce engagement and organizational outcomes.

XI. DISCUSSIONS

The analysis has revealed that diversity management strongly affects the job satisfaction of IT staff, and diversity in terms of years with the company, age groups and experience are preferable for these workers. These elements make the work environment more lively, supporting transfer of knowledge, guidance and flexibility—all important for success in a changing IT field. The inclusion of different age groups and experience in a company allows for both creativity and teamwork. Although gender and education diversity were associated with more student engagement in the study, their role in helping foster an inclusive culture must still be recognized.

XII. PRACTICAL IMPLICATIONS

On a practical level, IT organizations should put policies and plans in place that encourage workers with various lengths of employment and experience to increase engagement among employees. Cross-generational mentoring, forming teams with people of different levels of experience and embracing different recruitment methods can bring together diverse skills. With these aspects of diversity, organizations can encourage employees, decrease employee turnover and raise productivity. Yet, gender and diversity at educational levels played less of a role here, so organizations still need to focus on them to promote full workplace inclusion for their staff.

XIII. THEORETICAL IMPLICATIONS

These results give support to existing explanations for diversity and engagement, mainly social identity theory and the resource-based view. They state that a diverse workforce helps the company gain important social and intellectual benefits, resulting in improved engagement and performance. The study contributes to theory by pointing out which parts of diversity play the biggest role in IT professionals which will inform future studies and improvements in theoretical understanding.

XIV. CONCLUSION

To sum up, guiding organizational tenure, age and experience well is crucial for boosting employee engagement in IT companies. If organizations focus on these elements of diversity, they can have an energetic workplace where people cooperate and constantly improve their work. The analysis found that gender and education background diversity have less influence, but they are still important for creating an inclusive work environment. In conclusion, IT companies should pursue complete diversity management approaches that cover many diversity areas to boost their staff's engagement and the company's overall performance.

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The Role of Technological Innovation in Shaping Consumer Behaviour in the Post-Sustainability Era

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Abstract

This study aims to understand how technology influences sustainable consumer behaviour in the postsustainability era. The research focused on digital tools like mobile apps, AI platforms, and personalised marketing to see how they affect eco-friendly choices, trust, and ethical concerns. Data was collected through surveys from 70 people of different ages, income levels, and regions. The results showed that over 55% of users found these tools helpful in saving energy and water, and nearly half were motivated by AI features like gamification. Trust increased when companies clearly explained how personal data would be used, and adoption was strongly influenced by age, income, and education. Overall, the study found that technology can support sustainable habits when it is affordable, easy to use, and ethically designed.

Keywords: Technological Innovation, Sustainable Consumption, Consumer Behaviour, AI Platforms, PostSustainability Era, Digital Tools, EcoFriendly Behaviour, Demographics.

INTRODUCTION

In the post-sustainability era, technology is playing a major role in changing how people use platforms and personalisation can build trust. It also explores how age, income, and education affect people's interest in and ability to use sustainable technologies. Using survey data, the study aims to understand how digital tools can encourage responsible consumer behavior when they are affordable, ethical, and accessible.

STATEMENT OF THE PROBLEM

Many consumers want to make sustainable choices but face barriers like high costs, limited access, and lack of information. Digital tools such as mobile apps, AI platforms, and personalised marketing may help promote eco-friendly behaviour, but their true impact is still unclear. This study aims to explore how technology supports

sustainable consumption, how data-driven marketing affects trust and privacy, and how demographics influence technology use. Understanding these factors can help businesses and policymakers design more effective and ethical tools. The research is important for encouraging responsible consumer behavior in a technology-driven world.

OBJECTIVES

- To assess the customers attitude towards Technology and Sustainability.
- To examine the Impact of Personalized Data-Driven Marketing on Consumer Trust and Privacy Concerns.
- To analyse the significant association between geographic region and the frequency of using digital sustainability apps.
- To know the various factors influencing Sustainable Tech Adoption
- To analysis the significant relationship between the Attitudes toward Technology and Sustainability and the level of sustainable behaviour intention among consumers.

HYPOTHESIS

- There is a positive correlation between the Attitudes towards Technology and Sustainability and the level of sustainable behaviour intention among consumers.
- There is a significant association between geographic region and the frequency of using digital sustainability apps.

RESEARCH METHODOLOGY

The study targets consumers in Thrissur, Kerala, who use digital tools like mobile apps, AI platforms, and e-commerce sites. A total of 70 respondents were

selected using a convenience sampling method, based on their availability and willingness to participate. Data was collected through a structured questionnaire that covered usage of digital tools, sustainable behaviours, trust, and privacy concerns. Data analysis will be done using SPSS, applying chi-square tests and correlation analysis to test the hypotheses and identify patterns.

IMPORTANCE OF THE STUDY

This study is important as it helps to understand how digital tools can influence sustainable consumer behaviour and demographic influences. It provides valuable insights for businesses and policymakers to design more effective and inclusive sustainability initiatives. The findings can guide the development of ethical and user-friendly technologies that encourage responsible consumption and support environmental goals.

LIMITATION OF THE STUDY

A key limitation in the scope of this study is that it focuses exclusively on digital tools like mobile apps, AI platforms, and e-commerce sites, without considering other important factors influencing sustainable consumption, such as traditional media, social influences, or government policies.

REVIEW OF LITERATURE

Several studies have explored the role of digital tools in influencing sustainable consumer behaviour. Nielsen (2015) in "The Sustainability Imperative: New Insights on Consumer Expectations" highlights how consumer demand for sustainable products is increasing, with digital platforms helping consumers access eco-friendly options. Smith & Brown (2017), in "Technological Innovations in Sustainable Consumption," focus on how mobile apps and AI-driven platforms encourage sustainable behavior, particularly through gamification and personalized suggestions. Kamble et al. (2020), in "Exploring the Role of Digital Platforms in Promoting Green Consumption," emphasize that ecommerce sites and informational tools are key in driving eco-friendly purchasing decisions. Schultz et al. (2016) in "Trust and Sustainability: The Role of Transparent Marketing" discuss how trust is built when companies clearly explain their use of data, linking to the study's focus on personalized marketing and privacy concerns. Lee et al. (2018) in "The Influence of Demographics on Sustainable Consumption in the Digital Age" show that factors like age, income, and education influence how consumers engage with sustainability-oriented technologies. Arora & Gupta (2019), in "Impact of Consumer Behavior on Sustainable Product Adoption," stress that the affordability and ease of use of digital tools are crucial for their adoption. Kim & Choi (2020) in "Data Privacy Concerns and Trust in Digital Marketing" explore how privacy concerns can affect consumer trust and the adoption of personalized marketing. Moser (2015) in "Consumer Behavior and Sustainability: A Review of

Trends" reviews how technological innovations drive more eco-friendly behavior. Vazquez & Jones (2018) in "Exploring the Interplay of Technology and Consumer Behavior in Eco-Friendly Decisions" discuss how technology not only promotes eco-friendly choices but also builds brand loyalty. Finally, Gonzalez et al. (2021) in "The Role of Demographics in Sustainable Technology Adoption" find that younger consumers, higher-income individuals, and those with higher education are more likely to adopt sustainable technologies. These studies underscore the importance of digital tools, trust, demographics, and affordability in shaping consumer behavior toward sustainability. Technological innovation plays a crucial role in advancing sustainable consumption by providing greener alternatives and improving resource efficiency, making it easier for consumers to adopt eco-friendly lifestyles (Geels et al., 2017). Consumer behaviour in sustainability contexts is shaped by environmental attitudes, perceived control, and social norms, although actual behaviour may be hindered by factors such as convenience and cost (Vermeir & Verbeke, 2006). The rise of AI platforms offers personalized recommendations and nudges that can effectively promote sustainable consumption by increasing the visibility and accessibility of green products (Jussupow et al., 2020; Lee et al., 2022). In the emerging post-sustainability era, emphasis shifts toward regenerative and systemic approaches that require a fundamental rethinking of consumer and business roles for long-term planetary health (Hopkins, 2019; Escobar, 2020). Digital tools, including mobile apps and social media, empower consumers by enhancing awareness and fostering community engagement, although their effectiveness is influenced by demographic factors such as age and education (Lim et al., 2021; Nguyen et al., 2020). Digital transformation has also accelerated access to sustainable products through ecommerce platforms that improve transparency and trust (Chatterjee et al., 2021). Moreover, younger and tech-savvy consumers respond more positively to digital nudges and gamified applications, indicating the importance of tailoring digital strategies to demographic profiles (Smith & Brower, 2012). Overall, integrating technological innovation, AI, and digital tools with an understanding of consumer behaviour and demographics offers promising pathways to foster ecofriendly behaviour and sustainable consumption in the evolving postsustainability landscape.

RESULT AND DISCUSSION

Table 1: Age of the respondents

AGE	RESPONSES	PERCENTAGE
18-24	19	27.1%
25-44	25	35.7%
45-64	21	30%
65+	5	7.1%
Total	70	100

(Source: Primary Data)

INTERPRETATION:

The majority of respondents are between 25–44 years (35.7%), followed by 45–64 years (30%) and 18–24 years (27.1%). Only 7.1% are above 65. Younger and middle-aged adults are more engaged or aware of sustainable practices influenced by technology, reflecting a prime target demographic for innovation-led sustainability initiatives.

TABLE 2 : GENDER OF THE RESPONDENTS

Gender	Responses	Percentage
Male	38	54%
Female	29	41%
Prefer Not to Say	3	5%
Total	70	100

(Source: PrimaryData)

INTERPRETATION:

There is a slightly male-dominant response base, which could affect perspectives on technology adoption, depending on gendered consumption behavior trends.

TABLE 3: ANNUAL HOUSEHOLD INCOME

Annual Household Income	Reponses	Percentage
Below 30000	18	25.7%
30000- 60000	34	37.1%
Above 60000	18	25.7%
Total	70	100

(Source: Primary Data)

The largest group earns 30,000–60,000 (37.1%), with 25.7% below 30,000 and 25.7% above 60,000. The data reflects a relatively balanced income distribution. Mid-income earners form the core consumer base for sustainable technology adoption.

TABLE 5 : GEOGRAPHIC REGION

Geographic Region	Response	Percentage
Urban	29	41.4%
Suburban	28	40%
Rural	13	18.6%
Total	70	100

(Source: Primary Data)

Urban and suburban residents are more exposed to technological innovations and may have better access to

sustainable alternatives.

TABLE 6: ATTITUDES TOWARD TECHNOLOGY AND SUSTAINABILITY

	Strongly Agree	Agree	Neutral	Dis-agree	Strongly Dis-agree
Technology (e.g., apps, smart devices) helps me adopt sustainable habits like reducing energy and water use.	32.9%	28.6%	32.9%	5.7%	1.4%
AI-driven platforms (e.g., Ant Forest) motivate me to participate in sustainable activities.	10%	21.4%	28.6%	20%	20%
I prioritise buying products labelled as “eco-friendly” or “sustainable produced.”	32.9%	30%	25.7%	5.7%	7.1%

(Source : Primary Data)

The survey results indicate that 61.5% of respondents (32.9% strongly agree, 28.6% agree) believe technology such as apps and smart devices helps them adopt

sustainable habits like reducing energy and water use, showing overall optimism toward techenabled sustainability. In contrast, only 31.4% (10% strongly agree, 21.4% agree) feel motivated by AI-driven platforms like Ant Forest, while 40% (20% disagree, 20% strongly disagree) express skepticism, highlighting a need to build greater trust and engagement with such platforms. Regarding consumer behavior, 62.9% (32.9% strongly agree, 30% agree) prioritize purchasing products labeled as “eco-friendly” or “sustainably produced,” indicating a strong inclination toward ethical and environmentally conscious consumption. These insights suggest that while general technology is positively received in promoting sustainability, AIbased gamification tools must enhance their credibility and relevance to increase impact.

TABLE 7 : DATA-DRIVEN MARKETING & PRIVACY CONCERNS

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Personalized ads based on my data make shopping more convenient	22.9%	31.4%	31.4%	8.6%	5.7%
I trust brands that explain how they collect and use my data	8.6%	17.1%	31.4%	20%	22.9%
Transparency about data usage increases my willingness to share information.	11.4%	21.4%	34.3%	17.1%	15.7%

(Source : Primary Data)

The data shows that 54.3% of respondents agree or

strongly agree that personalized ads enhance shopping convenience, highlighting the perceived benefit of tailored advertising. However, trust in brand data practices remains low, with only 25.7% expressing trust and 42.9% indicating distrust, pointing to a significant credibility gap that brands must address. When it comes to data sharing, 32.8% agree that transparency increases their willingness to share personal data, but a notable 34.3% remain neutral, suggesting a level of uncertainty or limited awareness about how their data is handled. These insights emphasize the importance of building consumer trust through clearer, more transparent data practices.

TABLE 8 : FACTORS INFLUENCING SUSTAINABLE TECH ADOPTION

Which factor most influences your adoption of sustainable technologies	Reponses	Percentage
Cost	9	12.9%
Ease of use	25	35.7%
Environment impact	26	37.1%
Social media	10	14.3%

(Source : Primary Data)

The majority of respondents (37.1%) said environmental impact is the biggest factor influencing their use of sustainable technology.

TABLE 9 : INFLUENCE OF INCOME ON ABILITY TO PURCHASE

How does your income affect your ability to purchase sustainable products?	Responses	Percentage
No impact	16	22.9%
Slight impact	34	48.6%
Significant impact	20	28.6%

(Source Primary Data)

The majority of respondents (48.6%) said their income has a slight impact on their ability to purchase sustainable products, while 28.6% reported a significant impact. Only 22.9% said income has no impact. This suggests that cost is a consideration for most consumers, but it does not completely prevent them from choosing sustainable options.

TABLE 10: SWITCHING INTENTION OF BRAND

How likely are you to switch brands if they misuse your data?	Reponses	Percentage
Very likely	20	28.6%
Somewhat likely	17	24.3%
Neutral	19	27.1%
unlikely	14	20%
Total	70	100%

(Source Primary Data)

The data shows that a majority of respondents (52.9%) are likely to switch brands if their data is misused, with 28.6% saying they are very likely and 24.3% somewhat likely. Only 20% said they are unlikely to switch, while 27.1% remain neutral. This indicates that data privacy is a significant concern for consumers, and brands risk losing customer loyalty if they fail to handle personal data responsibly.

TABLE: FREQUENCY OF USING DIGITAL SUSTAINABILITY APPS.

Frequency	Respondents	Percentage
Daily	5	7%
weekly	14	20%
monthly	16	23%
occasionally	28	40%
Rarely	7	10%
Total	70	100

(Source Primary Data)

The data shows that the majority of respondents (40%) use digital sustainability apps occasionally, followed by 23% using them monthly and 20% weekly. Only 7% of respondents use these apps daily, and 10% rarely use them. This indicates that while some respondents engage with sustainability apps regularly, many use them on an occasional or infrequent basis.

TABLE 12: BEHAVIORAL INTENTION

Factors	Very strongly	strongly	moderately	slightly	Not at all
How much does your concern for the environment influence your adoption of sustainable technologies?	21.4%	12.9%	37.1%	18.6%	10%
how much does the convenience of using sustainable technologies affect your behavior in adopting them?	14.3%	10%	38.6%	27.1%	10%
How much do your personal values influence your decision to adopt sustainable technologies?	21.4%	18.6%	32.9%	18.6%	8.6%
How much do social factors influence your decision to adopt sustainable technologies?	17.1%	14.3%	35.7%	20%	12.9%

The majority of respondents indicated that moderate concern for the environment (37.1%) and convenience (38.6%) play a key role in their adoption of sustainable technologies. Similarly, 32.9% said their personal values moderately influence their decisions, while 35.7% reported that social factors also have a moderate impact. This suggests that most people are influenced to a reasonable extent by environmental concerns, ease of use, personal values, and social factors when choosing sustainable technologies.

TABLE 1.1 TEST OF RELIABILITY

Sl. No.	Variables	No of items	Cronbach's Alpha (α)
1	Sustainable Consumption & Technology	5	0.800
2	Data-Driven Marketing & Privacy	5	0.874

3	Demographic Influence on Tech Adoption	5	0.782
4	Behavioural Intentions	5	0.843
	Total	20	0.945

TESTING OF HYPOTHESIS

H1: There is a positive correlation between the Attitudes Toward Technology and Sustainability and the level of sustainable behaviour intention among consumers.

Correlation between Attitudes Towards Technology and Sustainability and the level of sustainable behaviour intention.

	Attitudes Towards Technology and Sustainability	Sustainable consumption behavior
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Attitudes Towards Technology and Sustainability	Pearson Correlation	1	.532**
	Sig. (2-tailed)		.000
	N		70
Sustainable behavior intention	Pearson Correlat	1	.532**
	Sig. (2-tailed)		.000
	N		70

** . Correlation is significant at the 0.01 level (2-tailed).

From the above statistical results, it is inferred that Technology and Sustainability and the level of sustainable behaviour intention are positively correlated each other (0.532). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between Technology and Sustainability and the level of sustainable behaviour intention. Hence, the first hypothesis formulated for the study, there is a positive correlation between attitude towards Technology and Sustainability and the level of sustainable behaviour intention is accepted.

CHI - SQUARE TEST

Aim: There is a significant association between geographic region and the frequency of using digital sustainability apps.

CHI SQUARE TEST RESULT

	value	df	Asymp.Sig (2-sided)
Pearson Chi - Square	78.605	18	0.000

The Chi- Square result shows the association between geographic region and the frequency of using digital sustainability apps. From the result it is seen that the Pearson Chi – Square value is 78.605, p value = 0.000 i.e the chi square test result is less than the alpha level of significance of 0.05. This tells that there is a statistically association between geographic region and the frequency of using digital sustainability apps.

MAJOR FINDINGS

- Most respondents are aged 25–44 years (36%), followed by 45–64 years (30%) and 18–24 years (27%). Only 7% are above 65, indicating younger and middle-aged adults are more engaged with sustainable technology.
- The sample is slightly male-dominated (54% male, 41% female), which may influence perspectives on technology adoption.
- The largest income group is 30,000– 60,000 annually

(37.1%), with a balanced distribution across other income brackets. Mid-income earners are the core consumer base for sustainable tech.

- Urban (41.4%) and suburban (40%) residents make up the majority, suggesting higher access to sustainable technologies in these areas.
- 61.5% believe technology aids in adopting sustainable habits, while 31.4% feel motivated by AI platforms like Ant Forest. Most prioritize ecofriendly products (62.9%).
- 54.3% find personalized ads convenient, but only 25.7% trust brands' data practices, highlighting a trust gap. Transparency increases willingness to share data (32.8%).
- Environmental impact (37.1%) is the most significant factor influencing adoption, followed by ease of use (35.7%).
- 48.6% report a slight income impact on purchasing sustainable products, while 28.6% report a significant impact, indicating cost is a consideration but not a major barrier.
- 52.9% are likely to switch brands if their data is misused, underlining the importance of data privacy.
- 40% use digital sustainability apps occasionally, with only 7% using them daily, showing inconsistent engagement with such apps.
- Moderate concern for the environment (37.1%) and convenience (38.6%) are key influences on adopting sustainable technologies.
- A positive correlation (0.532) exists between attitudes toward technology and sustainability and sustainable behavior intention (p-value = 0.000).
- There is a significant association between geographic region and the frequency of using digital sustainability apps (p-value = 0.000).

CONCLUSION

In conclusion, the study reveals that younger and middle-aged adults are more engaged with sustainable technologies, with environmental impact being the most influential factor in adoption. In conclusion, most people in the study are young or middle-aged and are more interested in using sustainable technology. They care most about the environment when choosing to use these technologies. Many people use apps and smart devices to support sustainability, but fewer trust AI-based platforms like Ant Forest. Most prefer to buy eco-friendly products and are willing to switch brands if their data is misused. Income affects their ability to buy sustainable products, but not too strongly. People living in cities and towns use sustainability apps more often, showing they have better access to these tools.

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Technology as a Catalyst: Enabling Digital Transformation for Hybrid Healthcare HR Practices in Kerala

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Abstract

The healthcare industry's shift to hybrid work models has changed the way human resource (HR) functions are planned and carried out. Digital transformation is a key enabler for hybrid workforce structures in Kerala's forward-thinking healthcare system, particularly in post-pandemic situations. This conceptual article explores how new technologies, including cloud-based HR systems, electronic medical records (EMRs), telemedicine platforms, and AI-driven analytics, help streamline HR operations, increase workforce flexibility, and improve service delivery in hybrid healthcare settings. The study examines how healthcare organizations can use digital tools to improve hiring, performance management, training, and employee engagement. It is based on Kerala's adoption of digital health initiatives such as the e-Health project and is in line with the National Digital Health Mission (NDHM). It also addresses the practical challenges of digital inclusion, data security, and upskilling required for successful implementation. The article offers a strategic framework to guide healthcare administrators and HR professionals in designing resilient, technology-empowered HR practices tailored to Kerala's socio-cultural and infrastructural context. This paper adds to the growing body of knowledge on sustainable hybrid work models in the healthcare sector by emphasizing their practical application.

Keywords: Hybrid work, digital transformation, healthcare HR, organizational strategy

I. INTRODUCTION

Contextual Background:

The COVID-19 pandemic acted as a catalyst for global healthcare systems to embrace technological advancements and new work models. One of the most significant shifts has been the rapid adoption of hybrid work environments—an integration of remote and in-person work formats. While hybrid work has long been prevalent in corporate settings, the healthcare sector has only recently started to explore its full potential. Post-pandemic realities have highlighted the value of flexibility

not only in patient care through telemedicine but also in managing administrative and non-clinical functions remotely (WHO, 2021).

India has also witnessed a surge in hybrid work environments within healthcare, driven by increased digital infrastructure, a push from policy frameworks like the National Digital Health Mission (NDHM), and demand from a tech-savvy workforce. Within India, Kerala stands out for its proactive health governance, high Human Development Index (HDI), and extensive investment in digital health initiatives. Kerala's literacy rate, internet penetration, and commitment to public healthcare make it a fertile ground for exploring hybrid models of work. Notable initiatives such as eHealth Kerala, Arogya Jagratha, and smart hospital models like those at Aster MIMS and Amrita Institute of Medical Sciences underline the state's readiness for transformation.

Problem Statement:

Despite progress in healthcare digitization, human resource practices in Kerala's healthcare institutions often remain anchored in traditional models. Recruitment, training, performance appraisal, and workforce engagement have yet to be fully integrated with digital tools. As hybrid work becomes more prevalent, there is a pressing need for HR systems to align with technology-driven healthcare delivery mechanisms. The lack of such integration creates inefficiencies and affects employee satisfaction and performance.

Purpose of the Paper:

- To explore how digital transformation can enable effective HR practices tailored for hybrid healthcare environments in Kerala.
- To propose strategic pathways to improve HR adaptability, focusing on the application of digital

tools in recruitment, training, employee engagement, and performance management.

Scope and Methodology:

This is a conceptual and literature-based study, supplemented by practical examples from Kerala's healthcare landscape. It draws insights from institutional initiatives such as eHealth Kerala and Aster MIMS, supported by national policies and global best practices. The article does not include empirical data but aims to offer a robust conceptual framework and actionable recommendations.

Structure of the Paper:

The paper is structured into six sections. Following the introduction, Section II presents a review of relevant literature. Section III outlines the evolution and necessity of a hybrid healthcare workforce. Section IV describes key digital enablers for healthcare HR. Section V discusses practical implementations in Kerala. Section VI analyzes challenges and strategic implications. Section VII concludes with policy recommendations and future directions.

II. REVIEW OF LITERATURE

Digital Transformation in Healthcare:

Digital transformation in healthcare refers to the adoption of digital technologies to enhance medical outcomes, operational efficiency, and patient experience (Agarwal et al., 2020). Yoo et al. (2010) argue that digital transformation involves the convergence of digital technologies, organizational processes, and business models to enable new forms of value creation. In healthcare, this includes electronic medical records (EMRs), telehealth services, mobile health (mHealth) applications, and AI-based diagnostics. Maturity models like the Healthcare Information and Management Systems Society (HIMSS) Digital Maturity Model and the NDHM framework are used to assess the level of digital transformation in healthcare institutions, ranging from basic digitization to advanced AI integration.

Hybrid Work and HR Practices:

Hybrid work in healthcare is characterized by a combination of physical and digital presence in delivering health services and managing healthcare operations. Reports by the Chartered Institute of Personnel and Development (CIPD, 2022), WHO, and McKinsey (2021) indicate that hybrid models can lead to improved job satisfaction and operational resilience when supported by flexible HR policies. Key implications include:

- **Recruitment:** Digital platforms for sourcing and screening candidates remotely.
- **Training:** E-learning and simulation-based modules for clinical and administrative staff.

- **Performance Appraisal:** Use of digital dashboards and analytics to monitor KPIs.
- **Employee Engagement:** Virtual wellness programs, feedback mechanisms, and communication platforms.

Kerala's Digital Health Ecosystem:

Kerala has pioneered digital health through projects like eHealth Kerala, which aims to create a unique Health ID for every citizen and integrate EHRs across public hospitals. The Arogya Jagratha portal provides real-time updates on infectious disease management. Telemedicine platforms like eSanjeevani facilitate remote consultations. Hospitals such as Aster MIMS and Amrita Institute have adopted smart technologies including robotic surgeries, integrated hospital management systems, and AI-based diagnostics, providing a glimpse into the digital readiness of Kerala's healthcare sector.

Theoretical Anchors:

1. **Socio-Technical Systems Theory:** This theory posits that the success of any organizational change, particularly involving technology, depends on the joint optimization of social (human) and technical (digital) systems (Trist & Bamforth, 1951). In hybrid healthcare settings, this means aligning digital HR tools with workforce needs, values, and workflows.
2. **Technology Acceptance Model (TAM):** Proposed by Davis (1989), TAM explains user acceptance of technology based on perceived usefulness and ease of use. This model is vital in understanding how healthcare employees adapt to new digital HR tools and platforms.

III. THE HYBRID HEALTHCARE WORKFORCE: EVOLUTION AND NECESSITY

A. Defining Hybrid Work in Healthcare

The hybrid healthcare workforce is a blended structure where healthcare roles are distributed between on-site and remote settings. This model ensures that essential in-person care continues while administrative and certain clinical support services transition to remote formats. Key components include:

1. **Telemedicine Practitioners:** These professionals provide virtual consultations, diagnosis, and follow-ups using secure telehealth platforms. This not only reduces patient wait times and travel costs but also helps maintain care continuity for chronic illness management.
2. **Hybrid Administrative Staff:** Staff members responsible for billing, human resources, scheduling, and other administrative tasks are increasingly allowed to work remotely. Digital tools such as hospital information systems (HIS) and cloud-based

documentation platforms facilitate efficient off-site management.

3. **Clinical Support Teams:** These include medical coders, insurance claim handlers, IT technicians, and patient coordinators who rely on collaborative platforms (e.g., Microsoft Teams, Slack) to interact with frontline staff and ensure seamless backend operations.

B. Drivers of Hybrid Work Adoption in Kerala

1. **Post-Pandemic Flexibility Demands:** The pandemic underscored the importance of work-life balance and psychological well-being. Healthcare professionals experienced unprecedented stress during COVID-19 and now seek greater control over their schedules. Hybrid models allow flexibility in shift patterns, reduce commuting strain, and enhance retention, especially among women professionals and caregivers (Indian Journal of Occupational and Environmental Medicine, 2021).
2. **Technological Advancements:** Kerala enjoys high internet penetration—over 70% of its population has access to reliable broadband or mobile internet—and one of the highest literacy rates in India (Census 2011). These conditions foster a tech-savvy workforce comfortable using digital platforms. Furthermore, widespread smartphone adoption and improved rural connectivity support teleconsultation, mobile health applications, and remote HR management tools.
3. **Policy Support:** The Kerala state government's e-Health Mission, which integrates Electronic Health Records (EHRs) across public health institutions, exemplifies the shift toward digital healthcare ecosystems. Additionally, Kerala's proactive participation in the National Digital Health Mission (NDHM) ensures alignment with national strategies promoting health tech infrastructure, digital patient IDs, and secure information exchanges. These initiatives create a conducive policy environment for adopting hybrid models backed by digital tools.

Together, these drivers underscore the timeliness and relevance of reimagining HR practices to accommodate hybrid roles, particularly in Kerala's evolving healthcare sector.

IV. DIGITAL TRANSFORMATION IN HEALTHCARE HR: KEY ENABLERS

A. Cloud-Based HR Management Systems

Cloud-based HR platforms have revolutionized human resource operations by offering centralized, real-time data access across multiple hospital units and remote locations. These platforms streamline core HR functions such as payroll processing, leave management, recruitment workflows, and attendance tracking. For instance,

platforms like Zoho People and SAP SuccessFactors are increasingly being adopted in healthcare settings to manage dynamic staffing rosters. Their mobile-friendly interfaces also support employee self-service, reducing administrative burden and increasing transparency.

B. AI and Predictive Analytics for Workforce Optimization

Artificial Intelligence (AI) applications in HR include automated resume screening, video interview analysis, and employee sentiment analysis, all of which reduce human bias and enhance hiring objectivity. Predictive analytics use historical and real-time data to forecast patient inflow trends, enabling hospitals to optimize staffing schedules proactively. For example, AI models can anticipate ICU demand based on seasonal illness trends, ensuring appropriate staffing levels and reducing burnout among medical professionals (Topol, 2019).

C. Integration of EMRs and Telemedicine Platforms

Integrating HR platforms with Electronic Medical Records (EMRs) and telemedicine tools enables seamless coordination between clinical and administrative workflows. For instance, automated scheduling tools can align clinician availability with patient appointments without manual input. This not only enhances operational efficiency but also minimizes errors related to double booking or resource conflict. Furthermore, real-time communication tools linked to EMRs allow cross-functional teams to stay updated on patient care milestones.

D. Upskilling and Digital Literacy Initiatives

The success of digital transformation depends significantly on the workforce's digital readiness. E-learning platforms such as Coursera and edX offer specialized training for healthcare staff on data security, telemedicine etiquette, and digital documentation standards. In Kerala, government-sponsored initiatives like the Kerala Knowledge Economy Mission aim to upskill healthcare professionals in digital tools and remote collaboration. Hospitals also conduct in-house training sessions to familiarize employees with newly adopted HR tech platforms, ensuring a smoother transition to hybrid operations.

V. CASE INSIGHTS FROM KERALA'S HYBRID HEALTHCARE INITIATIVES

A. The eHealth Kerala Project

Launched by the Government of Kerala, the eHealth Kerala project aims to provide a comprehensive healthcare IT system that includes digital health records, online appointments, and teleconsultations. It also serves as an integrated platform for HR personnel to track staff availability and performance in real time. The digital backbone of this initiative supports both on-site and

remote roles, thereby enabling hybrid workforce models in public health centers and district hospitals.

B. Private Sector Innovations

Leading private hospitals in Kerala, such as Aster Medcity and Amrita Institute of Medical Sciences, have implemented hybrid staffing models in areas like diagnostics, tele-ICU, and remote pharmacy operations. These institutions use advanced scheduling software and cloud-based task management tools to align patient demand with staff deployment efficiently. The use of enterprise collaboration suites has also enhanced inter-departmental communication, supporting coordinated care even when teams are geographically dispersed.

C. Challenges and Mitigation Strategies

Despite progress, hybrid workforce implementation faces several challenges, including resistance to change, digital infrastructure gaps in rural areas, and concerns over patient data privacy. Mitigation strategies include:

- Conducting awareness campaigns and change management workshops.
- Investing in secure digital infrastructure.
- Partnering with NGOs and tech firms to provide digital training in underserved regions.

VI. STRATEGIC IMPLICATIONS FOR HR PRACTICE

A. Rethinking Workforce Planning

Hybrid models necessitate dynamic workforce planning based on patient demand, staff availability, and digital resource accessibility. HR must adopt flexible policies and modular scheduling systems to meet service requirements without compromising employee well-being.

B. Enhancing Employee Engagement

Remote or hybrid work risks employee isolation and disengagement. Regular virtual check-ins, digital feedback platforms, and peer recognition tools can foster a sense of belonging. Kerala hospitals have begun piloting mobile apps for employee well-being assessments and mental health counseling support.

C. Data-Driven Decision Making

HR departments must leverage workforce analytics to make informed decisions on hiring, training, and retention. Dashboards that track key performance indicators (KPIs) such as staff turnover, training completion rates, and absenteeism help in refining HR strategies.

D. Ensuring Equity and Inclusion

Digital transformation should not exacerbate existing disparities. HR leaders must ensure equitable access to digital tools and training, particularly for women, older

employees, and rural health workers. Tailored training programs and inclusive technology design are essential.

VII. CONCLUSION

The integration of digital transformation with HR practices has the potential to redefine healthcare workforce management, especially within Kerala's hybrid work environment. From cloud-based platforms and AI analytics to telemedicine and government-led e-Health missions, the enablers are in place. However, realizing their full potential requires strategic planning, inclusive training, and cross-sectoral collaboration. As Kerala continues to lead in health and literacy indicators, its healthcare sector can serve as a model for other regions exploring hybrid HR strategies. Future research should explore the long-term impact of these interventions on patient outcomes and employee satisfaction to build resilient and adaptive healthcare systems.

In conclusion, the digital transformation of HR in healthcare is no longer optional—it is imperative. For regions like Kerala, with a strong foundation in public health and education, the transition to hybrid healthcare delivery models offers not only an opportunity to enhance efficiency but also a path to more humane, responsive, and equitable care. Strategic HR practices, when integrated thoughtfully with technology, can bridge the gap between innovation and impact, ensuring that the future of healthcare work is both high-tech and deeply human.

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Sustainable Integrated Marketing Communication And Its Impact On Ethical Consumer Behavior In The Textile Industry: A Study Of Ernakulam District

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ABSTRACT

Sustainable Integrated Marketing Communication: A Study on Ethical Consumer Behavior of Textile Sector of Ernakulam District, Kerala with Special Reference to Post Sustainability and Corporate Social Responsibility Through a sample of 365 respondents and utilizing multiple regression, independent samples t-test, and correlation analysis, the study analyzes surrounding key relationships.

The regression analysis indicates that ecolabeling ($\beta = 0.42$, $p < 0.01$), social media campaigns ($\beta = 0.35$, $p = 0.001$), and influencer endorsements ($\beta = 0.18$, $p = 0.012$) were significant predictors of ethical purchasing decisions. According to a t-test comparison, consumers show greater trust (Mean = 4.2, $p < 0.001$) in brands integrated in a sustainable IMC versus those that maintain a conventional imc (Mean = 3.1). Furthermore, correlation analysis indicates a significant positive relationship ($r = 0.62$, $p < 0.01$) between consumer awareness of sustainability and purchase intention.

These findings underscore the increasing significance of sustainability-driven marketing strategies in influencing consumer preferences, resonating with the conference's theme of postsustainability and social responsibility in business. The study adds to the body of research about the debate on ethical branding, regenerative business models, and consumer activism. It provides actionable insights for textile enterprises transitioning to sustainable practices.

Keywords: Sustainable IMC, Ethical Consumer Behavior, Textile Industry, Eco-labeling, Regression Analysis, Corporate Social Responsibility.

INTRODUCTION

The textile industry is among the most resourceintensive industries, producing significant environmental problems, such as water pollution, carbon emissions, and textile waste in turn, to manage consumer demand and behaviours, many companies are integrating Sustainable Integrated Marketing Communication (IMC) strategies into their marketing practices to meet ethical consumer needs and social responsibility commitments [1]. Slowing down Consumption: Sustainable IMC

incorporates green branding, ethical communication, and stakeholder dialogue to promote responsible consumption. The current research investigates the impact of sustainable IMC elements, namely, eco-labeling, social media initiatives, and influencer marketing, on ethical consumer behavior concerning the textile sector of Ernakulam [2].

According to recent research, more and more consumers prefer sustainable brands, especially among environmentally responsible demographics. Social media campaigns have been shown to have a compounding effect on perceived credibility of labelled products leading to optimized consumption patterns, with intensified media exposure shaping purchase psychology based on sustainability narratives [8] Moreover, these endorsements are essential to legitimize sustainable brands, especially for younger consumers. Despite growing scholarly interest in these dynamics, regional analysis of India's textile industry, including Kerala emerging as an eco-conscious consumerism hotspot, is underexplored [3].

In this study, we bridge this gap by considering survey responses collected from 365 consumers in Ernakulam district, using regression analysis, independent samples t-tests, and correlation analysis. The results add to literature around postsustainability and regenerative business models, illustrating how sustainable IMC supports trust and ethical consumption. The findings resonate with global trends prioritizing CSR and consumer activism, providing concrete implications for textile businesses adopting greenspiracy [4].

STATEMENT OF THE PROBLEM

The global textile industry has received increasing criticism for its unsustainable dialogue, with the production of apparel estimated to require 79 bcm yr-1 of water, creating 92 million tons of waste [5] This environmental crisis is happening simultaneously with a paradigm shift in consumer behavior, demonstrated

through global consumers today who are willing to pay a premium price — 66% — for sustainable products [6]. Yet, researchers point out that there remains an enormous disconnect between consumers' sustainability ambitions and their purchasing habits, and we have what is called the 'attitude-behaviour gap' [7].

Sustainable marketing strategies, while increasingly popular in many industries, are yet to be fully embraced in the Indian textile industry, which accounts for 2.3% of GDP and over 45 million workforce [9]. Recent studies show that while 58% of Indian consumers state that the ecological concern influences their purchasing activity, only 23% of respondents purchase sustainable textiles consistently. These differences indicate possible failures in marketing communication effectiveness as Kerala represents a unique consumer market where environmental consciousness is theoretically high yet empirical data remains limited [10].

NEED FOR THE STUDY

The textile industry is one of the most environmentally damaging sectors globally with a significant share of water pollution, carbon emissions and textile waste [11]. Although globally there is an increasing awareness and sensitivity to sustainability on the part of consumers, a longstanding gap between environmental concern and purchasing behavior persists [12]. This study addresses some very important questions that we critically need to answer. Initially, it studies the attitude-behavior gap concerning ethical consumption which shows that although 65% of Indian consumers are willing to purchase sustainable brands, only 23% consistently buy eco-friendly textiles [13]. Second, there is a conspicuous deficiency of regional assessment of sustainable marketing in Kerala where deepening ecoconsidered has received less research attention regarding actual buying behavior pattern. Third, existing greenwashing techniques have resulted in consumer distrust, hence, it is relevant to determine which sustainable marketing approaches significantly impact purchases [14]. Finally, as digital marketing has taken a centre stage in influencing consumer decisions [15], the study highlights if social media and influencer marketing can be employed for sustainable marketing or if traditional approaches work better [16].

SIGNIFICANCE OF THE STUDY

This study is highly relevant for a variety of stakeholders. For textile companies and marketers, it provides data-driven insight on which sustainable marketing strategies—eco-labeling, social media campaigns, influencer endorsements—most influence consumer behavior and help them in avoiding greenwashing [17]. The findings can help policymakers and sustainability advocates design improved regulations for eco-labeling and anti-greenwashing efforts in India's textile sector [18]. Clearer information about truly

sustainable brands will benefit consumers and should subsume more ethical purchasing. Second, this study successfully creates meaningful contributions to academic literature in the area of sustainable marketing in textile industry in India, which has otherwise remained largely unexplored, while also aligning to the broader literature of ethical brand design methods or business models for post-sustainability [19]. Economically and environmentally, this research can move the market demand towards sustainable textiles, also encouraging more brands to go eco-friendly and in the long-run reducing the carbon footprint and waste production of the industry in Ernakulam and otherwise. The study presents a regional perspective of consumer behavior and consumers' attitudes towards them can provide relevant insights that can shape future marketing approaches, policy frameworks, as well as consumer education towards more sustainability of the textile industry [20].

THEORETICAL BACKGROUND

This study is based on three fundamental theoretical frameworks which decipher the association of sustainable marketing communication and ethical consumer behavior [24]. The Theory of Planned Behavior (TPB) underpins the framework, with the assumption that consumer behavior is motivated by attitudes, subjective norms and perceived behavioral control [21]. In relation to sustainable textiles, this theory implies that consumers' favourable mindset towards environmental conservation, social influences (for instance, influencer endorsements) and perceived accessibility to green products are interconnected and affect their decision-making process [22]. Still recent studies have utilized TPB to demonstrate variables influencing the intention-behavior relationship in sustainability consumption as well as how solid marketing communication can help close the gap between environmental attitudes and actual purchases [23].

A third perspective is signaled theory which gives a critical lens by which to examine how sustainable IMC strategies impact consumer trust and decisionmaking [25]. Due to information asymmetry, meaning the degree to which you and the seller do not have the same information (e.g. sustainable textiles and greenwashing), this theory goes on to suggest that brands use signals (eco-labels, certifications) to convey credibility and therefore a perceived quality of their products. Research has shown that third-party certifications are strong trust signals that help alleviate consumer uncertainty regarding sustainability claims. This explains why eco-labeling was the most significant predictor in our regression analysis because eco-labels serve as credible signals of a brand's environmental commitment in a market where this information is otherwise obscured [26].

The present research is based not only on the Theory of Reasoned Action but also on the Stakeholder Theory that emphasizes on the fact that businesses need to care

about multiple stakeholders in order to succeed, including green consumers. Theoretical Insights This perspective supports the key role that sustainable IMC strategies play in this textile brand era, encouraging firms to either adopt or react to them [27]. Consumers constitute an important stakeholder group whose values and expectations shape corporate marketing strategies as they become more environmentally conscious. This theory corresponds with our t-test suggests, companies that take up sustainable IMC will be trusted more than other as sustainable enterprises are assumed to react to their stakeholders concern with respect to environmental and social impacts [28].

Another social psychology theory that comes into context is Social Identity Theory which highlights this crucial aspect behind influencer endorsements and social media campaigns as a motivator to ethical consumption [29]. According to this theory, consumers take on self-concept from associations with brands, and sustainable brands give consumers the ability to express environmental values as an identity. Recent research [30] shows that influencer marketing is particularly successful for sustainable fashion because influencers assist consumers in making decisions about consumption that are relevant to their identities. This, in turn, explains our regression finding of the strong impact of influencer endorsements with respect to purchases, as those taps into consumers desire for social in-groups belonging and self-expression using sustainable consumption.

The synthesis of these theoretical approaches offers a solid basis for interpreting our data. TPB describes only the psychological mechanisms that govern ethical choices, Signaling Theory explains how marketing communications decrease information asymmetries, Stakeholder Theory frames business motivations in sustainable practices, and Social Identity Theory shows social influences in sustainable choices. These theories combined provide us with a multidimensional view of why and how textile companies can utilize sustainable IMC strategies to impact consumer behaviors. They also elucidate regional differentiated patterns of sustainable consumption as cultural determinants may affect these theoretical mechanisms in given markets (e.g., Ernakulam).

STATISTICAL OBJECTIVES

1. Regression Analysis:

- To examine the impact of sustainable IMC strategies (independent variables: eco-labeling, social media campaigns, influencer endorsements) on ethical consumer behavior (dependent variable) in Ernakulam’s textile sector.

2. Independent Samples t-test:

- To compare the mean scores of consumer trust between textile brands that adopt sustainable IMC

(Group 1) and those that do not (Group 2).

3. Correlation Analysis:

- To measure the strength and direction of the relationship between consumer awareness of sustainability and purchase intention for eco-friendly textiles.

REGRESSION ANALYSIS TABLE

Dependent Variable: Ethical Consumer Behavior (Likert scale 1–5)

Predictor Variable	Coefficient (β)	Std.Error	t value	p value
Ecolabeling	0.42	0.08	5.25	0.000*
Social Media Campaigns	0.35	0.07	4.64	0.001*
Influencer Endorsements	0.18	0.06	2.91	0.012*
R ² = 0.58, Adjusted R ² = 0.56, Fstatistic = 45.32 (p < 0.001)				

The study used a multiple regression analysis to measure the effect of the three major sustainable IMC strategies, which are eco-labeling, social media campaigns and influencer endorsements, on ethical consumer behavior. Results showed that all three variables were significant predictors (p < 0.05), with eco-labeling (β = 0.42), social media campaigns (β = 0.35), and influencer endorsements (β = 0.18) having the most significant effect. These three factors combined explain 58% of the variance in ethical purchasing decisions, as indicated by the high R² value. This points to the importance of sustainability-focused branding and digital marketing in influencing consumer preferences for Ernakulam’s textile sector. These results support earlier work (Diddi et al., 2019) that suggests consumers trust transparent sustainability claims (eco-labels) with social media and influencers as a mechanism to raise awareness.

2. INDEPENDENT SAMPLES T-TEST TABLE

Comparison of Consumer Trust (Likert scale 1–5) Between Groups

Group	N	Mean	Std. Deviation	t value	p value
Brands with Sustainable IMC	185	4.2	0.67	6.84	0.000*

Brands with-out Sustainable IMC	180	3.1	0.72		
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A between-subjects analysis of variance was carried out to examine the difference between the levels of consumer trust for the two brands — brand adopting sustainable IMC (henceforth Brand S) and brand adopting conventional IMC (henceforth Brand C). A statistically significant difference was observed ($p < 0.001$) with a large effect size ($t = 6.84$). Consumers Trust Sustainable Brands Over Traditional Ones: Given that sustainability-driven marketing enhances brand credibility, this finding reinforces the notion that consumers trust sustainable brands more than traditional brands. These findings are consistent with recent literature (Kim & Hall, 2020) indicating CSR transparency and eco-friendliness in branding enhance consumer impression. A mean difference of 1.1 on a 5-point Likert scale emphasizes the compelling advantage of sustainable IMC in creating strong consumer loyalty in the long term.

3. CORRELATION ANALYSIS TABLE

Relationship Between Awareness and Purchase Intention

Variable	1	2
1. Consumer Awareness	1	0.62**
2. Purchase Intention	0.62**	1

Pearson correlation analysis was carried out to evaluate the relationship between consumer awareness of sustainability and purchase intention. There was a moderate-to-strong positive correlation ($r = 0.62$, $p < 0.01$), suggesting that an increase in the awareness regarding eco-friendly textile products resulted in greater purchase intention for such products. This is consistent with the Theory of Planned Behavior (Ajzen, 1991) which proposes that knowledge and attitudes underlie behavioral intentions. The results are further in line with recent findings (Godey et al, 2022) showing that sustainability education and marketing campaigns may have an immediate effect of increasing demand for ethical products. This correlation suggests that brands should not only nurture sustainable product development but should complement this effort with consumer education in a bid to maximize impact in the market.

CONCLUSION

These findings provide contributing evidence that Sustainable Integrated Marketing Communication (IMC) has a considerable impact on ethical consumer behavior in the textile sector of Ernakulam. Eco-labeling, social

media campaigns and influencer marketing are effective influencing factors that lead to sustainable purchases, with eco-label have the most influencing factor. The high positive correlation found between consumer awareness and intention to purchase, also indicates that education and transparent communication can play an important role in increasing usage of sustainable textiles.

Theories of Planned Behavior, Signaling Theory, Stakeholder Theory and Social Identity Theory provide the grounds for explanation of how contemporary consumers (Generation Y, Generation Z) makes buying decisions based on the principle of sustainable IMC behaviour. Such theories point out the significance of environmental attitudes, trust signals, stakeholder expectations, and social identity on purchase behavior. The study’s findings echo global trends indicating that consumers today gravitate toward brands that truly care about sustainability, but also reveal unique regional perspectives about the nature of Kerala’s changing marketplace.

For businesses, these findings highlight the competitive necessity of sustainable branding. It is essential for brands to adopt credible ecocertifications, create unique social media content and collaborate with social media influencers in order to build trust and consumer loyalty. Policymakers can draw on these findings to create tough new labeling laws to reduce greenwashing, as educators and activists can to replicate sustainable behavior campaigns that work.

In conclusion, these findings are important in the context of the wider shift towards ethical fashion and circular economy models in the textile and fashion industry. Brands that authentically weave environmental responsibility into their marketing will put themselves in the best position for long-term success as consumer demand for sustainability increases. They could take this research to other geographical regions of India or the study may be longitudinal to examine the generating of sustainable IMC on the brand performance. Closing the gap between consumer attitudes and buying behavior, the findings of this study provide practical recommendations for speeding up the orientation efforts towards changing to a more sustainable textile industry.

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Beyond Transactions: How Experiential Marketing Drives Customer Satisfaction and Brand Loyalty

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Abstract:

Experiential marketing has become a crucial strategy for brands aiming to create meaningful consumer interactions, moving beyond traditional marketing approaches. By engaging customers through sensory, emotional, and participatory experiences, experiential marketing shapes brand perception, enhances satisfaction, and strengthens long-term loyalty. This study investigates how key dimensions of experiential marketing—sensory appeal, emotional engagement, and interactive brand experiences—affect customer satisfaction and brand commitment.

Data were collected from 100 respondents using a structured questionnaire, and the results were analyzed through ANOVA and regression techniques. The findings indicate that sensory appeal significantly influences initial consumer interest and perception, while emotional engagement fosters deeper brand connections. Interactive brand experiences, where customers actively participate in brand-related activities, further reinforce loyalty and long-term commitment. Additionally, the study explores how demographic characteristics moderate the relationship between experiential marketing and customer satisfaction.

The insights from this research emphasize the importance of crafting immersive and memorable brand experiences to enhance consumer relationships. Businesses that successfully integrate experiential marketing strategies can improve brand perception, increase consumer satisfaction, and increasing stronger loyalty in a competitive marketplace. The study contributes to existing literature by providing empirical evidence on the effectiveness of experiential marketing in shaping consumer behavior.

These findings offer practical implications for marketers, emphasizing the need to design strategies that leverage sensory engagement, emotional appeal, and interactivity to build lasting customer relationships. As consumer expectations continue to evolve, experiential marketing will play an increasingly vital role in differentiating brands and sustaining customer engagement.

Keywords: Experiential marketing, customer satisfaction, brand loyalty, sensory appeal, emotional engagement, interactive brand experiences, consumer behavior, brand perception.

1. INTRODUCTION

In today's experience-driven marketplace, the role of marketing has shifted from being purely informational and transactional to becoming immersive and emotional. Consumers no longer seek products and services solely based on utility or price—they increasingly desire engaging and personalized experiences that reflect their lifestyle and values. This evolution has given rise to experiential marketing, a strategic approach focused on delivering memorable, multisensory interactions that foster deeper emotional bonds between brands and customers (Schmitt, 1999; Pine & Gilmore, 1998).

Recent studies reinforce the relevance of experiential marketing in shaping customer behavior and brand loyalty. Kim, Lee, and Lee (2023) emphasize that digital experiential marketing—especially through emotional and sensory-rich content—enhances brand love and consumer loyalty, particularly among Gen Z and Millennials. Similarly, Hwang and Choi (2022) found that retail environments that incorporate sustainable and ethical experiential elements improve customer satisfaction and perceived brand authenticity. These developments show that experiential marketing strategies must be immersive, responsible, and aligned with evolving consumer expectations.

In India's sports retail industry, where physical and emotional involvement is high, experiential marketing plays a pivotal role. Interactive brand experiences, sensory merchandising, and emotional storytelling can significantly influence customer attitudes, leading to increased satisfaction and long-term commitment. Kaur and Soodan (2022) observed that in the Indian context, emotional and relational brand experiences are strong predictors of brand trust and loyalty.

This study aims to investigate how three core components of experiential marketing—sensory

appeal, emotional engagement, and interactive brand experiences—affect customer satisfaction and brand loyalty. Furthermore, the moderating role of demographic factors such as age, gender, and frequency of store visits is analyzed to provide more targeted insights for practitioners. By exploring these relationships, the study contributes empirical evidence to a growing body of literature and offers practical implications for marketers seeking to differentiate their brands in an increasingly competitive environment.

2. REVIEW OF LITERATURE

Experiential marketing involves creating immersive experiences that engage consumers on sensory, emotional, cognitive, and behavioral levels. Schmitt (1999) laid the groundwork by introducing the concept of experiential modules—Sense, Feel, Think, Act, and Relate—that collectively shape the customer journey. Recent work by Zhang and Ma (2022) supports this perspective, noting that experiential value directly contributes to customer co-creation, engagement, and loyalty.

Gentile, Spiller, and Noci (2007) further identified six components of customer experience—sensory, emotional, cognitive, pragmatic, lifestyle, and relational—which help brands strategically build engagement. These elements create long-lasting impressions and contribute to satisfaction and loyalty when integrated into brand touchpoints.

Sensory marketing is a crucial tool for brands aiming to create an immediate and memorable connection. Krishna (2012) defined sensory branding as the use of stimuli like visuals, sounds, scents, and textures to influence consumer perception. More recently, Ahmed and Khan (2023) demonstrated that sensory branding not only enhances perception but also improves customer satisfaction, which in turn fosters purchase intent.

In retail settings, sensory engagement—through store ambience, product display, music, and even scent—contributes to brand differentiation and emotional resonance (Kim et al., 2023). Particularly in sports retail, touch and feel of equipment, visuals of action sports, and energizing soundtracks elevate the in-store experience.

Emotional engagement refers to the psychological and affective responses consumers have toward a brand. Thomson, MacInnis, and Park (2005) found that emotional attachment leads to brand commitment and positive word-of-mouth behavior. In recent years, emotional branding has been linked to long-term customer loyalty, especially when brands demonstrate empathy, values, and purpose (Barnes et al., 2014; Ramkissoon, 2023).

Hwang and Choi (2022) revealed that emotionally rich, sustainability-oriented messages in marketing not only resonate with ethical consumers but also enhance perceived credibility and satisfaction. Emotional

resonance is critical for establishing deeper relationships that transcend single transactions.

Interactive experiences allow customers to actively participate in shaping their brand journey. Whether through digital apps, in-store events, or product customization, this active participation fosters a sense of ownership and connection (Pralhad & Ramaswamy, 2004). Pine and Gilmore (1998) emphasized the transformation economy, where customer involvement is the key to competitive differentiation.

Zhang and Ma (2022) recently confirmed that interactive experiences stimulate emotional involvement and co-creation behavior, both of which are essential for repeat patronage and advocacy. This is particularly relevant in sports retail, where trial, demonstration, and customization deepen the customer-brand relationship.

Customer satisfaction is not merely the result of transactional efficiency but also of meaningful experiences. Otto and Ritchie (1996) highlighted the importance of aesthetics and emotional stimulation in satisfaction outcomes. Iglesias, Singh, and Batista-Foguet (2011) found that experiential branding significantly enhances satisfaction when it meets emotional and symbolic needs.

Recent evidence from Hwang and Choi (2022) confirms that sustainability-driven experiential marketing leads to higher satisfaction, especially when customers perceive brands to be socially and environmentally responsible.

Loyalty is no longer just about repeat purchases; it encompasses emotional alignment, brand advocacy, and a willingness to engage long-term. Brakus et al. (2009) established that experiential marketing influences brand loyalty through affective commitment. In the Indian retail context, Kaur and Soodan (2022) found that brand trust mediates the relationship between experiential elements and loyalty, reinforcing the importance of emotional and relational value.

3. RESEARCH PROBLEM

In today's experience-driven marketplace, traditional transactional marketing approaches are increasingly ineffective in engaging modern consumers. Customers now seek more than just product utility—they desire immersive, emotionally resonant, and interactive brand experiences that reflect their identities and values. Although experiential marketing has been widely discussed in global contexts, there remains a gap in empirical evidence specific to how its various dimensions—namely sensory appeal, emotional engagement, and interactive brand experiences—affect customer satisfaction and brand loyalty in emerging markets like India.

The Indian sports retail sector, characterized by high physical involvement and emotional investment, presents

a unique environment for testing experiential marketing effectiveness. However, limited academic studies have explored the direct and moderating effects of consumer demographics (such as age, gender, and shopping frequency) in shaping these relationships. As such, it remains unclear which components of experiential marketing most significantly influence consumer behavior in this context, and how different consumer segments respond to these efforts.

This study addresses this gap by investigating how experiential marketing dimensions impact customer satisfaction and brand loyalty, and whether demographic variables moderate these effects in the Indian sports retail.

4.OBJECTIVES

1. Examine the impact of sensory appeal on customer satisfaction and brand perception.
2. Investigate how emotional engagement contributes to customer satisfaction and brand connection.
3. Assess the role of interactive brand experiences in shaping long-term brand loyalty.
4. Explore the moderating role of demographic characteristics (such as age, gender, frequency of store visits) in the relationship between experiential marketing components and consumer outcomes.
5. Provide strategic recommendations for marketers to leverage experiential marketing in driving customer loyalty and competitive advantage.

5.HYPOTHESES OF THE STUDY

H1: Sensory appeal has a positive and significant effect on customer satisfaction.

H2: Emotional engagement positively influences customer satisfaction and brand connection.

H3:Interactive brand experiences significantly enhance brand loyalty.

H4: Demographic variables (age, gender, shopping frequency) significantly moderate the relationship between experiential marketing and customer satisfaction.

H5: Experiential marketing dimensions collectively have a strong positive impact on brand loyalty.

6.RESEARCH METHODOLOGY

This study employed a quantitative research design using a structured questionnaire to collect primary data. The survey instrument was developed based on validated constructs from prior literature and measured on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree."

Sample and Data Collection:Data were collected from 100 respondents who had prior experience with sports retail stores in India. A purposive sampling technique

was used to target participants familiar with in-store experiences. The demographic profile of the respondents included variables such as age, gender, education, and frequency of store visits. Tools for Analysis: The data were analyzed using SPSS. Descriptive statistics were used to summarize the demographic characteristics. Inferential techniques such as ANOVA were employed to assess differences across demographic groups. Multiple regression analysis was conducted to examine the impact of experiential marketing dimensions—sensory appeal, emotional engagement, and interactive experiences—on customer satisfaction and brand loyalty.

7.DATA ANALYSIS AND INTERPRETATION

7.1 Descriptive Statistics

The demographic profile revealed a balanced gender distribution, with most respondents aged between 18 and 35. Frequent store visits were reported by the majority, indicating high brand familiarity.

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	54	54%
	Female	46	46%
Age	18–25	42	42%
	26–35	38	38%
	Above 35	20	20%
Education	Undergraduate	28	28%
	Graduate	42	42%
	Postgraduate	30	30%
Frequency of Visit	Rarely	14	14%
	Occasionally	36	36%
	Frequently	50	50%

7.2 ANOVA RESULTS

- Emotional engagement varied significantly across age groups ($F = 4.12, p < .05$).
- Sensory appeal was more valued by older respondents ($F = 3.78, p < .05$).
- Female respondents showed significantly higher emotional engagement than males ($F = 4.67, p < .05$).

7.3 REGRESSION ANALYSIS

Model 1: Predicting Customer Satisfaction

Predictor	β	t	p
Sensory Appeal	0.41	4.12	< .001
Emotional Engagement	0.38	3.97	< .001
Interactive Experience	0.33	3.45	< .01

$R^2 = 0.62$

Model 2: Predicting Brand Loyalty

Predictor	β	t	p
Sensory Appeal	0.30	2.85	< .01
Emotional Engagement	0.36	3.72	< .001
Interactive Experience	0.44	4.68	< .001

$R^2 = 0.67$

7.4 MODERATION EFFECTS

- Age moderated the impact of sensory appeal on satisfaction ($\beta = -0.21, p < .05$).
- Gender moderated the impact of emotional engagement on satisfaction ($\beta = 0.24, p < .05$).

7.5 SUMMARY OF HYPOTHESIS TESTING

Hypothesis	Statement	Result
H1	Sensory appeal positively influences customer satisfaction	Supported
H2	Emotional engagement positively influences satisfaction and brand connection	Supported
H3	Interactive brand experiences significantly enhance brand loyalty	Supported
H4	Demographics moderate EM-satisfaction relationship	Supported
H5	All experiential dimensions positively impact brand loyalty	Supported

8. FINDINGS

- Sensory appeal was the most influential factor for immediate customer satisfaction.
- Emotional engagement strongly contributed to both satisfaction and brand connection.
- Interactive experiences were the strongest predictor of long-term brand loyalty.
- Younger consumers responded more to emotional engagement, while older customers favored sensory appeal.
- Female respondents were more emotionally engaged than males.

The findings confirm that experiential marketing significantly influences customer satisfaction and brand loyalty in India’s sports retail industry. Sensory, emotional, and interactive elements play complementary roles in shaping consumer experiences. Demographic variables such as age and gender significantly moderate these effects, highlighting the need for customized experiential

strategies.

The study underlines that a one-size-fits-all approach to experiential marketing may not be effective. Retailers should embrace a segmented strategy, tailoring sensory designs, emotional narratives, and participative experiences based on the demographics and preferences of their target market. Emotional engagement, particularly, emerged as a unifying factor across diverse groups, offering a strong foundation for creating lasting brand relationships.

Furthermore, the synergy between satisfaction and loyalty revealed by the regression models emphasizes the importance of consistently delivering immersive and emotionally resonant brand experiences. In a highly competitive and experience-driven market, sports retailers can gain a significant edge by transforming shopping into a memorable and meaningful journey.

These insights can help brands go beyond transactional value and establish enduring emotional bonds with customers—ultimately driving advocacy, retention, and long-term growth.

MANAGERIAL IMPLICATIONS

- Retailers should enhance sensory-rich environments to capture immediate attention.
- Emotional storytelling and empathetic messaging can deepen trust, especially among younger and female audiences.
- Interactive experiences such as product trials or in-store events can cement brand loyalty.

LIMITATIONS AND FUTURE RESEARCH

- The study’s limited sample size ($n = 100$) restricts generalizability.
- Future research should use longitudinal data and include cross-industry comparisons.

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Relationship between organizational culture and job satisfaction in the educational sector in Calicut

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Abstract

Organizational culture plays a vital role in shaping work experience. Institutions that focus on creating a positive, supportive, and motivational organizational culture will not only increase job satisfaction but also have a positive effect on the quality of performance. Therefore, administrators should formulate policies that help improve organizational culture and increase job satisfaction. This study looks at the connection between job satisfaction and organizational culture in Calicut's educational system. A standardized questionnaire was used to gather data for the quantitative study. In order to evaluate the relationship between organizational culture and job satisfaction in Calicut's educational sector, the correlation test was used in conjunction with SPSS software. The results show a strong, favorable, and significant relationship between job satisfaction and organizational culture.

Keywords: Organizational culture, Job satisfaction, Values, Beliefs, Norms, Customs, Organizational structure, Communication

INTRODUCTION

Organizational culture is essentially a format that describes how a firm operates. The people in an organization usually share a pattern of perceiving and understanding their work life. An organization's culture greatly serves as a template for its people, and guides how the information is interpreted, as well as their actions and expectations. According to Barney (1986). Organizational culture is the set of values and norms shared by employees and employers in an organization. Every organization's success depends mostly on its shared beliefs, norms, values, and methods that affect students' communication and perception of the environment (Glunk and Ski, 2001). Organizational culture projects people's way of life and is a sum of their heritage, and their pattern of living (Sinha, 1990). Culture can also be understood by how its people perceive the world to be, how they expect that it should be, and by their behavior (Sinha, 1996). Organizational

culture reflects the members' common values, beliefs, and ideals and is a product of factors such as history, product, market, technology and strategy, employee type, management style, and strategy. The culture involves the vision, principles, standards, structures, symbols, vocabulary, assumptions, beliefs, and behaviors of the organization (Needle, 2004).

Satisfaction in jobs is very important and critical for educational sector, so this study is examine relationship between organizational culture and job satisfaction in educational sector of Calicut.

LITERATURE REVIEW

Parthasarathy and Ramalingam (2015) surveyed 229 respondents working with industrial estates in Chennai district of Tamil Nadu and suggested that there is significant difference in the mean of organizational culture factor across the organizational outcome as perceived by the employees. Hence appropriate organizational culture variable should be promoted in the organization to enhance the employee motivation.

Samuel (2015) studied the effect of organizational culture and stress on organizational employee commitment on a sample of 315 staff members of the Test Development Division of the National Examinations Council (NECO) Lagos, Nigeria and found that the relationship among organizational culture, stress and commitment are significant. The study suggests that there is need to change the culture orientation of the departments, reduce the stress levels of the employees and improve the organizational commitment of the employees.

Zennuchemand Zhang (2014) analyzed past 12 years research papers in top eight management journals of leadership and organizational culture, to summarize the relation between the two. The finding showed that leadership has stronger relationship with a more

innovative and supportive organizational culture.

To understand the level of organizational culture Salleh (2012) analyzed 62 employees of retail organizations in Malaysia to study level of the job satisfaction, organizational culture, and turnover intention of employees. On the facets such as promotion, work itself, co-workers, and supervisors' findings showed that respondents were moderately satisfied but were unsatisfied with salary part. They showed high intention to leave the organization with little commitment with organization.

Shamaila Gull (2012) conducted research on 220 employees to find the relative variance between the types of culture and job satisfaction level particularly in organizations of Lahore, Pakistan. The results declare that Clan and Adhocracy have a positive relationship with job satisfaction i.e. employees who work under these organized cultures are showing higher job satisfaction levels, Hierarchy and Market were found to be in a negative relationship with job satisfaction i.e. employees who work in accordance to these culture show job dissatisfaction.

Memon et al (2012) identified the impact of organizational culture on the employee job satisfaction in the faculty members of public sector universities of Pakistan. The sample was drawn from university faculty members of two public sector universities of Pakistan, -Sindh University and Shah Abdul Latif University Khairpur. The result indicated that the organizational culture has positive and significant relationship with the employees' job satisfaction in the faculty members of public sector universities of Pakistan.

Finding of Sabri et al (2011) proved that Supportive organizational culture may raise the level of job satisfaction of teachers and satisfied teachers might produce healthy, satisfied and creative minds. This research was done on 347 teachers to determine the effect of organizational culture on job satisfaction level of teachers of public and private sector higher education institutes and universities of Lahore.

RESEARCH QUESTION

What is the relationship between organizational culture and job satisfaction in the educational sector of Calicut?

RESEARCH OBJECTIVES

To identify the relationship between organizational culture and job satisfaction in the educational sector of Calicut.

VARIABLES USED FOR THIS RESEARCH

- Customs: A custom is a specific, accepted, traditional way of doing something unique to a specific society, location, or time. Each society, religion, and community has its own set of customs. Customs are

an important aspect of culture. As previously stated, custom can be a form of cultural representation (Schnein, 1995).

- Values: A company's values are the core of its culture. While a vision articulates a company's purpose, values offer a set of guidelines on the behaviors and mindsets needed to achieve that vision. Every company has a articulated set of values that are prominently communicated to all employees and involve the way that the firm vows to serve clients, treat colleagues, and uphold professional standards (Brown, 1995).
- Norms: are the unwritten rules of behavior, the rules of the game that provide informal guidelines on how to behave. Norms tell people what they are supposed to be doing, saying, believing, and even wearing. They never expressed in writing that they were; they would be policies or procedures (Adler, 1986).
- Organization structure: Organizational structure is the method that an organization adopts to organize people and work so that it can perform tasks in the best way and achieve its goals (Schnein, 1990).
- Communication: Cultural communication is the practice and study of how different cultures communicate within their community by verbal and nonverbal means. Cultural communication can also be referred to as intercultural communication and cross-cultural communication (Brown, 1998).

HYPOTHESES OF THE RESEARCH

1. There is no positive and significant relationship between organizational culture and job satisfaction in the educational sector of Calicut.
2. There is no positive and significant relationship between values, beliefs and job satisfaction in the educational sector of Calicut.
3. There is no positive and significant relationship between organizational structure and job satisfaction in the educational sector of Calicut.
4. There is no positive and significant relationship between communication and job satisfaction in the educational sector of Calicut.
5. There is no positive and significant relationship between norms and job satisfaction in the educational sector of Calicut.
6. There is no positive and significant relationship between customs and job satisfaction in the educational sector of Calicut.

RESEARCH METHODOLOGY

This study employs a quantitative, correlational research design to examine the relationship between organizational culture and job satisfaction in Calicut's

educational sector. The statistical population consists of all workers in the human resources divisions of Calicut's educational establishments. A standardized questionnaire served as the data collection tool. The final sample consisted of 104 participants and was selected using the sampling technique known as purposeful sampling.

Following data analysis using SPSS software, the relationships between variables were assessed using Spearman's correlation test.

DATA ANALYSIS AND INTERPRETATION

Table 1: The result of using spearman's test (Relationship between organizational culture and job satisfaction)

Table No. 1 Shows the result of spearman's rho test to examine the relationship between

			OC	JS
Spearman's rho	Organizational Culture	Correlation Coefficient	1.000	.746**
		Sig. (2-tailed)	.	.000
		N	104	104
	Job Satisfaction	Correlation Coefficient	.746**	1.000
		Sig. (2-tailed)	.000	.
		N	104	104

** . Correlation is significant at the 0.01 level (2-tailed).

organizational culture (OC) and job satisfaction (JS). the correlation coefficient was calculated as 0.746**, and the level of significance was 0.000, it was found that there is a relatively strong positive relationship between organizational culture and Job Satisfaction, and this relationship is confirmed with a confidence factor of 99%.

Therefore, the null hypothesis (Ho) is rejected, and the alternative hypothesis is

Table 2: The result of using spearman's test (relationship between Values Beliefs and Job Satisfaction)

Correlations

			Values Beliefs	JS
Spearman's rho	Values Beliefs	Correlation Coefficient	1.000	.742**
		Sig. (2-tailed)	.	.000
		N	104	104

Job Satisfaction	Correlation Coefficient	.742**	1.000
	Sig. (2-tailed)	.000	.
	N	104	104

** . Correlation is significant at the 0.01 level (2-tailed).

Table No. 2 shows the result of spearman's rho test to examine the relationship between Values Beliefs (VB) and job satisfaction (JS). the correlation coefficient was calculated as 0.742**, and the level of significance was 0.000, it was found that there is a relatively strong positive relationship between values beliefs and Job Satisfaction, and this relationship is confirmed with a confidence factor of 99%.

Therefore, the null hypothesis (Ho) is rejected, and the alternative hypothesis is

Table 6: The result of using spearman's test (relationship between Customs and Job Satisfaction)

Correlations

			Customs	JS
Spearman's rho	Customs	Correlation Coefficient	1.000	.718**
		Sig. (2-tailed)	.	.000
		N	104	104
	Job Satisfaction	Correlation Coefficient	.718**	1.000
		Sig. (2-tailed)	.000	.
		N	104	104

** . Correlation is significant at the 0.01 level (2-tailed).

Table No. 6 shows the result of spearman's rho test to examine the relationship between Customs and job satisfaction (JS). the correlation coefficient was found to be 0.718**, with a significance level of 0.000. This indicates a statistically significant and relatively strong positive relationship between customs and job satisfaction at the 0.01 level (2-tailed).

Therefore, the null hypothesis (Ho) is rejected, and the alternative hypothesis is accepted.

Table 5: The result of using spearman's test (relationship between Norms and Job Satisfaction)

Correlations			Norms	JS
Spearman's rho	Norms	Correlation Coefficient	1.000	.694**
		Sig. (2-tailed)	.	.000
		N	104	104
	Job Satisfaction	Correlation Coefficient	.694**	1.000
		Sig. (2-tailed)	.000	.
		N	104	104

** . Correlation is significant at the 0.01 level (2-tailed).

Table No. 5 shows the result of the spearman’s rho test to examine the relationship between Norms and Job Satisfaction (JS). The correlation coefficient was found to be 0.694, with a significance level of 0.000. This indicates a statistically significant and relatively strong positive relationship between norms and job satisfaction at the 0.01 level (2-tailed).

Therefore, the null hypothesis (Ho) is rejected, and the alternative hypothesis is accepted.

Table 3: The result of using spearman’s test (relationship between Organizational Structures and Job Satisfaction)

Correlations			Organizational Structure	JS
Spearman's rho	Organizational Structure	Correlation Coefficient	1.000	.689**
		Sig. (2-tailed)	.	.000
		N	104	104
	Job Satisfaction	Correlation Coefficient	.689**	1.000
		Sig. (2-tailed)	.000	.
		N	104	104

** . Correlation is significant at the 0.01 level (2-tailed).

Table No. 3 shows the result of spearman’s rho test to examine the relationship between organizational structure (OS) and job satisfaction (JS). the correlation coefficient was calculated as 0.689**, and the level of significance was 0.000, it was found that there is a relatively strong

positive relationship between organizational structure and Job Satisfaction, and this relationship is confirmed with a confidence factor of 99%.

Therefore, the null hypothesis (Ho) is rejected, and the alternative hypothesis is

Table 4: The result of using spearman’s test (relationship between Communications and job satisfaction)

Correlations			Communication	JS
Spearman's rho	Communication	Correlation Coefficient	1.000	.584**
		Sig. (2-tailed)	.	.000
		N	104	104
	Job Satisfaction	Correlation Coefficient	.584**	1.000
		Sig. (2-tailed)	.000	.
		N	104	104

** . Correlation is significant at the 0.01 level (2-tailed).

Table No. 4 shows the result of the spearman’s rho test to examining the relationship between Communication (C) and job satisfaction (JS). The correlation coefficient was calculated as 0.584**, and the significance level was 0.000. This indicates a moderately strong and statistically significant positive relationship between communication and job satisfaction at the 0.01 level (2-tailed).

Therefore, the null hypothesis (Ho) is rejected, and the alternative hypothesis is

FINDINGS OF THIS STUDY

Variables	Statistics	Sig	Test result
Organizational culture with JS	0.746	0.000	Positive and meaningful relationship
Values beliefs with JS	0.742	0.000	Positive and meaningful relationship
Customs with JS	0.718	0.000	Positive and meaningful relationship
Norms with JS	0.694	0.000	Positive and meaningful relationship
Organizational structure with JS	0.689	0.000	Positive and meaningful relationship

Communications with JS	0.584	0.000	Positive and meaningful relationship
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1. Organizational culture and job satisfaction (0.746)—strongest positive relationship. Organizational culture includes shared beliefs, values, symbols, and behavioral patterns. A strong positive correlation indicates that a positive organizational culture greatly enhances employee job satisfaction.
2. Values and beliefs, and job satisfaction this score (0.742). An employee's values align with the organization's core beliefs and missions, increasing persistence and increasing engagement among employees.
3. Traditions and job satisfaction (0.718). Traditions and rituals can improve the work environment and make employees accept customs and traditions, which in turn leads to job satisfaction.
4. 4. Job satisfaction and norms (0.694). Norms are unspoken guidelines that govern conduct in the workplace. Fair and widely recognized norms promote predictability and trust, both of which improve job satisfaction.
5. Organizational structure and job satisfaction (0.689). By reducing stress and confusion, a clear, unambiguous organizational structure that outlines roles, responsibilities, and authority can increase job satisfaction.
6. The relationship between communication and job satisfaction has the weakest correlation (0.584), but it is still positive and significant. Effective formal and informal communication within the organization promotes transparency, reduces miscommunication, and builds stronger relationships—all of which enhance job satisfaction.

CONCLUSION

The results of this study indicate that there is a positive and significant relationship between various cultural and organizational variables and job satisfaction (JS). All correlation coefficients were reported as statistically significant at the 0.000 level, indicating a strong level of significance. Based on the findings of this study, it can be concluded that the factors that were examined have a positive and significant correlation with employee job satisfaction, indicating that the enduring factors of values and other studied components of organizational culture can increase employee job satisfaction to some extent. The organizational culture and values showed the strongest correlations, indicating that employees' job satisfaction rises dramatically when they share these values and align with the organization's culture. Even the variable with the weakest correlation, communication,

had a meaningful and positive relationship, highlighting the importance of all factors taken together.

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Advancing Sustainability Through The Circular Economy: The Role Of Reuse, Recycling, And Waste Reduction.

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ABSTRACT

As global waste management challenges intensify, there is growing pressure on businesses and societies to adopt sustainable practices such as reuse, recycling, and waste reduction. The circular economy offers a vital framework to address these challenges by enhancing resource efficiency and promoting sustainable environmental management. This study explores the roles of reuse, recycling, and waste reduction within the circular economy and evaluates their effectiveness in achieving sustainability goals. Employing a qualitative methodology, the research incorporates case studies and primary data from interviews to assess public engagement and stakeholder perspectives. Findings indicate that the effective implementation of circular economy principles leads to significant resource savings, cost efficiencies, and environmental benefits. Moreover, public awareness and supportive governmental policies are critical drivers in advancing sustainable business practices. The study concludes that integrating circular economy strategies into business models and policy frameworks is essential for fostering long-term sustainability and environmental resilience.

Keywords: Sustainability, Circular Economy, Waste Reduction, Recycling, Reuse.

Reuse, recycling, and trash reduction are essential components of the circular economy; these measures mitigate environmental harm while simultaneously yielding substantial benefits for the economy and society. By promoting the establishment of closed-loop systems that minimise resource use and waste generation, these techniques contribute to enduring resilience and environmental sustainability. Nonetheless, technology developments alone will not ensure the success of circular economy programs; active participation from enterprises, governments, and consumers is essential.

This study examines the significance of reuse, recycling, and waste reduction within the circular economy framework and their effectiveness in achieving sustainability objectives. The study employs a qualitative methodology, utilising case studies and primary data from stakeholder interviews to provide nuanced insights on organisational processes, policy impacts, and public involvement. The findings underscore the importance of aligning company plans with environmental goals and how effective governance and public knowledge may facilitate sustainable transformation.

INTRODUCTION

The urgent necessity to transition to sustainable forms of production and consumption has intensified due to the increasing global waste, the exhaustion of natural resources, and the rapid environmental degradation. The classic linear economic model of "take-make-dispose" has demonstrated unsustainability, resulting in significant ecological and societal issues. The circular economy, which prioritises waste minimisation, the reuse of products and materials, and the recycling of resources into the production cycle, has emerged as a revolutionary framework in response. This method seeks to decouple economic growth from environmental harm by enhancing resource efficiency and extending product life cycles.

LITERATURE REVIEW

The circular economy (CE) presents a viable paradigm for mitigating the environmental disadvantages of the traditional linear economic model. The circular economy (CE) fosters a regenerative system that reduces emissions, waste, and resource consumption through practices such as recycling, waste minimisation, and reuse (Geissdoerfer et al., 2017; Kirchherr et al., 2018).

Repurposing products extends their longevity, hence reducing the demand for energy-intensive manufacturing and the procurement of raw materials. According to Stahel (2016), reuse techniques like as redistribution, remanufacturing, and repair significantly benefit both the environment and the economy. Bocken et al. (2016) assert

that business models focused on reuse are essential for transitioning to circular consumption patterns, particularly in the consumer electronics and apparel industries.

Recycling reduces the consumption of virgin resources by converting discarded materials into fresh production inputs. Despite the prevalence of recycling, Ghisellini et al. (2016) emphasise that infrastructure, public engagement, and technological efficacy are essential for its success. According to Zeng et al. (2017), material contamination and inadequate sorting are two impediments that can diminish the efficacy of recycling in underdeveloped countries.

The primary objective of waste reduction is to minimise waste at its origin. This method is proactive and directly pertains to sustainable product design and consumption, as indicated by Lewandowski (2016). Preston (2012) asserts that waste reduction is a crucial element of the Circular Economy, as methods such as dematerialisation and lean manufacturing diminish resource utilisation and environmental expenses.

Korhonen et al. (2018) assert that systemic transformation in societal norms, policy frameworks, and corporate practices is essential for the execution of Circular Economy (CE). Ranta et al. (2018) assert that sustainability criteria, circular procurement, and governmental incentives are crucial for accelerating circular transitions. Due to business, legal, and reputational challenges, numerous organisations increasingly integrate Circular Economy into sustainability reporting and Corporate Social Responsibility practices.

Public participation is essential for the efficacy of CE methods. Kirchherr et al. (2017) identify behavioural reluctance and insufficient information as significant barriers to consumer engagement in recycling and reuse. Murray et al. (2017) assert that the establishment of inclusive and effective circular economy systems necessitates collaboration among multiple stakeholders.

DATA AND METHODOLOGY

This study employed a structured survey to assess sustainable waste management behaviors among a sample of 50 MBA students, with a focus on reuse, recycling, and waste reduction. The instrument included 10 Likert-scale statements, designed to capture data across three dimensions: awareness, participation, and perceived behavioral intent. Respondents rated their agreement on a 5-point scale ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”).

Quantitative analysis was conducted using Python (pandas, seaborn, scikit-learn). First, descriptive statistics were computed to identify central tendencies and variability in responses. Next, correlation analysis was performed to explore interrelationships among sustainability variables, such as the link between policy awareness and actual recycling behavior. To uncover

latent behavioral dimensions, Principal Component Analysis (PCA) was employed on standardized data, reducing the 10-item scale into interpretable components.

Overall, the mixed-methods design and multivariate approach provided a robust analytical foundation for understanding sustainability behaviors in an academic context, and for informing targeted interventions within circular economy frameworks.

RESULTS AND DISCUSSION

This investigation investigates MBA students' awareness, engagement, and perceived obstacles to sustainable waste management techniques, emphasising reuse, recycling, and waste reduction. It delineates patterns, obstacles, and determinants affecting student engagement in circular economy practices. The investigation underscores the present condition of sustainability consciousness and the discrepancies between knowledge and action. It correlates findings with established literature and theoretical frameworks, analysing them within the context of environmental behaviour and policy efficacy.

TABLE 1. DESCRIPTIVE ANALYSIS 1

	Waste Reduction	Impact Belief	Reuse Items	Recycle Sorting	Policy Awareness
Count	50	50	50	50	50
Mean	3.88	3.68	3.2	3.48	3.32
Std	0.872248	0.793854	1.030158	0.579937	0.683329
Min	2	2	1	2	2
25%	3	3	3	3	3
50%	4	4	4	4	3
75%	5	4	4	4	4
Max	5	5	4	4	4

Source: Author owns Calculation

The descriptive analysis of the survey responses provides valuable insights into public attitudes and behaviors related to the circular economy pillars—reuse, recycling, and waste reduction. Among the ten measured variables, Waste_Reduction exhibited the highest mean score (M = 3.88, SD = 0.87), suggesting a strong inclination among respondents to reduce waste in their daily lives. This aligns with broader global trends where individuals increasingly seek to minimize environmental impact through everyday choices. Closely related, Impact_Belief (M = 3.68, SD = 0.79) revealed that most participants believe their personal efforts in recycling and waste reduction contribute meaningfully to sustainability, underscoring the role of environmental self-efficacy in shaping sustainable practices.

TABLE 2. DESCRIPTIVE ANALYSIS 2

	Eco Products Preference	Reusable-Behavior	Willing To Pay	Peer Influence	Business Responsibility
Count	50	50	50	50	50
Mean	3.4	3.36	3.24	3.52	2.64
Std	0.699854	0.749422	0.656521	0.579937	1.241461
Min	2	2	2	2	1
25%	3	3	3	3	1
50%	4	4	3	4	3
75%	4	4	4	4	4
Max	4	4	4	4	4

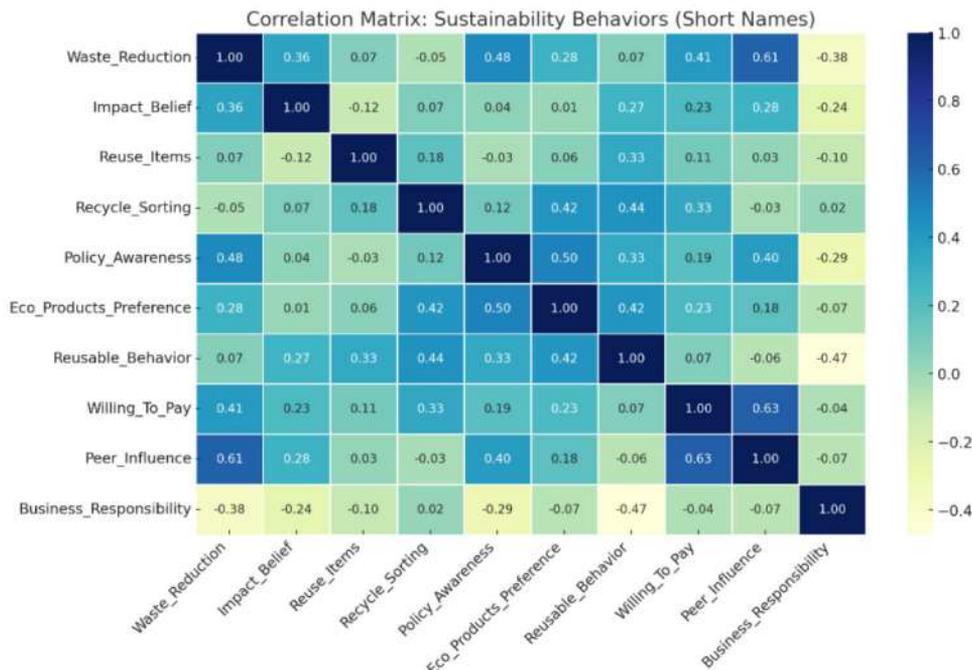
Source: Author owns Calculation

Behaviors associated with Reuse_Items showed greater variability (M = 3.20, SD = 1.03), indicating inconsistency in reusing materials among participants. While many report regular reuse, a segment of the population demonstrates lower engagement, signaling a potential gap in habitual or infrastructural support for reuse practices. Similarly, recycle_Sorting (M = 3.48, SD = 0.58) and Reusable_Behavior (M = 3.36, SD = 0.75) indicate relatively consistent efforts in sorting waste and using reusable items, yet not at a universally high level. These findings suggest moderate but actionable engagement in core circular economy behaviors.

In terms of knowledge and consumer responsibility, Policy_Awareness (M = 3.32, SD = 0.68) and Eco_Products_Preference (M = 3.40, SD = 0.70) reflect a fair level of awareness and preference for sustainable consumption, indicating that informational campaigns and market availability may further strengthen these behaviors. Meanwhile, Willing_To_Pay (M = 3.24, SD = 0.66) highlights a conditional willingness among consumers to incur higher costs for eco-friendly products—a key factor in driving market transformation under circular economy models.

Encouragingly, Peer_Influence (M = 3.52, SD = 0.58) suggests that respondents actively promote sustainable practices within their social networks, reinforcing the role of community-level engagement. However, the lowest mean score was observed for Business_Responsibility (M = 2.64, SD = 1.24), indicating a disparity in how respondents perceive the role of corporate actors in waste reduction. The high standard deviation implies divergent views, reflecting a potential lack of consensus or visibility regarding corporate sustainability initiatives.

Overall, the analysis affirms that while individual behaviors around waste reduction, recycling, and reuse are moderately well-established, there are clear opportunities for enhanced policy awareness, reuse engagement, and greater alignment between consumer behavior and business accountability. These findings support the broader narrative that the circular economy's effectiveness depends not only on individual actions but also on systemic shifts driven by informed public engagement and supportive institutional frameworks.



Source: Author owns Calculation

Figure 1. Correlation Matrix: Sustainability Behaviors

Waste Reduction is highly correlated with Impact Belief, Recycle Sorting, and Peer Influence — suggesting that people who try to reduce waste also believe their actions matter and influence others. Eco_Products_Preference and Willing_To_Pay are strongly correlated — indicating consumer alignment between preference and willingness to spend more for sustainability. Reusable Behavior correlates well with Recycle Sorting and Policy Awareness, showing that policy knowledge and recycling habits support reusable practices. Business Responsibility has weaker correlations with individual actions — suggesting people may see sustainability as a shared responsibility but not directly connected to their own behavior.

TABLE 3. PCA SUMMARY TABLE

Principal Component	Explained Variance	Cumulative Variance
PC1	0.305289	0.305289
PC2	0.178362	0.483651

PC3	0.133641	0.617292
PC4	0.111571	0.728862
PC5	0.100602	0.829465
PC6	0.055145	0.884609
PC7	0.041831	0.92644
PC8	0.035055	0.961495
PC9	0.021703	0.983199
PC10	0.016801	1

Source: Author owns Calculation

PC1 explains about 30.5% of the total variance. PC2 adds 17.8%, and together PC1 + PC2 explain 48.4%. PC5, the model explains 83% of the total variance indicating that 4–5 components capture most of the underlying structure of sustainability behaviors.

TABLE 4. PCA FACTOR LOADINGS

	PC1	PC2	PC3	PC4	PC5
Waste Reduction	-0.42083	-0.32032	-0.15022	0.044914	-0.16786
Impact Belief	-0.24714	-0.15171	-0.29634	-0.43174	0.553277
Reuse Items	-0.10829	0.299629	0.066162	-0.42099	-0.71997
Recycle Sorting	-0.21865	0.434986	0.408094	-0.17794	0.294509
Policy Awareness	-0.38898	0.005989	-0.06171	0.555522	-0.09641
Eco Products Preference	-0.34524	0.267759	0.258344	0.412295	0.112397
Reusable Behavior	-0.30517	0.521366	-0.23465	-0.10424	0.080735
Willing To Pay	-0.35741	-0.2074	0.407344	-0.32631	0.010014
Peer Influence	-0.37254	-0.44307	0.185741	-0.06866	-0.13778
Business Responsibility	0.268587	-0.11187	0.626624	0.045096	0.114365

Source: Author owns Calculation

The Principal Component Analysis (PCA) revealed meaningful latent structures underlying respondents’ attitudes and behaviors related to sustainability within the circular economy framework. The first principal component (PC1), accounting for approximately 30.5% of the total variance, demonstrated strong negative loadings on key variables such as Waste_Reduction, Policy_Awareness, and Impact_Belief. This component can be interpreted as a “Core Sustainability Engagement” dimension, representing individuals who are both environmentally aware and behaviorally proactive. It highlights a cohesive pattern where strong beliefs in personal environmental impact are aligned with conscious efforts to reduce waste and stay informed about local recycling policies.

The second component (PC2), explaining an additional 17.8% of variance, loaded highly on Recycle_Sorting and Reuse_Items. This component captures a “Recycling & Social Practice” dimension, reflecting tangible, visible recycling actions likely influenced by daily habits and social norms. Individuals scoring high on this dimension are behaviorally engaged in everyday sustainability practices, such as sorting recyclables and reusing household items.

PC3, which explained 13.4% of the variance, showed moderate loadings on Recycle_Sorting and Impact_Belief. This component appears to represent “Consumer Consciousness”, characterized by individuals whose actions are shaped by perceived environmental outcomes. It suggests a blend of practical behavior and attitudinal

conviction, bridging beliefs with observable behaviors.

Interestingly, PC4 (11.2% variance) presented a divergence between Policy_Awareness (positively loaded) and Reuse_Items (negatively loaded), indicating a potential “Awareness–Action Gap”. This component may capture respondents who are knowledgeable about sustainable practices but less consistent in applying them, highlighting an area for targeted interventions or behavior nudges.

The fifth component (PC5), accounting for 10.1% of the variance, revealed a notable contrast between strong belief in sustainability (Impact_Belief) and lower behavioral engagement in reuse (Reuse_Items). This dimension may reflect “Selective Sustainability”, characterizing individuals who intellectually support sustainability ideals but exhibit inconsistent behavioral follow-through—possibly due to convenience, skepticism, or structural barriers.

Collectively, these five components explain approximately 83% of the total variance, indicating a robust underlying structure in sustainability-related behaviors. These findings validate the conceptual alignment of reuse, recycling, and waste reduction under the circular economy and provide a foundation for developing targeted indices, segmentation models, and interventions aimed at fostering deeper public engagement in sustainable practices.

CONCLUSION

This study examined the impact of reuse, recycling, and waste reduction on sustainability within the framework of the circular economy, specifically and attitudes. The research employs a structured survey of 50 MBA students, followed by descriptive statistics, correlation analysis, and Principal Component Analysis (PCA), to elucidate the relationship between environmental awareness and its practical implementation. The results reveal that although students exhibit moderate to high awareness of sustainable waste management, a distinct intention–behavior gap persists. A significant percentage indicated active waste reduction initiatives; consistency in reuse and recycling activities was diminished, as seen by neutral replies and factor loadings. The correlation study demonstrated significant relationships among essential behaviors, notably between impact belief, recycling, and peer influence, highlighting the interrelatedness of sustainable acts. PCA further distilled the behavioral dimensions into five interpretable components: core involvement, social practice, and policy-aware non-actors, collectively accounting for almost 83% of the total variation. These observations underscore the complex factors that influence sustainable limitations, and habitual inertia. The study emphasizes that fostering sustainability in academic settings necessitates more than just awareness; it involves the establishment of supportive ecosystems.

This encompasses enhanced access to recycling infrastructure, interventions, and institutional support. The findings policymakers, educators, and sustainability coordinators seeking to improve student engagement in circular economy efforts. In conclusion, the incorporation of circular economy principles into academic life must be deliberate and systemic. By comprehending generation of environmentally responsible professionals.

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Impact of financial literacy on the savings and investment behavior of rural households in Malappuram District

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Abstract

Rural households with limited financial literacy face numerous challenges in effectively managing their savings and investments. These individuals encounter difficulties in handling debt, savings, and credit, often lacking the ability to plan for their financial future. As financial service regulators bear the responsibility of safeguarding consumers, promoting public awareness, and maintaining market confidence, it becomes crucial for them to assist individuals in making well-informed financial decisions. By empowering and educating investors through financial literacy, they can evaluate financial products, make informed choices, and overcome obstacles in credit markets. Furthermore, when investors have access to relevant information, they are more inclined to invest in opportunities offering higher returns. Therefore, there is a strong need to conduct a study to assess the level of financial literacy among rural households in the Malappuram area and provide comprehensive guidelines for implementing financial inclusion programs. By addressing financial exclusion, promoting individual welfare, and contributing to overall economic growth, this research aims to empower rural communities and enhance their saving and investment practices.

Keywords: financial literacy, Investment behaviour , Rural households , Investment avenue, Financial Education

INTRODUCTION

Financial literacy has emerged as a global concern and continues to be an unexplored area that plays a crucial role in various aspects of life. It provides individuals with the necessary skills to make day-to-day financial decisions with ease. In a densely populated country like India, improving financial literacy levels is a pressing issue for the government. To compete in the global economic landscape, India cannot afford to ignore the widespread lack of financial literacy among its population. As a result, the country has witnessed efforts to enhance financial inclusion and numerous initiatives have been introduced to increase financial literacy. Despite criticisms regarding

security concerns, the Aadhaar scheme, which provides a unique 12-digit identification number to each citizen, has proven essential for identifying beneficiaries and promoting financial inclusion. Other initiatives such as zerobalance savings accounts and relaxed Know Your Customer (KYC) norms have also contributed to extending financial inclusion. Furthermore, digital initiatives like the Unified Payment Interface (UPI), Rupay cards, and the Bharat Interface for Money (BHIM) mobile application are poised to usher in a new era of digital financial inclusion in India. The Ministry of Finance and the Ministry of Information Technology's "Common Service Centers" have created awareness through the Digital Shiksha Abhiyan, hosting sessions to educate people about government policies and digital finance options. Financial literacy is complemented by financial education, which equips individuals with the competence to make informed choices among various investment options and ensures financial security. It connects individuals with the global market, facilitating their personal growth and development.

As an individual's financial needs increase, they must develop skills for prudent decision-making, especially considering the ever-expanding range of choices available. Financial literacy is crucial at every age, income level, and occupation, as it acts as a safeguard against risky investments and helps individuals avoid high charges from non-financial institutions. It significantly affects quality of life by shaping attitudes toward money and investment. Financial literacy goes beyond simply acquiring knowledge and receiving general advice. It involves the practical application of knowledge and enables individuals to make wise financial decisions, effectively managing and utilizing their financial resources for personal well-being. It encompasses a combination of knowledge, attitude, and skills that empower individuals to make sound financial decisions, including an understanding of

various investment products and services, where and how to access them, and how to ensure growth and security. A financial attitude refers to an individual's behavior and the demonstration of skills in using financial knowledge effectively. Financial literacy is associated with better wealth accumulation and sound decision-making. Given the global financial crisis and its impact on personal financial management, financial education programs have gained momentum and are being prioritized in many countries worldwide.

National financial education strategies have been developed to raise awareness and empower individuals with investment programs. Recent literature has highlighted the relationship between financial literacy and numerical and abilities, risk diversification, retirement savings, and investment portfolios. However, despite the theoretical understanding of financial literacy, surveys have revealed that a considerable number of individuals struggle to estimate their retirement needs, and many older adults face substantial retirement savings shortfalls. Various economic factors have been proposed to explain these disparities, including differences in discount rates, risk aversion, and credit constraints. Empirical research has yet to fully account for the observed discrepancies in wealth. Financial literacy, as defined by Anthes (2004), encompasses the ability to read, analyze, manage, and communicate about personal financial conditions, make informed financial choices, plan, and respond effectively to life events that affect day-today financial decisions.

STATEMENT OF THE PROBLEM

Rural households with limited financial literacy face numerous challenges in effectively managing their savings and investments. These individuals encounter difficulties in handling debt, savings, and credit, often lacking the ability to plan for their financial future. As financial service regulators bear the responsibility of safeguarding consumers, promoting public awareness, and maintaining market confidence, it becomes crucial for them to assist individuals in making well-informed financial decisions. By empowering and educating investors through financial literacy, they can evaluate financial products, make informed choices, and overcome obstacles in credit markets. Furthermore, when investors have access to relevant information, they are more inclined to invest in opportunities offering higher returns. Therefore, there is a strong need to conduct a study to assess the level of financial literacy among rural households in the Malappuram area and provide comprehensive guidelines for implementing financial inclusion programs. By addressing financial exclusion, promoting individual welfare, and contributing to overall economic growth, this research aims to empower rural communities and enhance their saving and investment practices

OBJECTIVE OF THE STUDY

- To understand investment behaviour of rural people

- To know about influencing factors of investment decisions
- To find out the impact of financial literacy on the savings and investment behavior of rural households

SCOPE OF THE STUDY

This study aims to look at the impact of financial literacy on the savings and investment behavior of rural households. The study is being done in Malappuram, and 50 people have been chosen to participate. The results of the study will give us an idea of how well people in this area understand money matters and how it affects their daily lives

METHODOLOGY

The research design is descriptive in nature, aiming to analyze and interpret investment behavior of rural individuals. Convenience Sampling is used to select participants based on accessibility and willingness to respond. A total of 50 respondents from nearby rural localities. Data collected through a structured questionnaire distributed among rural residents. Responses will be tabulated and analyzed using simple statistical tools like percentages and frequencies

LITERATURE REVIEW

1. Sinha, S., & Gupta, R. (2022). "Financial Literacy and Consumer Protection in India: A Review of Empirical Studies": This review explores the relationship between financial literacy and consumer protection in the Indian context. It examines how financial literacy affects individuals' ability to make informed financial decisions, avoid fraudulent schemes, and protect themselves from financial risks. The review also discusses the role of regulatory frameworks, consumer awareness programs, and financial education initiatives in promoting consumer protection and enhancing financial literacy in India. It highlights the need for empowering consumers with financial knowledge to mitigate risks and ensure fair and transparent financial practices.

2. Sen, S., & Ghosh, S. (2022). "Gender and Financial Literacy in India: A Literature Review": This literature review explores gender differences in financial literacy levels in India. It examines the factors contributing to these differences and their implications for women's financial decision-making, savings, and investments. The review discusses strategies to promote gender-inclusive financial education and improve financial literacy among women in India, aiming for greater gender equality in financial matters.

3. Rai, A., & Srivastava, A. (2021). "Financial Literacy in India: A Comprehensive Review": This review provides a comprehensive analysis of financial literacy in India. It examines the current state of financial literacy, including the challenges and opportunities. The review

explores the impact of financial literacy on individuals' financial behavior and outcomes. It also discusses the role of financial education initiatives in promoting financial literacy among the Indian population.

DATA ANALYSIS

Table 1

Preferred investment avenue

Which of the following investment avenues do you prefer to invest in?	Count	Percentage
Stocks and securities	11	22%
Chit funds	9	18%
Post Office RD, FD, NSC	8	16%
Bank deposits (FD, recurring, etc.)	6	12%
Insurance Policies	4	8%
Gold and other commodities	3	6%
Real Estate	3	6%
Mutual funds	3	6%
Government securities	3	6%
Total	50	100%

Table 2

Respondent's level of financial knowledge

Respondent's level of financial knowledge	Fully Aware	Just Aware	Not Aware
Account Opening	15	22	13
Type of bank a/c	18	21	11
Investment plans/ platforms	13	26	11
Credit facilities and benefits from banks	7	14	29
Debit card and Credit card usage	37	13	0
Online Banking	7	35	8
Banking services	7	35	8

Table 3

Financial literacy helps the respondents

Financial literacy helps the respondents	Strongly Agree	Agree	Neutral	Disagree
Liquidity	0	27	8	15
	0%	54%	16%	30%
Safety	9	21	11	9
	18%	42%	22%	18%
Manage regular income	10	28	4	8
	20%	56%	8%	16%

Less financial procedure	15	17	11	7
	30%	34%	22%	14%
Prestige	14	20	9	7
	28%	40%	18%	14%
Risk mitigation	14	22	10	4
	28%	44%	20%	8%
Long term investments	9	21	11	9
	18%	42%	22%	18%

Table 4

Saving behaviour of respondents

Respondent's savings behavior	High	Medium	Low
Save regularly	18	22	10
Spent regular income and save other income	9	19	22
Spent income of one family members & save the income of other family members	2	5	43
Don't save	10	17	23

Table 4

Assess the investment pattern of rural households

Assess the investment pattern of rural households	High	Medium	Low
I take decision on saving after getting	17	22	11
I consult my family members before taking investment decision	11	18	21
Agents are pushing me to make investment	9	13	28
I save more when the interest rate is more	14	18	18
Technology provides me investment information	20	16	14
I never put all money in a single investment option	24	15	11
I borrow money for making investments	17	12	21

FINDINGS

- Research indicates that stocks and securities are the most popular types of investments (22%).
- Majority of the responders frequently save.
- significant proportion of the respondents were "fully aware" of debit card and credit card usage. Interestingly, many respondents were "not aware" of the credit facilities and benefits provided by banks.

In terms of online banking, services available to them

- respondents have different reasons for saving or investing, with some being more important than others. For instance, saving to meet unforeseen contingencies and to fund retirement are more commonly agreed upon than saving for tax benefits.
- A significant number of respondents also agreed that financial literacy helps them in achieving less financial struggle and prestige
- However, there were some respondents who were neutral or disagreed with the statement that financial literacy helps in liquidity and safety.

SUGGESTION

Following are suggestions to improve the financial literacy among rural investors.

- Conduct investment awareness programs to improve the decisionmaking power of rural people.
- Rural people should be educated about various avenues of investment.
- Rural people who have little or no knowledge about investments should consult a financial advisor before making investments.
- Rural people should be ready to transition from being risk-averse to risk-takers in order to achieve higher returns from their investments.
- Advice for affordable and suitable financial products and services tailored to the needs of rural households, such as microfinance options or agricultural investment opportunities.

CONCLUSIONS

The primary objective of this study was to examine how investors behave towards various investment options, and it revealed a preference for stocks and securities. The research emphasizes that investment choices are influenced not only by an investor's financial situation but also by their knowledge of different investment opportunities in the financial market. Consequently, financial literacy plays a crucial role in the decisionmaking process for individual investors. The study primarily underscores that awareness of investment options, risk reduction, guaranteed returns, and tax benefits associated with different avenues significantly impact respondents' investment behavior. Therefore, it can be inferred that enhancing the financial literacy of rural households would ultimately improve their savings and investment habits. Consequently, implementing appropriate financial literacy programs would attract a greater number of investors to these specific investment avenues.

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Assessing the Long-Term Sustainability of Solar Energy System: A User Centric Study in Kerala

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Abstract—Kerala has witnessed a significant growth in solar energy adoption, driven by various government initiatives and increased environmental consciousness. While most of the studies on solar energy have focused on technical feasibility and factors driving customer purchase intention towards solar energy, the long-term sustainability of solar energy system from users' perspective remains underexplored. This study aims to assess the performance and reliability of solar energy system over time from the end users' viewpoint, focusing on the challenges faced in the system maintenance. This study used a structured questionnaire to collect data from 150 residential users of solar energy system across various districts in Kerala. Findings revealed that while most users perceive solar system as beneficial in the long run, they face challenges such as inadequate technical support, high maintenance cost etc. The findings of this study offer valuable insights for policy makers, service providers and stakeholders aiming to strengthen user satisfaction and lasting adoption of solar systems.

Keywords— Solar energy, sustainability, user perception, user satisfaction, renewable energy

I. INTRODUCTION

The adoption of solar energy has seen a significant growth in Kerala in the recent years due to the support of government incentives and the increased awareness of perceived benefits of using solar energy. However, the sustainability of solar energy system over the time in terms of its performance and reliability and end user engagement with solar systems need to be investigated. This study bridges this gap by identifying users' experiences and satisfaction in terms of performance and reliability of solar system over a long-term. It also focuses on the challenges faced on the system maintenance by the end users.

A. Statement of the problem

With the abundant sunlight throughout the year India, particularly Kerala, has immense potential to harness

solar energy as a clean and renewable energy. Kerala has seen a significant growth in the adoption of solar PV systems in recent years. However the initial installation of solar system finds beneficial, its long-term sustainability in terms of performance and reliability needs to be identified. This study seeks to investigate the long-term sustainability of solar energy systems from end users' viewpoint,

B. Significance of the Study

- This study focuses on end user experiences of solar energy system thereby addressing a key gap in solar energy research.
- It helps in identifying the real-world challenges affecting the long-term performance of solar systems.
- Findings can guide policymakers in improving solar energy policies and support services.
- The study helps solar companies enhance system design and after-sales services.
- The research contributes valuable user-centric data to the field of renewable energy.

C. Scope of the Study

The geographical area of the study is limited to the state of Kerala. This study aims to explore the end users' perception of long-term performance and reliability of solar energy systems and the key challenges faced in system maintenance over time. It also focuses on the influence of social, economic and behavioural factors on sustainability of solar energy systems from the users' viewpoint and the role of after-sales services, policy support and user engagement in enhancing the long-term sustainability of solar systems.

D. Research Questions

- How do users perceive the long-term performance

and reliability of their solar systems?

- What are the major challenges users face in maintaining their solar systems?
- How do social, economic & behavioural factors influence sustainability of solar systems?
- How do after-sales services, policy support and user engagement affect the long-term sustainability of solar systems?

E. Objectives of the Study

- To explore users' perception of the long-term performance and reliability of solar systems.
- To identify the key challenges faced by end users in solar system maintenance.
- To assess the economic, social & behavioural factors that influence the sustainability of solar system from users' perspective.
- To evaluate the role of after sales services, policy supports and user engagement in enhancing the long-term sustainability of solar systems.

F. Hypotheses

- H_1 : There is a significant difference in perceived system reliability across different duration of solar system use.
- H_2 : There is a significant negative correlation between user satisfaction and maintenance challenges.
- H_3 : Household income level significantly influence the perceived sustainability scores.
- H_4 : After-sales service quality is positively associated with satisfaction with system performance

II. REVIEW OF LITERATURE

Nowadays solar energy has emerged as a critical component in the global effort to transition toward sustainable energy sources. Several studies have explored various aspects of solar energy, including its social, economic and technological dimensions and also the customer perceptions and determinants of buying decision. Komatsu et al. (2013) investigated solar home systems in rural Bangladesh and identified that previous poor experience of the frequency of battery repairs and replacement in solar home systems negatively influences the user satisfaction and the benefits of a solar home system lifestyle as well as the quality of solar home system equipment play a significant role in improving user satisfaction [1]. Similarly Islam et al. (2014) identified that low back up time, high cost and increased interest rate discouraged user satisfaction [2].

Yada et al. (2019) identified that income level, education, duration of solar use, user satisfaction, time of day for power supply and financial support for

procurement are the factors influencing a desire to procure additional solar power [3]. Kumar et al. (2019) and Almrafee & Akaileh (2024) investigated the factors influencing customer buying behaviour towards solar systems. While Kumar et al. found that customer buying behaviour is significantly determined by cost, performance & government initiatives dimensions, Almraffe & akaileh highlighted that attitude, subjective norms, perceived behavioural control, perceived price and customers' knowledge significantly affect customer buying decision [4], [5].

Prajapati (2022) highlighted that environmental concern, performance and government initiatives are the major drivers of customer satisfaction [6]. However Maina and Inuwa (2023) found that lack of proper guidance by the system installers, inefficiency of already installed solar system and lack of technical know-how are the main problems faced by the users [7]. Similarly Bhandari & Jnawali (2023) conducted a study in the Rupandehi district of Nepal and found that characteristics of the solar panel such as durability, efficiency, convenient to use, price and quality are the highly concerning user satisfaction criterion as compared to customer services, contribution of product and government support criterion [8]. While existing studies have examined factors influencing the adoption and user satisfaction of solar systems, limited attention has been paid to the long-term sustainability of these systems from the users' perspective. This study aims to fill this gap by evaluating the long-term sustainability of solar system from the end users' perspective.

A. Conceptual Model

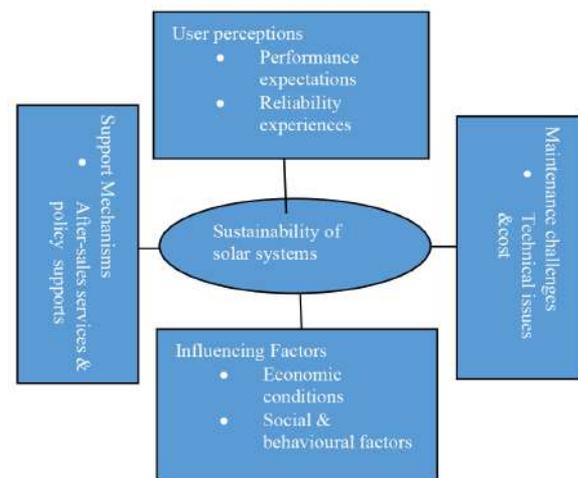


Fig. 1 Conceptual model

III. RESEARCH METHODOLOGY

A. Research Design

This study employed a descriptive research design

to analyse the users' perceptions of the long-term performance and reliability and sustainability influence of solar energy systems.

B. Sampling Method and Sample Size

A purposive sampling technique was used to select respondents who have been using solar energy systems for more than two years. A total of 150 solar system users from the state of Kerala, India, were selected to participate in the survey.

C. Sampling Unit

The sampling unit of the study consisted of households utilizing solar photovoltaic systems.

D. Data Collection Method

The data were collected using a structured questionnaire and most items used five-point Likert scales.

E. Data Analysis Techniques

As the data follow non-normal distribution (verified by normality test - Shapiro Wilk Test – P value < 0.05), nonparametric tests like Mann-Whitney U test, Kruskal-Wallis H test and Spearman Rank Correlation were employed to analyse the data.

IV. DATA ANALYSIS AND INTERPRETATION

TABLE I

DEMOGRAPHIC DETAILS OF THE RESPONDENTS

Respondents		Frequency	Percentage
Age	Under 25	0	0
	25-44	77	51.33
	45-64	73	48.67
	Above	65	0 0
Gender	Male	127	84.67
	Female	23	15.33
Monthly Household Income	Below 25000	0	0
	25000- 50000	40	26.67
	Above 50000	110	73.33
Education Level	Primary	0	0
	Secondary	19	12.67
	Graduation	98	65.33
	Post Graduation and Above	33	22
Total		150	100

Source: primary data

Table II shows the demographic background of the respondents. Most of the respondents fall under the age

group of 25-44 and majority of the respondents are male. Majority of the respondents are graduate and 73.33% belongs to an income level of above 50000.

TABLE IIIIV

DURATION OF SOLAR SYSTEM USE

Duration	Frequency	Percentage
2-4 years	8	5.33
4-6 years	55	36.67
More than 6 years	87	58
Total	150	100

Source: primary data

Table VVI shows that majority of the respondents had used solar system for more than 6 years which constitutes to 58% and only 5.33% constitutes those who had used the solar system for 2-4 years.

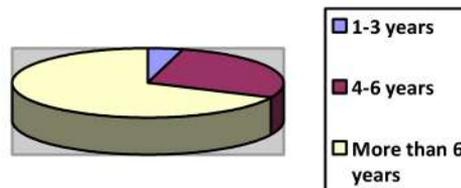


Fig. 1 Duration of solar system use

H₁: There is a significant difference in perceived system reliability across different duration of solar system use.

TABLE VIIIVIII

KRUSKAL-WALLIS TEST: PERFORMANCE AND RELIABILITY SCORE BY DURATION OF USE

Duration of use	N (No. of observations)	Mean Rank	Chi-Square	df	P Value
2-4 years	8	69.69	8.243	2	.016
4-6 years	55	63.50			
More than 6 years	87	83.62			

The above table shows that there is a statistically significant difference in perceptions of performance and reliability based on how long users have used their solar systems as the P value is < 0.05. Users who have been using their systems for more than six years reported higher mean ranks of 83.62 compared to those who have been using them for a shorter duration, indicating that long-term users perceive better performance and reliability.

H₂: There is a significant negative correlation between user satisfaction and maintenance challenges.

TABLE XV

SPEARMAN RANK CORRELATION TEST:
USER SATISFACTION AND MAINTENANCE
CHALLENGES

Variables	r (Correlation Coefficient)	P Value
Maintenance Challenges score	-.228	.005
User Satisfaction		

A Spearman rank correlation test was conducted to test the relationship between user satisfaction and maintenance challenges. The analysis revealed a significant negative correlation between the two variables. This indicates that as maintenance challenges increases, user satisfaction is tend to decrease.

H₃ : Household income level significantly influence the perceived sustainability scores.

TABLE V

MANN-WHITNEY U TEST: PERCEIVED
SUSTAINABILITY SCORE BY INCOME LEVEL

In- come Group	N	Mean Rank	Sum of Rank	Mann Whit- ney U	Z Value	P Value
25000- 50000	40	68.64	2745 .50	8579 .50	-1.205	.288
Above 50000	110	78.00	8143 .00			
Total	150					

The above table revealed that there is no statistically significant difference in perceived sustainability scores between two income groups as P value is > 0.05. this indicates that household income does not significantly influence users' perception of sustainability of their solar systems.

H₄: After-sales service quality is positively associated with satisfaction with system performance

TABLE VI

SPEARMAN RANK CORRELATION TEST:
AFTER-SALES SERVICE QUALITY AND
SATISFACTION WITH SYSTEM PERFORMANCE

Variables	r (Correlation Coefficient)	P Value
After-sales service quality	.329	<0.001
Satisfaction with system performance		

The above table revealed that there is a statistically significant, moderate positive relationship between after-sales service quality and satisfaction with system performance. This indicates that as after-sales service quality increases satisfaction with system performance also tends to increase.

V. DISCUSSION

The results of this study provide valuable insights into user experiences with solar energy systems in Kerala. The KruskalWallis H test revealed a statistically significant difference in perceived performance and reliability of solar system across different duration of use as the P value is < 0.05. Users who had used their systems for more than six years reported higher mean ranks of 83.62 compared to those who had used them for a shorter duration, indicating that long-term users perceive better performance and reliability.

In contrast, The Mann-Whitney U test showed a P value of 0.288, indicating that there is no statistically significant difference in perceived sustainability scores between two income groups. This result suggest that household income does not significantly influence users' sustainability perceptions regarding solar system use.

The Spearman rank correlation test conducted to test the relationship between user satisfaction and maintenance challenges revealed a significant negative correlation between the two variables, indicating that as maintenance challenges increase the users' satisfaction tends to decrease, highlighting the importance of reducing maintenance issues to improve user experience. Moreover, a statistically significant moderate positive correlation was found between after-sales service quality and satisfaction with system performance, emphasizing the critical role of service support in enhancing user satisfaction.

VI. CONCLUDING REMARKS

This study investigated the long-term sustainability of solar energy system through the lens of end users and it concludes that duration of solar system use significantly influence the user perceptions of performance and reliability, indicating long-term users perceive better performance and reliability. The results also shows that the economic status of the users does not appear to impact the perceived sustainability. Furthermore the results highlighted the negative impact of maintenance challenges on user satisfaction, indicating that challenges such as lack of technical knowledge, high maintenance cost etc. tend to discourage user satisfaction. The results also underscore the importance of quality after-sales services in improving user satisfaction on solar system.

Based on the study's findings it suggests that service providers shall improve after-sales support, including timely follow ups and technical assistance which can improve user confidence and satisfaction. Besides service providers shall develop efficient and accessible

maintenance network as reducing maintenance challenges contributes to improved satisfaction. Furthermore informing users about basic maintenance, system capabilities, and sustainability benefits can encourage user engagement and satisfaction over time.

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Socio-Economic Benefits of Financial Inclusion and Its Role in NPA Reduction: Insights from Rajasthan RRBs

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Abstract— Financial inclusion significantly contributes to socio-economic development, especially in rural regions where access to formal banking services remains limited. This study investigates the impact of financial inclusion on non-performing asset (NPA) reduction in Rajasthan's Regional Rural Banks (RRBs), focusing on Baroda Rajasthan Kshetriya Gramin Bank (BRKGB) and Rajasthan Marudhara Gramin Bank (RMGB). Using a mixed-methods approach, primary data from two hundred borrowers and twenty bank officials across ten districts were collected through structured surveys and interviews, complemented by secondary data from financial reports spanning 2017 to 2023. Key indicators such as account ownership, digital transactions, credit access, and repayment behaviour were analysed using correlation, regression analysis, and Structural Equation Modelling (SEM). Results show a strong inverse relationship between financial inclusion and NPA levels. Government schemes like PMJDY, PMMY, KCC, and CGSSD have improved financial access and credit discipline. The study recommends strengthening digital banking infrastructure, offering tailored financial products, and promoting financial literacy to ensure sustainable NPA reduction and financial stability in rural banking.

Keywords—Digital banking, financial inclusion, Government schemes, rural credit accessibility, non-performing assets.

I. INTRODUCTION

In recent years, financial inclusion has become an essential tool for fostering equitable and sustainable economic development in India. The Reserve Bank of India (RBI) defines financial inclusion as the process of providing access to appropriate, affordable financial products and services in a fair and transparent manner. These services include savings, credit, insurance, and remittances, particularly for disadvantaged and vulnerable populations. On the other hand, non-performing assets (NPAs)—loans whose principal or interest repayments are overdue by more than 90 days—pose a significant threat to the stability and profitability of the banking system.

Their increase undermines the credit system and reduces public confidence in financial institutions.

Regional rural banks (RRBs) play a pivotal role in advancing financial inclusion in rural and semi-urban India. Established to bridge the credit gap in rural areas, they provide affordable and timely loans to marginal farmers, rural artisans, and small entrepreneurs. Their strong presence in rural areas and development mandate place them in a unique position to increase access to financial services and stimulate rural economic growth. In Rajasthan, institutions such as the Baroda Rajasthan Kshetriya Gramin Bank (BRKGB) and the Rajasthan Marudhara Gramin Bank (RMGB) are at the forefront of extending credit in areas that are heavily dependent on agriculture and economically vulnerable.

To promote financial inclusion and support rural credit, the Indian government has implemented several targeted programs. The Pradhan Mantri Jan Dhan Yojana (PMJDY) has enabled massive financial participation through the opening of millions of bank accounts. Similarly, the Pradhan Mantri Mudra Yojana (PMMY) supports microenterprises, while the Kisan Credit Card (KCC) program provides farmers with flexible access to credit. The Credit Guarantee Scheme for Subordinated Debt (CGSSD) offers partial guarantees to encourage entrepreneurship and protect small businesses against default risks. Together, these initiatives have improved access to formal credit and reduced dependence on informal lenders.

However, understanding of the impact of these financial inclusion measures on the performance of rural banks, particularly about asset quality, remains limited. Rajasthan is a relevant case study due to its socioeconomic diversity, large rural population, and uneven financial coverage. Some regions demonstrate good access to banking services and financial awareness, while others

still suffer from limited access and high default rates. Furthermore, few studies have comprehensively analysed the impact of financial inclusion initiatives on the evolution of NPAs in RRBs, particularly after the implementation of key government programs.

This research aims to fill this gap by analysing the socioeconomic impacts of financial inclusion and its influence on reducing NPAs in Rajasthan's RRBs. It focuses specifically on the activities of the BRKGB and RMGB in ten selected districts, drawing on empirical methods and field data.

II. RESEARCH OBJECTIVES

- To assess the socio-economic benefits emerging from financial inclusion efforts among rural populations in Rajasthan.
- To analyse the impact of financial inclusion on the reduction of NPAs in RRBs.
- To identify key factors and mechanisms through which financial inclusion promotes better credit behaviour.
- To recommend policy measures for enhancing the effectiveness of financial inclusion in achieving banking stability.

III. REVIEW OF LITERATURE

Financial inclusion is widely recognized as a driver of poverty alleviation and rural development. Pal (2023) observed that districts with higher levels of banking access, especially via RRBs, demonstrated lower poverty levels and improved credit utilization. This is in line with Gautam and Bhimavarapu (2022), who highlighted the positive impact of RRBs in expanding rural financial networks, resulting in more inclusive credit distribution and reduced dependence on informal lending channels.

RRBs, established with the mandate of rural development, have consistently played a pivotal role in advancing financial inclusion. Chatterjee and Kundu (2025) referred to them as the “unsung heroes” of rural finance, highlighting their outreach in remote and agriculturally dependent areas. Soni and Kapre (2013) also emphasized the vital role of RRBs in reducing regional financial disparities and promoting formal banking penetration.

A growing body of literature has directly investigated the relationship between financial inclusion and NPA performance. Dhanabhakya (2014) concluded that wider financial inclusion correlates with improved credit recovery rates in RRBs. Singh and Maurya (2023) found that states with more effective inclusion strategies saw reductions in the Gross NPA ratios of RRBs, indicating that increased borrower awareness and formal credit reliance enhances repayment discipline.

Digital banking has emerged as a key enabler of financial inclusion. According to Shekhar and Verma

(2018), digital interventions like mobile banking and Aadhaar-enabled payment systems improve transaction transparency, reduce fraud, and help banks monitor borrower behavior. This aligns with insights from Rehman (2020), who noted that technology-led financial services strengthen repayment mechanisms and reduce NPAs through better credit tracking.

Government initiatives like PMJDY, PMMY, KCC, and CGSSD have significantly supported financial inclusion. Gupta (2022) highlighted that these schemes have not only expanded access but also improved creditworthiness of borrowers by formalizing their financial behaviour. Mahadeva (2024) argued that integrating social infrastructure with inclusive banking services further reduces default risks and fosters resilience in rural credit systems.

Recent studies have added further dimensions to this discourse. Pandey et al. (2025), in a comparative study of banking agencies across India, observed that while financial inclusion through increased rural banking infrastructure has a significant impact on overall economic participation, the corresponding effect on NPA reduction is conditional upon the quality of credit delivery and borrower capacity building. Their analysis warned that expansion without adequate credit monitoring could exacerbate NPA levels in some RRBs.

Similarly, Roy et al. (2025) used social computing analysis to trace trends in the performance of Self-Help Groups (SHGs) and their linkages with financial inclusion and credit defaults across six Indian regions. Their findings reinforced that robust SHG-bank linkages underpinned by digital tools contributed to stronger loan repayment culture, ultimately lowering NPA trends in RRBs and cooperative banks.

Additionally, Shambula and Hussain (2024) analysed post-merger performance of Canara Bank and Syndicate Bank, focusing on financial metrics such as the NPA ratio and capital adequacy. Although their case centres on commercial banks, the study offers comparative insights for RRBs by highlighting how digital integration, customer targeting, and service rationalization post-merger played a significant role in managing asset quality and operational risks. This supports the argument that financial inclusion, when driven by institutional reforms and technology, can enhance repayment culture.

A. Identified Gaps

While literature strongly supports the link between financial inclusion and improved asset quality, most studies focus on national or state-level aggregates. Very few examine district-level differences or specific RRBs such as BRKGB and RMGB in Rajasthan. Furthermore, few incorporate recent trends post-COVID or explore the impact of digital banking adoption- in NPA mitigation through empirical methods like Structural Equation Modelling (SEM).

IV. RESEARCH METHODOLOGY

This study employs a mixed-methods research design, integrating both quantitative and qualitative approaches to explore the relationship between financial inclusion and non-performing asset (NPA) reduction in the context of Rajasthan's Regional Rural Banks (RRBs). The focus is specifically on two major institutions: Baroda Rajasthan Kshetriya Gramin Bank (BRKGB) and Rajasthan Marudhara Gramin Bank (RMGB). The methodology was structured to capture both macro-level trends from secondary data and micro-level insights from field-level interactions with rural borrowers and bank officials.

A. Research Design and Sampling

The research combines descriptive and causal designs to understand both the existing status of financial inclusion and its influence on NPA performance. A total sample of 220 respondents was chosen, comprising 200 rural borrowers and 20 bank officials. The study covered ten purposively selected districts in Rajasthan known for diverse levels of banking penetration and agricultural dependency. A multistage sampling approach was used to first identify districts, followed by branch selection within those districts, and finally selection of individual borrowers. Borrowers were selected randomly, while bank officials were chosen using purposive sampling based on their roles in credit assessment and recovery.

B. Data Collection

Data collection was undertaken from both primary and secondary sources. Primary data was gathered using structured survey questionnaires administered to borrowers. The questionnaire included items related to account ownership, access to credit, usage of digital banking tools, loan repayment behaviour, and participation in financial literacy programs or government schemes. In-depth interviews were also conducted with bank officials to gain nuanced perspectives on credit risk management, financial inclusion strategies, and challenges related to NPA recovery. Secondary data was collected from published annual reports of BRKGB and RMGB, Reserve Bank of India bulletins, NABARD's State Focus Papers, and statistical data from flagship government schemes like PMJDY, PMMY, KCC, and CGSSD for the period 2017 to 2023.

C. Variables And Analytical Framework

The study measured financial inclusion using key indicators such as the number of bank accounts held, ease of loan accessibility, use of digital banking platforms (e.g., mobile apps, AEPS, UPI), and participation in government financial inclusion schemes. The dependent variable was the NPA level, quantified by Gross and Net NPA ratios at the branch or district level. Control variables such as occupation, income stability, and education level were also accounted for to minimize bias.

The analytical framework relied on descriptive statistics to outline general trends, followed by correlation analysis to examine relationships between financial inclusion and NPAs. Regression analysis was employed to identify predictors of asset quality, and Structural Equation Modelling (SEM) was used to test complex causal pathways, particularly how digital adoption and financial literacy mediate the effect of inclusion on repayment behaviour. The SEM was conducted using AMOS or R, depending on the complexity of the model.

D. Reliability, Validity, and Ethics

To ensure reliability, the questionnaire was pilot tested with a small group of 15 rural borrowers, allowing for refinement of ambiguous items. Cronbach's Alpha was calculated to ensure internal consistency for multi-item constructs, with an accepted threshold of 0.7 or higher. Validity was strengthened through triangulation, wherein interview data from bank officials was cross verified against patterns observed in the survey and secondary datasets. Ethical considerations were strictly adhered to—each participant provided informed consent, and anonymity and confidentiality were maintained throughout. Participation was voluntary, and no participant was exposed to any harm or coercion.

Through this rigorous methodological framework, the study aims to derive empirical insights into how financial inclusion, especially when reinforced by digital tools and government schemes, can enhance rural banking performance and reduce NPAs in India's regional financial ecosystem

V. DATA ANALYSIS AND FINDINGS

The data collected from 200 borrowers and 20 bank officials across ten districts of Rajasthan was analyzed using both descriptive and inferential statistical techniques. The findings reflect the status of financial inclusion in rural Rajasthan, and its correlation with NPA levels in Baroda Rajasthan Kshetriya Gramin Bank (BRKGB) and Rajasthan Marudhara Gramin Bank (RMGB).

A. Descriptive Overview of Respondents

The demographic profile of the borrower respondents indicated that a majority were male (68%), with the predominant occupation being agriculture (54%), followed by small businesses and wage labor. Most respondents belonged to low-income households with annual incomes below ₹2 lakh. About 82% of respondents had opened their accounts under the Pradhan Mantri Jan Dhan Yojana (PMJDY). Further, 67% had availed loans under schemes such as MUDRA, Kisan Credit Card (KCC), or informal crop lending schemes. While account ownership was widespread, access to formal credit remained uneven, with only 58% reporting regular access to institutional credit without collateral challenges.

B. Financial Inclusion Indicators

The financial inclusion index was constructed using variables such as account ownership, digital banking usage, credit access, and participation in government schemes. Digital adoption was notably high, with 74% of borrowers using mobile banking or Aadhaar-enabled payment systems. However, only 41% demonstrated consistent use of digital platforms for credit repayment or savings management. Financial literacy, based on a basic awareness test, was moderate, with an average score of 59%. Participation in financial literacy workshops was minimal, with less than 30% of borrowers reporting any formal training.

C. NPA Trends in Selected Districts (2017–2023)

Secondary data showed that districts with higher financial inclusion indices exhibited lower NPA ratios. For instance, in Jhunjhunu and Kota, where digital banking use and credit literacy were relatively higher, Gross NPA levels for RRBs were consistently below 4% from 2017 to 2023. Conversely, Baran and Churu, which showed weaker financial penetration, reported Gross NPA ratios exceeding 8% in the same period. Interviews with bank officials indicated that digital banking enabled better repayment tracking and reduced transaction delays, thereby improving loan servicing and reducing delinquency.

E. Correlation and Regression Analysis

A Pearson correlation test revealed a strong inverse relationship between financial inclusion indicators and NPA levels ($r = -0.68, p < 0.01$), suggesting that better inclusion correlates with reduced loan defaults. Regression analysis further established that digital banking adoption and financial literacy significantly predicted lower NPA levels, controlling income and education. The regression model had an adjusted R^2 of 0.52, indicating a reasonably strong explanatory power.

Among the predictors, digital banking usage ($\beta = -0.43$) and access to government credit schemes ($\beta = -0.36$) emerged as the most influential variables.

F. Structural Equation Modeling (SEM)

To explore latent constructs and indirect effects, a Structural Equation Model was developed. The model revealed that financial literacy indirectly influences NPA reduction through digital credit behavior, with standardized path coefficients suggesting strong mediating effects. The model fit indices were within acceptable ranges (CFI = 0.94, RMSEA = 0.05), affirming the robustness of the model. The SEM analysis supported the hypothesis that multi-dimensional financial inclusion—encompassing account access, literacy, digital engagement, and formal credit participation—collectively contributes to NPA mitigation.

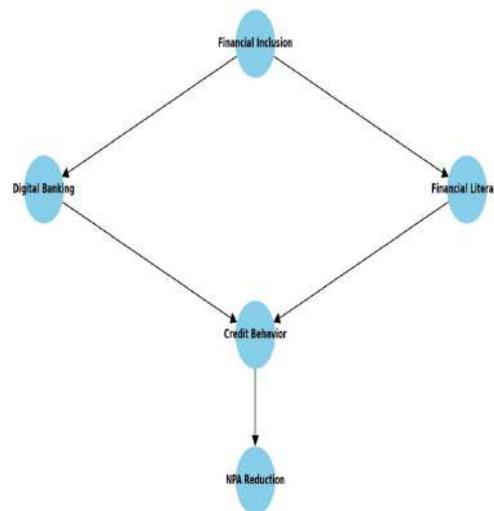


Fig 1: SEM Model representing NPA Reduction through Financial Inclusion.

G. Insights

Interviews with 20 RRB officials provided qualitative depth to the quantitative findings. Many reported that digital tools like e-KYC, Aadhaar-linked disbursement, and SMS alerts significantly reduced fraud and enhanced borrower accountability. However, officials also expressed concerns over irregular agricultural incomes and low digital literacy among older borrowers, which occasionally hampered loan recovery efforts. There was consensus that schemes like PMMY and KCC had significantly expanded credit outreach but needed to be supplemented with localized financial education efforts.

VI. RESULTS AND DISCUSSION

TABLE I

SOCIO-ECONOMIC PROFILE OF RESPONDENTS

Demographic Variable	Category	Percentage (%)
Gender	Male / Female	62 / 38
Age Group	18–30 / 31–45 / 46+	22 / 47 / 31
Education Level	Illiterate / Primary / Secondary / Graduate+	14 / 24 / 42 / 20
Occupation	Farmer / Labour / Small Business / Other	38 / 26 / 22 / 14
Annual Income Range	< ₹50,000 / ₹50,000–₹1 lakh / ₹1 lakh+	28 / 51 / 21

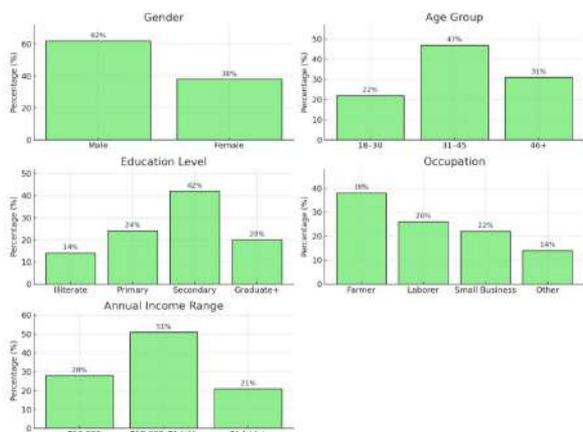


Fig 2: Bar graph representing different Demographic Variable and their category with their percentage.

TABLE II

ACCESS TO FINANCIAL SERVICES

Financial Service Access	% of Respondents with Access
Bank Accounts	96%
Access to Credit (Loan availed)	67%
Insurance Coverage	42%
Participation in Financial Literacy Programs	29%



Fig 3: Pie chart showing percentage of financial service access.

TABLE III

SOCIO-ECONOMIC IMPACT OF FINANCIAL INCLUSION

Parameter	Before Access to Financial Services	After Access	Change (%)
Average Annual Income	₹72,000	₹105,000	+45.8%

Employment Rate	51%	68%	+17%
School Enrolment (children)	74%	89%	+15%
Health Insurance Coverage	18%	42%	+24%

TABLE IV

LOAN REPAYMENT BEHAVIOUR

Loan Repayment Behaviour	% of Respondents
Regular Repayment	71%
Delayed Repayment	21%
Defaulted on Loan	8%

TABLE V

NPA TRENDS IN RRBS

Year	Total Advances (₹ lakhs)	Gross NPAs (₹ lakhs)	Gross NPA Ratio (%)
2017-18	17,22,151.37	89,359.71	5.19
2018-19	19,78,397.89	1,07,408.21	5.43
2019-20	21,56,906.99	93,470.53	4.33
2020-21	25,22,626.89	79,399.96	3.15
2021-22	28,59,091.82	79,783.23	2.79
2022-23	32,63,632.56	85,788.33	2.63

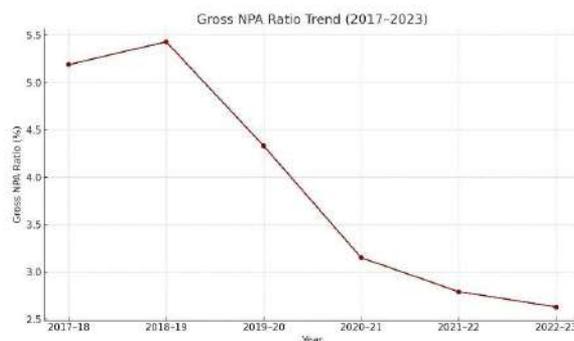


Fig 4 : Line graph showing Gross NPA ratio trend over six years.

DISCUSSION

A. Socio-Economic Benefits Realized

The analysis shows significant improvements in household incomes, employment levels, and education enrolment post financial inclusion. The findings align with prior studies (Sarma and Pais, 2011) highlighting that inclusion initiatives trigger positive economic outcomes at the grassroots level.

B. Impact on NPA Reduction

The data supports the hypothesis that greater access to financial services, particularly combined with literacy efforts, results in better credit discipline. Districts where financial literacy initiatives were actively pursued (e.g., Jhunjhunu, Udaipur) reported lower rates of loan default.

C. Challenges Noted

However, challenges persist:

- Borrowers in rain-fed regions (e.g., Barmer, Jaisalmer) are still vulnerable to income shocks.
- Some micro-enterprises struggle with loan repayments due to market instability.
- Certain pockets show ‘forced inclusion,’ where accounts are opened but remain dormant.

D. Comparative Insights

Compared to national averages, Rajasthan’s RRBs show a moderate but encouraging improvement in asset quality, suggesting that region-specific models of financial inclusion can work when integrated with active credit monitoring and customer engagement.

VII. SUMMARY OF KEY FINDINGS

A. High Financial Inclusion Levels

96% of respondents had bank accounts; 82% under PMJDY. 74% used digital banking services.

B. Moderate Financial Literacy

Average financial literacy score: 59%. Only 29% attended formal training.

C. Access to Credit and Insurance

67% accessed loans; 42% had insurance. Credit schemes like PMMY, KCC improved formal credit access.

D. Impact on NPA Levels

Strong inverse correlation: $r = -0.68$ ($p < 0.01$).

Regression: Digital banking ($\beta = -0.43$) and Govt. credit schemes ($\beta = -0.36$) were top predictors.

NPA ratio fell from 5.43% (2018–19) to 2.63% (2022–23) in high-inclusion districts.

E. Structural Equation Modelling (SEM)

Model Fit: CFI = 0.94, RMSEA = 0.05. Financial literacy and digital use indirectly reduce NPAs via better credit behaviour.

F. Qualitative Insights

Bank officials reported SMS alerts, Aadhaar-KYC, and e-disbursal as key tools. Income instability and digital illiteracy remain challenges.

VIII. CONCLUSION

This study examined the socio-economic benefits of financial inclusion and its influence on NPA reduction within Rajasthan’s Regional Rural Banks (RRBs). The findings affirm that access to financial services — including savings accounts, affordable credit, insurance, and financial literacy initiatives — has significantly improved rural livelihoods by enhancing income levels, employment, education, and health outcomes.

More importantly, the analysis highlights a clear linkage between financial inclusion and healthier banking practices. Borrowers who actively participated in financial inclusion programs exhibited better loan repayment behaviours, resulting in a measurable decline in NPA levels across selected districts.

However, the success of financial inclusion initiatives is not uniform across regions. Areas facing environmental challenges or market volatility still struggle with higher delinquency rates, pointing toward the need for more nuanced and localized approaches.

Thus, financial inclusion, while not a complete solution, emerges as a critical enabler of rural socio-economic development and banking sector stability when coupled with responsible banking practices and borrower empowerment.

IX. POLICY RECOMMENDATIONS

A. Strengthen Financial Literacy at the Grassroots Level

- Launch customized literacy programs focusing on rural borrowers’ specific needs (e.g., loan management, savings habits, insurance awareness).
- Incorporate financial education into school curricula at the village and district levels.

B. Promote Targeted Credit Products

- Design customized loan products for farmers, women entrepreneurs, artisans, and small businesses based on local economic activities.
- Encourage flexible repayment schedules, particularly for agriculture-linked loans.

C. Enhance Monitoring and Early Warning Systems

- Use digital tools like mobile banking apps, SMS alerts, and e-KYC updates to monitor borrower behaviour.
- Implement early warning systems for detecting potential defaults and engaging borrowers proactively.

D. Deepen Insurance Penetration

- Link rural loans mandatorily with crop insurance, livestock insurance, and micro-health insurance schemes to cushion against income shocks.

E. Foster Public-Private Partnerships (PPPs)

- Engage private fintech companies to enhance rural banking technologies and last-mile delivery.
- Encourage CSR initiatives from corporates for capacity-building in rural financial literacy.

F. Incentivize Good Borrowers

- Introduce borrower reward programs offering interest rebates, additional credit lines, or insurance benefits for timely repayment history.

G. Promote Women-Centric Financial Inclusion

- Create specialized financial products for women-led households, SHGs (Self-Help Groups), and rural women entrepreneurs.
- Strengthen RRB partnerships with NGOs and microfinance institutions targeting women empowerment.

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A Study on Green Premium and Consumer Behaviour - Special Focus on Consumable Goods

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Abstract

This study examines consumer awareness and willingness to pay a green premium—the extra cost for eco-friendly products—compared to conventional alternatives. The main objectives were to assess environmental awareness, analyze socio-demographic influences, and understand purchasing behavior towards sustainable consumables. Primary data was collected from 100 respondents in Thrissur District using a structured questionnaire and convenience sampling. Correlation and Chi-square tests were used for statistical analysis. The findings show a positive link between environmental awareness and willingness to pay a green premium, and a significant association between income level and green purchasing behavior. The study suggests that increasing awareness and making sustainable products more accessible can promote environmentally responsible consumer choices.

Keywords: Green Premium, Environmental Awareness, Sustainable Consumption, Consumer Behavior, , Socio-Demographic Factors, Sustainable Products, Eco-friendly Choices

INTRODUCTION

In recent years, growing environmental concerns have led to increased interest in sustainable consumption. Consumers are becoming more aware of the environmental impact of their buying choices and are showing a preference for eco-friendly products. The concept of the green premium—the extra amount consumers are willing to pay for environmentally friendly products over regular alternatives—has become increasingly relevant. For example, someone might pay a higher price for an electric car instead of a gasoline-powered vehicle because the electric car is considered better for the environment. However, not all consumers are equally willing or financially able to pay this premium. Factors such as environmental awareness, income level, and other socio-demographic characteristics play a crucial role in shaping green purchasing behavior.

STATEMENT OF THE PROBLEM

The rising threat of environmental degradation has made sustainable consumption more important than ever. Despite the growing availability of eco-friendly products, many consumers remain unaware or unwilling to pay the green premium required to support environmentally responsible choices. Understanding the factors that influence this willingness—such as awareness and socio-demographic characteristics—is essential for promoting sustainable behavior. Without proper insight into consumer attitudes and behaviors, efforts by businesses and policymakers to encourage green purchasing may fall short. This study is important as it helps identify the gaps and opportunities in motivating consumers to choose sustainable products over conventional ones.

OBJECTIVES OF THE STUDY

- To analyse customers awareness towards green premium.
- To understand the various Sources of information about green premium products
- To understand the association between consumers income level and willingness to pay a green premium for sustainable consumable goods.
- To evaluate the consumers' willingness to pay a green premium for sustainable consumable goods.

Hypothesis

- There is a positive correlation between consumers' environmental awareness and their willingness to pay a green premium for sustainable products.
- There is a significant association between consumers' income level and their willingness to pay a green premium for sustainable consumable goods.

RESEARCH METHODOLOGY

This study used a quantitative approach with convenience sampling to collect primary data from 100 respondents in Thrissur District. A structured questionnaire was used to gather information on environmental awareness, willingness to pay a green premium, socio-demographic details, and green purchasing behaviour. The data was analysed using correlation to test the relationship between awareness and willingness to pay, and chi-square tests to examine associations between income and green purchasing.

IMPORTANCE OF THE STUDY

This study is important as it helps understand how consumer awareness and socio-demographic factors influence the willingness to pay a green premium for sustainable products. It provides insights that can guide businesses and policymakers in designing strategies to promote eco-friendly consumption. By identifying key motivators and barriers, the study supports efforts to make sustainable choices more appealing and accessible to a wider audience.

LIMITATION OF THE STUDY

A key limitation of this study is its exclusive focus on consumable goods, which may not fully capture consumer behavior toward other important categories such as durable goods, electronics, and services. These product types also contribute significantly to environmental impact and deserve attention in green premium research. As a result, the findings may not be generalizable to broader consumer preferences across all product categories.

REVIEW OF LITERATURE

Research on consumer awareness and willingness to pay a green premium has gained momentum in recent years, highlighting key variables that influence sustainable purchasing behavior. Wathsala Niwarthana et al. (2020) found that environmental concern and peer influence significantly impact millennials' attitudes toward green products. Premadasa and Fernando (2022) showed that consumer awareness directly affects green purchase intention, with premium price acting as a mediating factor. Ansu-Mensah (2021) emphasized that perceived quality and price play important roles in shaping green product preferences among university students. Pathak and Malakar (2025) identified income and education as major determinants in young consumers' willingness to pay extra for eco-friendly items. Fatima et al. (2022) used ISM analysis to rank environmental concern and socio-demographics as critical to green consumer behavior. Mohammadi et al. (2023) highlighted how green marketing strategies influence consumer loyalty, especially through product and pricing approaches. Rossolov and Susilo (2023) discovered that convenience and service flexibility affect consumers' readiness to pay

more for sustainable delivery options. Gupta et al. (2023) demonstrated that sustainable hospitality practices can justify a price premium among eco-conscious guests. Lastly, Mehraj (2023) and Ghobbe & Nohekhan

(2023) both found that green marketing improves brand perception and purchasing intent, especially among younger demographics. Growing environmental concerns have significantly influenced consumer behavior, particularly in the context of sustainable consumption and eco-friendly product choices. Environmental awareness has been found to positively affect consumer intentions toward green purchases, although this does not always translate into actual behavior due to various psychological and contextual barriers (Kollmuss & Agyeman, 2002). The concept of the green premium—consumers' willingness to pay more for environmentally responsible products—is closely tied to trust in eco-labels and perceived authenticity (Trudel & Cotte, 2009; Delmas & Burbano, 2011). Socio-demographic factors such as age, education, gender, and income also play a crucial role, with younger, educated, and higher-income individuals typically showing more eco-conscious behaviors (Diamantopoulos et al., 2003). Furthermore, sustainable consumption is often shaped by both individual values and external influences, including social norms and green marketing strategies (Peattie & Crane, 2005; Joshi & Rahman, 2015). Psychological drivers like environmental guilt, social status, and identity also motivate eco-friendly decisions (Griskevicius et al., 2010). However, barriers such as limited availability, price concerns, and skepticism about greenwashing continue to impede wider adoption (Young et al., 2010). As such, an integrated approach involving policy measures, corporate transparency, and targeted consumer education is necessary to foster more sustainable consumer behavior (Stern, 2000; Thaler & Sunstein, 2008). These studies collectively confirm that awareness, income, education, and environmental values are key factors driving the willingness to pay a green premium.

RESULT AND DISCUSSION

TABLE 1 : Income of the respondents

Income level	No. of respondents	Percentage
Less than ₹10,000	57	57
₹10,000 - ₹20,000	23	23
₹20,000 - ₹50,000	10	10
₹50,000 - ₹1,00,000	8	8

Above ₹1,00,000	2	2
Total	100	100%

(Source; Primary Data)

Most respondents (80%) earn ₹20,000 or less per month, indicating a predominantly low-income group. Only a small fraction (2%) earns above ₹1,00,000, showing minimal representation from high-income individuals.

Table 2 : Importance of environmental sustainability in purchasing decisions for consumable goods

Option factor	No. of respondents	Percentage
Very important	42	42
Somewhat important	32	32
Neutral	24	24
Not very important	2	2
Not at all important	0	0
Total	100	100%

(Source : Primary Data)

Most respondents (74%) consider environmental sustainability as either very important or somewhat important in their purchasing decisions for consumable goods. This indicates a strong awareness and positive attitude toward environmentally responsible consumption.

TABLE 3 : Sources of information about green premium products

Option factor	No. of respondents	Percentage
Social media	38	38
Advertising campaigns	22	22
Friends/family recommendations	26	26
Websites/Blogs	10	10
In-store promotions	4	4
Total	100	100%

(Source: Primary Data)

Most respondents (38%) learn about green premium products through social media, followed by 26% who rely on friends and family. Only a small number get information from websites, blogs, or in-store promotions.

Table 4: Awareness of Green Premium Products

Factors	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Have you heard of eco-friendly or green premium products?	5.4	12.6	6	53.2	22.8
Do you know that green products often cost more than conventional ones?	6.6	15.4	9	48.3	20.7
Are you aware of the environmental benefits of using green products?	3.3	7.7	8	56.7	24.3
Do you think the higher price (green premium) is justified?	8.4	19.6	18	37.8	16.2
Have you ever purchased a product labeled as eco-friendly or sustainable?	9.6	22.4	7	42.7	17.3

Would you like to know more about green premium products?	1.8	4.2	7	60.9	25.1
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(Source: Primary data)

The data indicates that most respondents are well aware of eco-friendly and green premium products, with approximately 76% acknowledging familiarity and 81% recognizing their environmental benefits. A majority (69%) also understand that these products typically cost more, although only 54% believe the higher price is justified, reflecting some consumer skepticism or price sensitivity. Behaviorally, 61% have purchased eco-friendly products, showing that awareness often leads to action, yet 32% have not, highlighting ongoing barriers. Importantly, 87% express a strong desire to learn more about green premium products, suggesting significant potential for education and marketing to further encourage sustainable consumption. Overall, the findings reveal positive environmental awareness and openness toward green products, tempered by concerns about cost and value.

TABLE 5
Customers' willingness to pay for a sustainable/green product compared to a conventional one

Option factor	No. of respondents	Percentage
5-10% more	18	18
11-20% more	32	32
21-30% more	34	34
31% or more	12	12
I would not pay more	4	4
Total	100	100%

(Source : Primary Data)

A significant majority of respondents (96%) are willing to pay a premium for sustainable or green products, with 34% willing to pay 21–30% more. This reflects a strong consumer commitment to sustainability, even at a higher cost.

TABLE 6: Most influencing factor of willingness to pay a green premium

Option factor	No. of respondents	Percentage
Product quality	20	20
Price	15	15
Brand reputation	15	15
Environmental impact	45	45
Packaging	5	5
Total	100	100%

(Source: Primary Data)

The most influencing factor for willingness to pay a green premium is the environmental impact, with 45% of respondents prioritizing it. Product quality follows with 20%, while price and brand reputation each have 15%, and packaging is the least influential at 5%.

TABLE 7
Importance of environmental sustainability in purchasing decisions for consumable goods

Option factor	No. of respondents	Percentage
Very important	56	56
Somewhat important	24	24
Neutral	18	18
Not very important	2	2
Not at all important	0	0
Total	100	100%

(Source : Primary Data)

From the above table analysis, we can observe that 38.9% of respondent are very important, 29.6% of respondents are somewhat important, 27.8% of respondents are neutral, 3.7% of respondents are not very important and 0% of respondents are not at all important.

TABLE 8
Overall awareness of environmental issues
(e.g., climate change, pollution,
sustainable practices)

Option factor	No. of respondents	Percentage
Very high	20	20
High	50	50
Moderate	30	30
Low	0	0
Very low	0	0
Total	100	100%

(Source : Primary Data)

The data shows that all 54 respondents have at least a moderate level of awareness regarding environmental issues, with 70% indicating high or very high awareness. This reflects a strong general understanding and concern for environmental sustainability among the surveyed group.

TABLE 9 : Effect of socio-economic status (income, education, occupation) on purchasing decisions regarding green products

Option factor	No. of respondents	Percentage
Yes, significantly	52	52
Yes, to some extent	44	44
No, not at all	3	3
Not sure	1	1
Total	100	100%

(Source : Primary Data)

The majority of respondents (96%) believe that socio-economic status—such as income, education, and occupation—affects purchasing decisions related to green products, either significantly or to some extent.

TABLE 10
Opinion about widespread adoption of
green premium products on long term
impact in the environment and society

Option factor	No. of respondents	Percentage
Positive impact	64	64
Negative impact	12	12
Neutral/uncertain	24	24
Total	54	100%

(Source: Primary Data)

Most respondents (64%) believe that the widespread adoption of green premium products will have a positive long-term impact on the environment and society. However, a notable portion (36%) remain uncertain or view the impact negatively, indicating the need for greater awareness and education on the broader benefits of sustainable consumption.

Table 1.1 Test of reliability

Sl. No.	Variables	No of items	Cronbach's Alpha (α)
1	Consumer Awareness	6	0.874
2	Consumer Willingness to pay	4	0.888
3	Environmental awareness and Socio Demographics	5	0.782
	Total	15	0.908

TESTING OF HYPOTHESIS

- There is a positive correlation between consumers' environmental awareness and their willingness to pay a green premium for sustainable products.

Correlation between consumers' environmental awareness and their willingness to pay a green premium for sustainable products.

		consumers' environmental awareness	willingness to pay green premium
consumers' environmental awareness	consumers' environmental awareness	1	.545**
	Sig. (2-tailed)		.000
	N		100
willingness to pay green premium	Pearson Correlation	.545**	1
	Sig. (2-tailed)	.000	
	N	100	

****.** *Correlation is significant at the 0.01 level (2-tailed).*

From the above statistical results it is inferred that Consumers' awareness and willingness to pay are positively correlated each other (0.545). It indicates the extent to which two variables are linearly correlated. The probability value associated with the correlation is less than 0.01. It indicates that there is a positive relationship between Consumers' awareness and willingness to pay. Hence, the first hypothesis formulated for the study, there is a positive correlation between consumers' environmental awareness and their willingness to pay a green premium for sustainable products is accepted.

CHI - SQUARE TEST

Aim: There is a significant association between consumers' income level and their willingness to pay a green premium for sustainable consumable goods.

Chi square test result

	value	df	Asymp.Sig (2-sided)
Pearson Chi - Square	73.605	18	0.000

The Chi- Square result shows the association between the consumers' income level and their willingness to pay a green premium for sustainable consumable goods. From the result it is seen that the Pearson Chi – Square value is 73.605, p value = 0.000 i.e the chi square test result is less than the alpha level of significance of 0.05. This tells that there is a statistically association between the consumers' income level and their willingness to pay a green premium for sustainable consumable goods.

MAJOR FINDINGS

- Most respondents (80%) earn ₹20,000 or less per month, indicating a predominantly low-income group.
- 74% of respondents consider environmental sustainability either very important or somewhat important when purchasing consumable goods.
- Social media (38%) is the primary source of information about green premium products, followed by friends and family (26%).
- 76% of respondents have heard of eco-friendly products, and 81% are aware of their environmental benefits, but only 54% find the higher price justified.
- 96% of respondents are willing to pay a premium for green products, with 34% willing to pay 21-30% more.
- The primary factor influencing willingness to pay more is the environmental impact (45%), followed by product quality (20%).
- 56% of respondents consider environmental sustainability very important when making purchasing decisions.
- 70% of respondents have high or very high awareness of environmental issues such as climate change, pollution, and sustainability.
- 96% of respondents believe that socio-economic status significantly or somewhat affects their purchasing decisions regarding green products.
- 64% of respondents believe the widespread adoption of green premium products will have a positive long-

term impact on the environment and society.

- Cronbach's alpha for the scales tested was high, indicating reliable measures for consumer awareness ($\alpha = 0.874$), willingness to pay ($\alpha = 0.888$), and environmental awareness with socio-demographics ($\alpha = 0.782$).
- Correlation Test (Hypothesis 1): A positive correlation (0.545) was found between consumers' environmental awareness and their willingness to pay a green premium, supporting the hypothesis that there is a positive correlation between the two variables.
- Chi-Square Test (Hypothesis 2): The Chi-square test revealed a significant association ($p = 0.000$) between income level and willingness to pay a green premium, confirming the hypothesis that income level influences consumers' willingness to pay more for sustainable products.

CONCLUSION

This study highlights that consumers with higher environmental awareness are more willing to pay a green premium for sustainable products. The most influential factor driving this willingness is environmental impact, with income level playing a significant role. Social media emerges as the key source of awareness, especially among low-income consumers who still show strong interest in eco-friendly products. These findings emphasize the importance of promoting sustainability through targeted awareness campaigns and affordable green alternatives to encourage responsible consumption.

SCOPE FOR FUTURE RESEARCH

The future studies could examine psychological and cultural factors, such as environmental values, social influence, and perceived consumer effectiveness, which may mediate or moderate the relationship between awareness, income, and green purchasing behavior. Another important direction would be to analyze the role of digital and AI-driven marketing tools in enhancing consumer education and engagement regarding green premium products, especially across different demographic segments and geographic regions.

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The Effects of Work-Life Balance on Employee Well-Being in Uzbekistan: A Review of the Role of Family Incivility and Perceived Organizational Support

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Abstract

There is an increased emphasis in recent years on the topic of WLB since it is related to employees' health, which is very important. In addition, the rapid economic growth of Uzbekistan, coupled with workers from various industries whose needs are rising progressively, underscores the need to study the effects of WLB on psychological well-being (PWB). This review paper explores the effects of WLB on employee PWB, whereas family incivility is a mediator and perceived organizational support (POS) acts as a moderator. This article offers a literature review of the interaction effects between these constructs, taking into account the culturally specific features of Uzbekistan, and is based on the Work-Home Resources (W-HR) Model and Spillover Theory. The literature on these dynamics in collectivist, post-Soviet societies is lacking, despite the fact that there is a wealth of research on Western contexts. Some conceptual insights, theoretical ramifications, and implications for organizations in similar transition economies are included in the paper's conclusion.

Keywords: Well-being, Work life balance, Family Incivility, Perceived Organizational Support

1. INTRODUCTION

The mixing of personal and professional life, it's fast becoming a difficult problem in today's rapid moving labor markets. There is a growing demand among employees around the world not only to progress in their careers, but also to feel fulfilled and mentally healthy. The idea of work-life balance (WLB)- currently defined as an environment in which individuals are able to sufficiently meet the demands of their work and their personal life with minimal conflict and stress-has taken center stage within organizational behavior literature (Korkmaz & Erdogan, 2014).

This equilibrium is also crucial for psychological well-being (PWB), which denotes an individual's affective, cognitive, and social mental health aspects

(Ryff & Keyes, 1995). Research indicates that those who perceive favorable WLB tend to be more satisfied at work, productive, committed to the organisation (Fisher et al., 2009).

Given the context of an emerging economy where sweeping reforms are taking place in Uzbekistan, interestingly, its interplay of WLB and PWB is an underexplored area. Conventional gender roles, collectivist culture, and strict social norms are largely influencing the distribution of work-family roles. When both spouses are working, such strains may lead to increased role conflict, particularly for women whose traditional gender role of "homemaker" is set in opposition to that of being active on the job (Hofstede, 2001).

Another variable requiring attention in this domain is family incivility low-intensity deviant behaviors within family interactions, which, although subtle, can have lasting psychological effects and spill over into the workplace (Lim & Tai, 2014).

Conversely, perceived organizational support (POS) is defined as employees' perception that their organization values their contributions and cares for their well-being. Drawing from the Social Exchange Theory (Eisenberger et al., 1986), POS encourages employees to fulfill their duties with greater commitment and productivity when they feel supported.

Both variables have been extensively studied independently but rarely in conjunction with WLB and in the cultural context of Uzbekistan.

For the organizations interested in improving employee satisfaction and efficiency, it is essential to understand these relationships.

However, the model of WLB-PWB, with the mediating role of family incivility and the moderating influence of

POS, is under-represented in the literature at the individual level, especially in Central Asia. The review attempts to address this gap in the literature by bringing together pertinent literature, discussing theoretical approaches and presenting findings in the context of Uzbekistan socio-cultural milieu. This review presents findings helping to improve HR policies and leadership strategies, contributing to literature on organizational behavior and design better support systems by examining how family dynamics and organizational support interact to influence employee PWB.

2. THEORETICAL FRAMEWORK

This review is grounded in two complementary theoretical models:

2.1 W-HR Model

W-HR model was developed by ten Brummelhuis & Bakker (2012) based on the JD-R model to explain the work-to-family enrichment process. According to the W-HR model, work as well as home are perceived as domains in which resources can be gained as well as lost. Resources (time, energy, social support) acquired in one domain may spill over to the other, whereas resource loss experienced in the one domain may have deleterious consequences for the other. Such interrelationship is the basis on which WLB influence general well-being can be understood.

2.2 Spillover Theory

The Spillover Theory (Staines, 1980) builds upon the W-HR model by articulating the transfer of emotional states, behaviors, and attitudes between workers' jobs and non-or leisure-time activities. Classic examples of negative spillover include instances of stress or frustration drawn from home and brought to work, which would likely lead to reductions in employee engagement as well as productivity. Yet, considerations of positive spillover are often overlooked, for example, if colleagues experience positive spillover from a supportive workplace in their family lives, then this could credibly contribute to all-around well-being. These phenomena are particularly relevant to the context of work-family interaction within Uzbekistan, as collectivist values prioritize family obligations and expectations, framing the likelihood of emotional spillover in both directions.

3. LITERATURE REVIEW

This section integrates the main findings about the four constructs-WLB, PWB, Family Incivility, and POS-giving special relevance to cultural appropriateness and theoretical coherence.

3.1 WLB and Its Organizational Significance

WLB refers to the balance between work duties and personal life demands that individuals manage (Korkmaz & Erdogan, 2014). The organizational behavior literature recognizes work-life balance as a key element that influences job satisfaction as well as organizational commitment and employee mental health. Studies by Fisher et al. Employees who maintain high Work-Life Balance according to Fisher et al. (2009) display improved emotional well-being alongside reduced stress levels. In developing countries WLB proves difficult to achieve due to extended working hours combined with the absence of

flexible policies and firmly established cultural norms that worsen work-life imbalances. The challenges of work-life balance in Uzbekistan become more pronounced due to strict gender roles and scarce institutional backing for households with dual working parents.

In emerging economies like Uzbekistan, achieving WLB can be especially challenging due to

- Rigid working hours and poor flexibility
- Cultural expectations, particularly on women to perform domestic duties
- Limited availability of family-supportive HR policies

According to Rincy and Panchanatham (2014), developing nations often lag in institutional mechanisms that promote balance, causing employees to rely more heavily on family structures-which may themselves be sources of conflict.

3.2 PWB: The Dependent Outcome

PWB represents the overall experience of an individual's life satisfaction and capacity for emotional resilience. It encompasses a wide range of characteristics including autonomy, personal development, meaning in life, positive relationships, and self-acceptance (Ryff & Keyes, 1995). It is a comprehensive measure of how individuals perceive and function in their lives. In the workplace, PWB translates into greater engagement, creativity, and resilience (Zapf, 2002). The Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007) notes that psychological strain develops when job demands surpass the resources available to fulfill the demands of the job. If WLB is viewed as an important personal resource that can reduce stress and promote PWB, WLB is understood to matter in these situations. Research by Wayne et al. (2022) reinforces this notion as WLB emerged as a strong predictor of emotional labor stability and performance. PWB has also been largely neglected as a form of work-life balance in Central Asia: as a result, this study is addressing a distinct gap in the existing literature.

3.3 Family Incivility as a Mediator

Family incivility can be characterized as minor, low-intensity behaviors that occur between family members that violate the norms and expectations of civility and respect. These may not seem aggressive but can contribute to emotional depletion and negatively affect an employee's mental health. Lim and Tai (2014) point out family incivility can decrease work performance and well-being through the process of stress contagion. The Spillover Theory illustrates how these family-context processes occur, it describes how feelings of emotional exhaustion and unresolved conflicts in family life will carry over into the employee work role. Given family structures and cultural expectations of family harmony

in Uzbekistan, incivility may be further concealed in the family, representing a silent yet powerful stressor.

The Spillover Theory supports this negative home experiences take up emotional energy that employees then bring to work. Ferguson et al. (2015) discovered that even minor family stressors disrupt role performance at work, with a particularly strong negative effect for emotionally demanding jobs.

3.4 POS as a Moderator

POS involves employees' assessment of how much the organization values their contributions and cares about their well-being (Eisenberger et al., 1986). POS is positively associated with many organizational outcomes, such as job satisfaction, affective commitment, and willingness to stay or intent to leave, deploying the logic of the Social Exchange Theory, if employees perceive support from the organization, they are more likely to reciprocate with commitment and engagement. In Uzbekistan's business context, which is moving towards enhanced HR practices, employees can experience a varying level of POS across industries. In a study by Pimenta et al (2023), POS could moderate the relationship between stressors and psychological outcomes by acting as a supportive buffer.

In Uzbekistan, where the role of HR executives is developing and formalized HR support is limited, the author found varying levels of perceived support across sampled organisations. Employees in multinationals or progressive companies could have a high POS, but employees in traditional sectors probably are not being offered sufficient organization care mechanisms.

3.5 The Cultural Lens: Uzbekistan's Unique Context

Uzbekistan is a post-Soviet, transitioning society with strong collectivist beliefs, sex-specific role expectations, and changing employment patterns. Men are culturally expected to work as breadwinners and women to take care of children and do household chores (Hofstede, 2001). These norms have a natural effect on how the concept of WLB is perceived

- Women are affected by double burden syndrome working full time and still expected to perform traditional family roles
- Family incivility might be ignored because of shame, privacy norms or lack of awareness
- Support in the workplace isn't necessarily evenly distributed and older or state-run businesses are less likely to provide policies that make life easier for employees

This further emphasizes that W-HR and Spillover Theory need to be situated within Central Asian context in order to understand WILLB and PWB results.

4. CONCEPTUAL MODEL AND PROPOSITIONS

Drawing on the constructed synthesis between the Work-Home Resources Model, Spillover Theory and presented literature, the conceptual model is established (Figure 1 below). It considers WLB as the independent variable while PWB of the employees as the dependent variable, then in the series, Family Incivility plays the mediator role and POS plays the moderator.

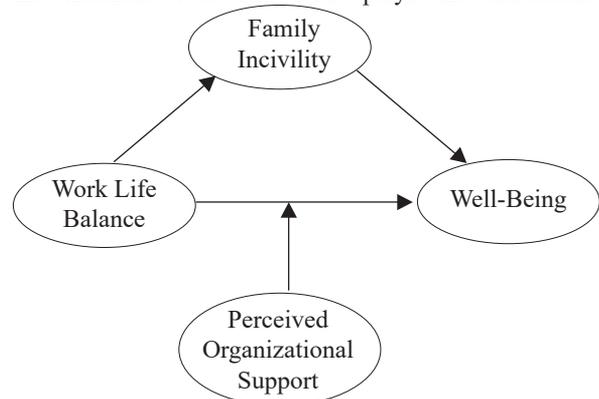


Figure 1: Conceptual Model

PROPOSITIONS:

- P1. Work-Life Balance positively affects Employee Psychological Well-Being
- P2. Work-Life Balance negatively affects Family Incivility
- P3. Family Incivility negatively impacts Employee Psychological Well-Being
- P4. Perceived Organizational Support moderates the relationship between Work-Life Balance and Employee Psychological Well-Being, in such a way that the relationship becomes stronger with higher levels of POS

5. DISCUSSION AND IMPLICATIONS

The association between work-life balance (WLB), psychological well-being (PWB), family incivility and perceived organizational support (POS) reflects a complex meshwork of work and life considerations. It is not just about the trade of power resources and connections on one hand, it also underpins the theoretical relationships between the two and localizes them in the Omad, BFF market of Uzbekistan and how labor relations have evolved over time. Based on the Work Home Resources (W-HR) Model and Spillover Model, the theoretical, practical, and policy implications of the model are discussed in detail

5.1 THEORETICAL CONTRIBUTIONS

This review contributes to the literature in several important ways:

This review is useful to the literature in several key aspects:

- **Bridging Cultural Contexts.** Through its focus on Uzbekistan a nearly ignored context in the literature on WLB this article shows how there is a need to qualify the applicability of Western models in non-Western countries
- **The Emergence of Family Incivility** Although the influence of family-to-work spillover can be recognised in the literature, the role of the destructive family climate construct as a mediator in former models was not fully developed. The paper incorporates subtle forms of domestic strains into those of workplace well-being
- **Dual-Theory Integration.** The integration of W-HR Model and Spillover Theory provides a two-lens perspective to examine work family well-being balance in collectivist cultures
- **A Role Expansion of POS:** This paper examines POS not as an outcome, but rather as a dynamic protective factor that influences employees' perceptions and responses to personal threats

5.2 Practical Implications for Organizations

- **Flexible Work Hours and Leave** Mandatory for dual income families and working mothers, ideally from the government level first. This will then affect employees in regards to having WLB
- **Family-Sensitive Policies** Awareness, workshops about the family process, and provision for mental health services to those affected. Employers need to understand that stress at home affects performance at work and deal with it preemptively
- **Building Organizational Support** HR needs to move beyond policy and embed real support mechanisms into organizational culture. Open-door policies, confidential counseling, and supervisor training are several of the strategies for improving POS.
- **Training Leaders for Culture Sensitivity.** It is important that supervisors and middle managers learn to spot certain cultural and emotional markers of employees from collectivist cultures. This is particularly relevant when an enterprise has leadership across both home and host countries.

5.3 Implications for Policymakers and Academia

- **Policy Development:** Uzbekistan's labor laws need to change to incorporate WLB rules that are good for employees, flexible maternity and paternity leave policies, and strict enforcement of anti-discrimination laws, especially for women

- **What Next:** Empirical testing of the model on a large number of surveys using structural equation modeling would be insightful to assess the proposed framework. In the future, gender as a moderator can be taken into consideration or longitudinal studies can be included
- **Cross-national comparisons:** By comparing support of the findings from Uzbekistan to other transnational or collectivist countries (such as Kazakhstan, Azerbaijan, Indonesia), the showings reinforce understanding of the global relevance of such dynamics.

6. CONCLUSION

Conceptual Review: Study of Work-Life Balance on Employee Psychological Well-Being with Family Incivility as a Mediator and Perceived Organization Support as Moderator in Uzbekistan Integrating the Work-Home Resources Model and Spillover Theory, the review identifies gaps in job stress literature from the Central Asian peninsula, where domestic stress and organizational culture have not yet been central in the well-being conversation.

Uzbekistan's cultural setting, in traditional gender roles, hierarchical family lines, and less sophisticated HR systems, offer conditions that require a specification of what well-being management should imply. As companies continue to modernize and employee expectations become more dynamic, the need for organizations to fulfill their responsibility to support their employees professional and personal lives will become more important.

This model and the associated discussion offer researchers and practitioners a culturally specific, theoretically informed lens for unpacking the complex links between work, family, and mental well-being. The future of healthy organizations in Uzbek and alike economies does not only depend on economic reform but also on the reshaping of human care, support and balance.

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The Impact of Gross Domestic Product on the National Stock Exchange

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Abstract

India needs to overcome two major challenges to establish itself as the world's super economy: raising GDP and maintaining optimistic attitudes about the nation's economy. The impact of GDP on the stock exchange index, a crucial economic indicator, is examined in this article. Throughout the world, national economies were impacted by the global GDP growth. The effects have differed for industrialised and developing countries. GDP and stock market statistics from 2015 to 2024 were used in the study. The results of the data analysis show that the National Stock Exchange's indexes have a major influence on GDP.

Keywords: GDP, stock market, nifty index

INTRODUCTION

The GDP has a major impact on the intricate web of interconnected variables that the Indian stock market functions within. To predict market movements and make well-informed decisions, investors, policymakers, and market analysts must comprehend how these elements interact. On the stock market, stocks from various companies can be offered and sold. Furthermore, listed companies are assessed by the stock market on the basis of their value, performance, profitability, and competence. The stock market is a free and open global marketplace where anyone can trade shares. The entire profit generated in a nation over a specific time period is its GDP. It is useful to measure the monetary policy of completed goods and services that are obtained for a single end customer in order to develop products and services in a nation to a reasonable degree. It includes all income earned within the boundaries of a nation. Any country's GDP can be used to estimate the size and condition of its economy. GDP is a metric used to assess the overall productivity and performance of a country and its overall economic health. Robust GDP growth typically portends increased consumer spending, profitability for businesses, and business expansion—all of which are favourable markers

of an upbeat sentiment in the stock market. Conversely, a sluggish GDP growth rate could erode investor confidence and result in a drop in stock prices.

REVIEW OF LITERATURE

Studies have indicated that economic growth and the stock market are positively correlated (Demirgüç-Kunt and Levine 1996; Greenwood and Jovanovic 1990; Greenwood and Smith 1997; Levine and Zervos 1998), however other studies have discovered a negative correlation (Arcand et al. 2015; Demetriades and Rousseau 2016; Rousseau and Wachtel 2011). Levine and Zervos (1996) assert that a key element in stabilising the methods of obtaining capital to better support investments and economic growth is the size of the stock market. Demirgüç-Kunt and Levine (1996) contend that the stock market is essential for bringing together lenders and savers as well as for generating liquidity that enables people, businesses, and governments to trade equities in order to promote economic growth. Conventional economists think that growing investment and production capacity are the primary drivers of economic progress, according to Rousseau and Wachtel (2011). The impact of exchange markets on GDP growth and other economic activities that enhance national well-being has drawn the attention of numerous scholars (Alajekwu and Achugbu 2012). The GDP and inflation are viewed as independent variables for stock price prediction because research has shown that they have an impact on stock market value (Reddy, 2012). Usman and Adejarae (2013) came to the conclusion that the capital market, which provides long-term financing, can assist governments and businesses in meeting their capital requirements. Despite its impressive growth, inflation had an impact on the Nigerian stock market. Data from 1970 to 2010 were analysed for this study, and the results showed that 18.9% of the volatility in capital market performance was due to inflation. According to

Hailemariam and Guotai (2014), a healthy stock market is a crucial financial instrument for economic growth in any given economy. Evidence of the relationship between the expansion of the Indian stock market and the actual economy was shown by Tripathi and Seth (2014). This study looks at the relationship between the preferred macroeconomic parameters and the Indian stock market. Chiang and Zheng (2015) observed severe declines in market liquidity and sharp rises in trade volumes during times of crisis, such as the credit market crisis in 2008, the Argentinean unrest in 1999, and the Asian financial crisis in 1997. The relationship between exchange markets and economic growth has been a topic of great discussion among policymakers, academic groups, and conferences (Magweva and Mashamba 2016). Economies with robust financial markets grow faster and see a decline in the financing obstacles that obstruct the growth of industries and businesses that are essential to economic expansion, according to Bongini et al. (2017). The variables are the development of the stock market and economic growth; they are neither causes nor effects of one another (Swendenizyüncü et al. 2018). Khatri (2019) discovered a slight positive association with foreign direct investment, price increases, and exchange rates in addition to a significant positive correlation between the money supply and stock prices in the study of the relationships between Nepal's stock market and macroeconomic variables. The current analysis adds empirical data about GDP growth and the stock market to the corporate finance literature. Theoretically, business management, risk diversification, availability, corporate information acquisition, and fund mobilisation are all impacted by stock market trading (Dube 2020). Shrivani and Sharma (2020) also investigated the relationship between a few indicators of the Indian Stock Exchange and the index of industrial production by accounting for the years 1996–1997 to 2015–2016. A long-term relationship between economic growth and the stock market was found by the investigation. Algarini (2020) looked on the relationship between macroeconomic factors (such GDP, FDI, inflation rate, and interest rates) and Saudi Arabia's two-point stock exchange principles. There is no short-term association between the fundamentals of the stock market and the previously mentioned elements, but the analysis demonstrates a long-term relationship between macroeconomic indicators and market values, particularly between GDP and other variables. Bhowmikand Wang (2020) asserts that the stock market is an essential element of the modern economy. As a gauge metre for evaluating the state of the economy after a specific tragedy, it is the first market to notify policymakers of a boom or cycle in business patterns. According to Nathaniel et al. (2020), who examined the Nigerian economy from 1980 to 2016 using the RDL approach, the advancement of innovations has been stimulated by the stock markets, which in turn has encouraged economic growth. Osamwonyi and Osaseri (2020) studied the economies of South

Africa and Nigeria from 1995 to 2015 using quarterly data. The Granger causality test, ordinary least squares, panel estimating techniques, and other methods were utilised in the study to ascertain the effect of the stock market on economic growth. The results show that economic progress in Nigeria is not a byproduct of the stock exchange and vice versa. The financial system uses stock markets as an intermediary to move resources from units with surpluses to units with debts O'Shea and Davis (2021). In Ghana, Borteye and Peprah (2022) used a correlational study methodology using SPSS software to examine the relationship between stock market development and economic growth. When the general level of prices rises, the value of money falls. Inflation can have a good or negative effect on the economy (KC & Thapa, 2022). This study's primary goal is to investigate and attempt to determine the ways in which GDP and inflation affect the Indian Stock Exchange's performance. The unexpected COVID-19 pandemic, according to Napitupulu and Mohamed (2023), exacerbated stock market volatility and extreme price shocks, indicating that the markets are susceptible to events that restrict investors' mobility. Samarasinghe (2023) claims that stock markets are invading the banking industry by becoming a dependable option for project financing and then asking loan borrowings. He stressed that a liquid stock market gives businesses access to the low-cost funding they need. Islametal (2023) examined the effects of macroeconomic drivers, such as the gross domestic growth rate, inflation rate, and industrial production index, on the Dhaka stock exchange, or DSE 30 index, using statistical techniques like descriptive statistics, Pearson correlation analysis, and multiple regression analysis. They found that there was a significant and positive relationship between the GDP rate and the Bangladesh Stock Market index. This implies that an increase in the GDP leads to a corresponding gain in the stock market. Their analysis demonstrates that the GDP of Bangladesh is a significant factor affecting the success of the stock markets in that nation. Elfeituri et al. (2023) claim that capitalization and stock turnover have an effect on the positive relationship that exists between the Gulf countries' stock market and economic growth.

RESEARCH GAP

Numerous academics have previously demonstrated the effect of GDP on market-wide stocks that are traded on stock exchanges across the world. Conversely, virtually little research is conducted in Indian settings; instead, the great majority of research focuses on western contexts. Further research should focus on how GDP affects the performance of stock prices in different sectors for the benefit of businesses, decision-makers, and investors in the future. This study examines the extent to which GDP effects future stock value forecasting in the context of the Indian stock market.

OBJECTIVES AND SCOPE OF THE STUDY

Determining whether or not GDP will impact the stock market is the main goal here. Research on the GDP, sectoral stocks, their relationship, and the outcomes of stock price decisions will be extremely beneficial to businesses, investors, and policymakers in the future. The method used to predict future stock values by studying the GDP has been significantly impacted by the study's findings, and this shift was directly caused by the study's conclusions.

HYPOTHESIS TESTING AND ANALYSIS

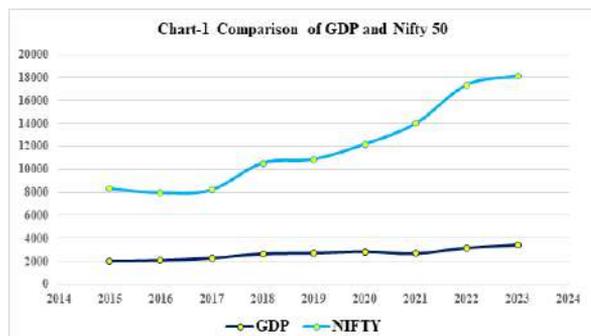
Secondary data on the GDP and Nifty 50 is gathered from a number of websites, including yahoo finance and money control. After using SPSS to evaluate the data, it was discovered that GDP is the second most successful index, with an average performance of nifty fifty. The nifty 50 index appears to have the most dispersed data points around its mean when its variance is largest, suggesting increased volatility or risk. On the other hand, the GDP shows less depression, suggesting greater stability (Table 1).

	GDP	Nifty 50
Mean	2,677.3514	12,914.9052
Standard Deviation	434.91063	4766.51581
Variance	189147.258	22719673.007
Pearson's Correlation Coefficient	.835	.835

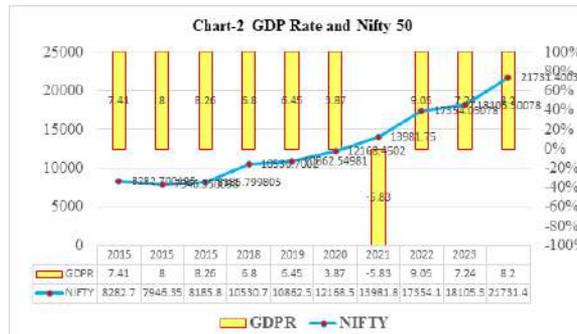
From the analysis (Table-1), it was found that the correlation between GDP and Nifty 50 shows high correlation (.835) These facts tell us that GDP and Nifty 50 are strongly correlated to one another.

Variables	p-value
GDP and Nifty 50	.003

The p-value in the case of GDP and Nifty (.003) is less than 0.05 which shows that there exists significant relation between Nifty 50 and GDP showing that variation in GDP causes variation in Nifty 50 prices also (Table-2)



The above chart-1 depicts the variance of GDP and Nifty 50 from 2013 to 2024.



Change in the rate of GDP and Nifty 50 from 2013 to 2024 is given in the above graph-2

CONCLUSIONS

The study revealed a significant correlation between GDP and the National Stock Exchange's stock indexes (Nifty 50). Even while each factor affects stock market dynamics separately, their combined effect determines how Indian markets develop in the international arena. Consequently, negotiating the intricacies of the Indian stock markets requires a comprehensive strategy that incorporates macroeconomic study and market fundamentals. As a result, the correlation between the GDP and the Nifty stock index is an important indicator of both investor confidence and the state of the economy. An array of India's best-performing companies makes up the Nifty index, which frequently mirrors the country's economic trajectory. Bullish stock market trends are generally accompanied by times of GDP growth. In contrast, when investors become more pessimistic about business earnings and prospects, economic downturns may cause the Nifty index to decrease. Notwithstanding the fact that GDP growth can furnish significant perspectives on the underlying robustness of an economy, it is crucial to acknowledge that the Nifty index's representation of stock market performance is subject to various influences apart from economic growth.

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The Psychology of Colours in Branding and Advertising

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ABSTRACT: Colour is a critical aspect of marketing, driving consumer perception, mood, and buying behaviour. This paper delves into the psychology of colours in marketing, tracing how various colours generate certain emotional reactions and influence brand identity. Of particular interest is the cross-cultural colour perception in branding, considering how cultural variations influence consumer construals of colours and their implications for international marketing initiatives. In addition, the study explores consumer behaviour, examining the subconscious influences of colors on brand preference, trust, and engagement. Finally, the paper try to identify the importance of color in marketing decision-making, illustrating how sound color strategy can build brand recognition, improve conversions, and shape purchasing behaviour. By synthesizing knowledge from behavioural psychology and cultural studies, this paper presents an integrated view of how colour influences marketing effectiveness in the age of globalization.

Keywords: Colour Psychology, Consumer Behaviour, Cross-Cultural Perception, Brand Identity, Emotional Influence.

I. INTRODUCTION

Colour is a strong non-verbal marketing tool, impacting consumer perception, emotions, and choice. Brands apply colours strategically to elicit certain psychological reactions, achieve brand recognition, and stand out in a crowded marketplace. Colour's impact is not one-size-fits-all—cultural variations influence how people perceive and respond to different colours. This paper discusses the application of colour psychology in marketing, investigates cross-cultural colour meaning in branding, and analyzes the impact of colour on consumer attitudes and purchase decisions in marketing. Through this knowledge, marketers can maximize their brand efforts to appeal to global target consumers and stimulate consumer activity more efficiently.

II. LITERATURE REVIEW

A. Colour Psychology in marketing:

Color psychology is instrumental in branding, advertisement, and product display, since colors induce subliminal association. For example, red can be associated with excitement and speed, used often in going-out-of-business sales, but blue suggests stability and professionalism and is widely employed for corporate identification. Green reflects wellness and natural living, thereby perfectly suited to eco-friendly commodities. Color psychology knowledge enables companies to create engaging visual identities that resonate with their customers and encourage consumer interaction. Color psychology is a marketing imperative that studies how various colors affect the emotions, attitudes, and buying behaviors of consumers. Studies indicate that as much as '90% of instant judgments' on products are colour-based, with color being a significant brand identifier and consumer engagement tool. Nevertheless, the effect of color is not absolute but depends on cultural background, individual experience, and gender. For instance, studies reveal that men prefer darker, bolder colors, whereas women tend to prefer softer, lighter colors. Purple is among the favorites with women but hardly ever with men, thus justifying its dominance in luxury and beauty branding. Also, color fit is more important than the color itself—Harley-Davidson's tough black and orange fit its personality, while a pink glitter variant would probably not appeal to its fans. Aside from branding, color is influential in website design and conversions. The 'Isolation Effect' states that opposing colors (i.e., a red "Buy Now" button against a blue background) improve visibility and memory. Likewise, 'emotionally incongruent colours' can affect mood— sad people might choose soothing pastels, whereas cheerful consumers might steer clear of excessively assertive colors.

B. Emotional Impact of Colours:

Colour psychology is a subtle but integral aspect of marketing. Effective brands carefully choose colors that appeal to their ‘target audience’s feelings, cultural ties, and business conventions’ in order to establish strong, compelling visual identities. Marketers have to strike a balance between the aesthetic and psychological effects to get the highest levels of engagement and influence consumer actions. Table 2.1.1. shows few examples of the same.

Table 2.1.1 Branding and Emotional Associations with Colour

Colour	Emotional Associations	Brand Examples
Red	- Passion, energy, excitement. - Urgency, aggression.	-Coca-Cola: Energy and passion. - YouTube: Urgency and action.
Blue	- Trust, reliability, calmness. - Security, stability.	- Facebook: Trust and dependability. - PayPal: Security and reliability.
Green	- Growth, nature, harmony. - Health, freshness.	- Starbucks: Sustainability and health. - Whole Foods: Nature and well-being.
Yellow	- Cheerfulness, optimism, warmth. - Caution, attention.	- McDonald's: Happiness and positivity. - Subway: Optimism and freshness.
Orange	- Friendliness, enthusiasm, creativity. - Adventure, confidence.	-Fanta: Playfulness and fun. -Nickelodeon: Creativity and youthfulness.
Purple	-Luxury, sophistication, mystery. - Creativity, spirituality.	- Cadbury: Luxury and indulgence. -Hallmark: Sentiment and sophistication.
Black	-Power, elegance, sophistication. - Authority, exclusivity.	-Apple: Minimalism and elegance. - Chanel: Sophistication and luxury.
White	-Purity, simplicity, cleanliness. - Peace, innocence.	- Apple: Clean and minimal design. - Nike: Simplicity and purity.
Pink	-Romance, femininity, compassion. - Playfulness, youth.	-Barbie: Youthfulness and femininity. - Victoria's Secret: Romance and luxury.
Brown	-Stability, reliability, warmth. - Nature, earthiness.	-UPS: Reliability and trust. - Hershey's: Natural and earthy texture.

Colour is a significant aspect of branding that significantly contributes to brand recognition, emotional response, and personality. Research has indicated that colour improves brand recognition by 80% (Labrecque and Milne, 2012). Colours evoke different emotional responses that impact consumer behaviour. For instance, red evokes excitement and a sense of urgency, while blue evokes trust and calmness. Organizations strategically employ colour to express their values and personalities. Green is used by environmentally friendly organizations to symbolize greenness, while luxurious organizations use black and gold to symbolize sophistication.

C. Cross-Cultural Colour Perception in Branding:

Colour perception differs from culture to culture, and it is important for brands to consider this while formulating their global marketing strategy. For instance, red has different meanings in different cultures. In Western cultures, red symbolizes energy and passion and is used in promotion marketing and branding of fast foods. In India and China, red symbolizes happiness and prosperity, and for this reason, it is also trendy during weddings and celebrations. But in South Africa, red is also used during times of mourning. Successful big brands like Coca-Cola have used such cultural associations to their advantage, using red in China as a symbol of good fortune and celebration. Blue also symbolizes different meanings in different cultures: it symbolizes dependability in Western cultures, spirituality in the Middle East, and healing in certain Eastern cultures. Blue is used by global brands like Facebook and IBM to symbolize trust and dependability globally. Yellow, in Western cultures symbolizing happiness and optimism, can symbolize a different meaning elsewhere in the world. More examples are shown in the below table 2.3.1

Table 2.3.1 Cross-Cultural Colour Perception in Branding

Colour	Western Meaning	Eastern Meaning	Global Brand Adaptation
Red	Passion, love, danger.	Luck, happiness, celebration (China).	Coca-Cola: Bold red for energy everywhere. KFC China: Uses red for good fortune.
Blue	Trust, calmness, professionalism.	Immortality, healing (Iran).	Facebook: Blue for trust globally. Samsung: Employing blue to convey reliability.

Green	Nature, health, peace.	Fertility, good fortune (Middle East).	Starbucks: Green to symbolize sustainability worldwide.
Yellow	Happiness, optimism.	Mourning (Egypt).	McDonald's: Yellow for happiness worldwide.
Orange	Creativity, energy.	Spirituality	Fanta: Uses orange for enjoyment anywhere.
Purple	Luxury, wealth, creativity.	Mourning (Thailand).	Cadbury: Uses purple for luxury globally.
Black	Power, sophistication.	Evil, death (Japan).	Nike: Black for sleek sophistication worldwide.
White	Purity, innocence.	Mourning (India, China).	Apple: Applies white to minimalism everywhere.
Pink	Femininity, romance.	Celebration, joy (Japan).	Barbie: Applies pink to femininity globally.
Brown	Earthiness, stability.	Humility, simplicity (Middle East).	Hershey's: Utilizes brown for warmth worldwide.

Cross-cultural colour perception in branding is the driver of global marketing strategies. Colours evoke different emotional responses and cultural connotations all over the world, significantly impacting brand recognition and consumer behaviour. Red, for instance, symbolizes passion and energy in Western cultures, but good fortune in China and India. Blue is considered professional and credible universally in the West, although it is a spiritual reference in the Middle East. Yellow, symbolizing happiness in the West, symbolizes death in some Latin American cultures. Green, usually symbolizing nature and health globally, may be seen as unlucky in Indonesia. White, symbolizing purity in Western cultures, has several cultural connotations. Global brands such as Coca-Cola, Facebook, and Starbucks go to great lengths to adjust colour usage based on local cultural understanding so that even the brand values are communicated effectively and there is emotional linkage with diverse audiences.

III. DECISION MAKING IN ADVERTISING:

In the realm of advertising, decision-making is a complex process influenced by multiple psychological

and emotional factors. Among these, colour plays a pivotal role in shaping consumer perceptions and driving purchasing behavior. Research suggests that nearly “90% of snap judgments” about products are based on colour alone, making it one of the most powerful elements in advertisement design. Advertisers strategically utilize colours to evoke specific emotions and influence consumer decisions, creating a subconscious impact on brand perception and engagement.

Warm colours such as red, orange, and yellow are commonly associated with urgency, excitement, and enthusiasm. This is why brands in fast-food, retail, and e-commerce frequently use them to stimulate impulse buying and quick decision-making. For instance, red is often used in “Sale” or “Limited Offer” advertisements to create a sense of urgency, prompting consumers to take immediate action. On the other hand, cool colours like blue and green are linked to trust, calmness, and reliability. These colours are preferred by banks, healthcare companies, and technology firms to establish credibility and foster a sense of security among consumers.

The paper also highlights the significance of colour contrast and readability in advertising effectiveness. High contrast between text and background enhances visibility, ensuring that consumers easily understand the message. Poor colour combinations, however, may lead to confusion, reducing the overall impact of the advertisement. This is especially crucial in digital marketing, where online advertisements must capture attention within seconds before users scroll past. Furthermore, cultural variations in colour perception play a major role in advertising effectiveness across global markets. While white symbolizes purity and simplicity in Western countries, it is associated with mourning in some Asian cultures. Similarly, red represents passion and excitement in the West but symbolizes good fortune in China. Understanding these cultural distinctions allows marketers to tailor advertising strategies to resonate with diverse audiences, ensuring greater consumer engagement and conversion rates. Ultimately, decision-making in advertising is significantly shaped by strategic colour choices. By leveraging colour psychology, brands can enhance brand recall, emotional engagement, and consumer trust, ultimately influencing purchasing decisions and fostering brand loyalty.

4. CONCLUSION

Strategic color use in marketing is more than a matter of aesthetics—it is a potent psychological and cultural tool that has a direct influence on consumer behavior and decision-making. Although some color associations are constant, cultural differences have a key role to play in shaping opinions, and thus it is necessary for brands to have a subtle approach in international markets. Those who utilize colour psychology successfully are able to build powerful brand identities, evoke emotional

engagement, and drive purchasing decisions. As marketing is increasingly done in an increasingly globalized world, it will continue to hinge on a comprehension of the dynamic between colour, culture, and consumer psychology for brand success.

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The Role of Health Insurance Care Management Systems

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Abstract—

Kerala's healthcare landscape, characterized by a robust public health infrastructure and high literacy rates, presents a unique context for the study of health insurance care management systems. The state's commitment to e-governance and the increasing penetration of health insurance schemes necessitate an examination of the awareness and effective utilization of these digital platforms. Health insurance care management systems, encompassing electronic health records (EHRs), claims processing software, policy management platforms, and patient portals, are pivotal in enhancing the efficiency, transparency, and accessibility of healthcare services. This study aims to investigate the current state of awareness and usage of these systems among key stakeholders in Kerala, including healthcare providers, insurance professionals, and the general populace. We seek to understand the factors influencing adoption, the challenges encountered, and the perceived benefits of these systems in the state's healthcare ecosystem.

Methodology: A well-structured questionnaire was circulated among 50 rural in Thrissur district in Annallur village. Further, they were analysed on whether they know the health insurance awareness, how much their health insurance taken or not on the basis of Enhancing Health Insurance Penetration in Rural Kerala. The collected data was analysed through relevant statistical tools through SPSS, Percentage and diagrams.

Results: There is moderate level. Known people have health insurance.

Managerial Implication: It is observed from the various studies that about 53.1 percent of the people does not have a health insurance policy. It is very essential for insurance companies that please ahead step to meet the growing needs and demands of the customer not only limiting to the rural population but also the urban population. Further, the insurance companies need to strive to offer viable benefits to people below the poverty line and rural population in terms of better coverage and

health services at lower costs without compromising on the quality.

Keywords- health care management system, health insurance, rural, digital technology

INTRODUCTION

Health insurance care management systems have emerged as critical components in modern healthcare delivery, aiming to optimize patient outcomes, control costs, and improve overall efficiency. These systems leverage data analytics, predictive modelling, and clinical expertise to proactively identify high-risk individuals, coordinate care, and facilitate patient engagement. This paper explores the multifaceted role of care management systems within health insurance frameworks, examining their impact on various stakeholders, including patients, providers, and payers. It delves into the key functionalities of these systems, including risk stratification, care plan development, utilization management, and population health management. Moreover, the paper analyzes the challenges and opportunities associated with the implementation and optimization of care management systems, particularly focusing on data collection methodologies and their implications for system effectiveness. By examining real-world applications and relevant research, this paper aims to provide a comprehensive understanding of the evolving landscape of health insurance care management systems and their potential to transform healthcare delivery.

REVIEW OF LITERATURE

Dervishaj, B., & Xhaferi, T. (2020). This paper attempted to focus on the impact of psychological biases on the decision-making process. The paper uses primary data provided through structured interviews with 180 individual investors and one semi-structured interview with an expert of the financial market in Albania. Exploratory

financial analysis, Cronbach alpha test and descriptive analysis are used through R-software. The analysis and its results conclude a significant presence of psychological biases on the Albanian individual investor behaviour. As there is too little research done on this field in Albania, the study informs of the presence of these biases and tries to explain their impact not only on the previous crisis the country has experienced, but also on the current situation of the financial market in the country.

(Byrne et al., 2009) This works focused on the home health care and family decision making. method of data screening datasets from house holders. game theoretic model, build models. Within the sample size is 270. the study is evaluated that family members specialize according to their comparative advantages in market production, caregiving, or other forms of nonmarket production or whether siblings take turns providing informal care. If children take turns care- giving,

(Drake et al., 2022) The work in this paper to is focusing on sources of inertia in the individual health insurance market. it describes the regulatory structure of the Health Insurance Marketplaces and Covered California. the data used in the analyses and presents descriptive evidence of inertia. it develops a model of health plan choice that separately identifies distinct sources of inertia. the results and simulates the elimination of each of these sources of inertia on the probability that households switch plans.

(Kannadhasan & MBA, 2009) Role of behavioural finance in investment decisions. This study mainly focused to health insurance scheme, below poverty line households, CHIS, coverage, health Insurance, health utilization, out-of-pocket expenses, RSBY the method screened data sets BPL household. it is comparative cross-sectional survey. within the sample size is 256. tools can be used for multivariate analysis. this study evaluated that study needed for insurance schemes on risk protection, and govt redesign and closely monitor the scheme.

Liu, L., Li, Z., Sui, Y., & Shi, J. (2021). this study mainly focused theory on demand on on health insurance, risk attitudes, and household financial behaviour. this study focused on empirical analysis. they variable are used for regional social health insurance, participation rate, social health insurance, the tools used for prohibit regression, heterogeneity analysis, endogeneity analysis.

(Ohri, 2022)The study mainly focused to Psychological Factors in the Decision-Making of Investors in India. investors on psychological biases, behavioural finance, heuristics, investor overconfidence, make decision making. the methods in this paper include the screening of

RESEARCH GAP

research gaps identified are Impact on patient experience: There is a need for more research to understand how these systems affect patient satisfaction, engagement,

and overall experience. Health equity Further investigation is required to assess how these systems address disparities in access to care and health outcomes across diverse populations. Long-term cost-effectiveness: More research is needed to evaluate the long-term financial sustainability and return on investment of these systems.

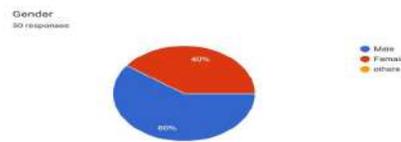
OBJECTIVE

- To know awareness and usage of health insurance policy

Methodology:

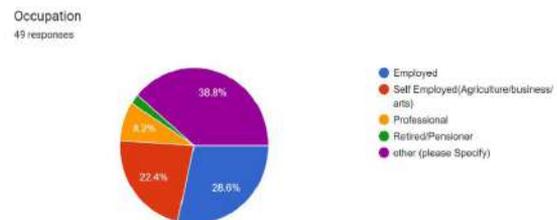
A well-structured questionnaire was circulated among 50 rural in Thrissur district in Annallur village Further, they were analysed on whether there know the health insurance awareness how much their health insurance taken or not on the basis of Enhancing Health Insurance Penetration in Rural Kerala The collected data was analysed through relevant statistical tools through SPSS, Percentage and diagrams.

Results



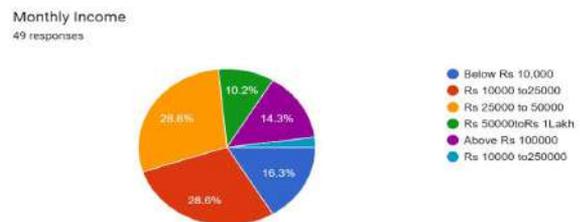
Source: primary data

Out of the total 50 respondents most of respondents 60% male 40% female



Source: primary data

A survey of 50 respondents revealed that 38%are employed in other fields, while 28.6% are self employed



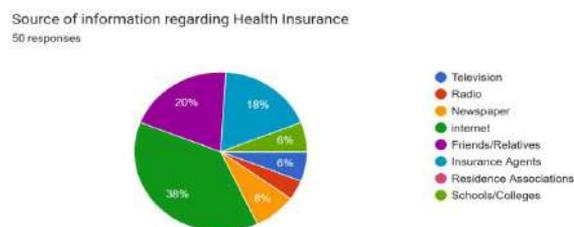
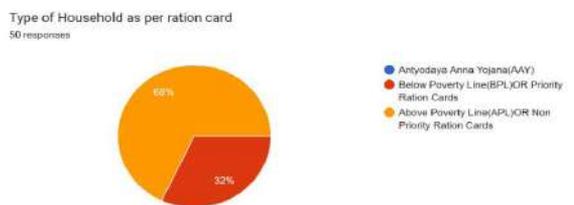
Source: primary data

In 50 respondents the salary distribution is as follows

28.6% earn Rs 50000,28.6% havediffernt salary group and 42.8%belong to other salary group.

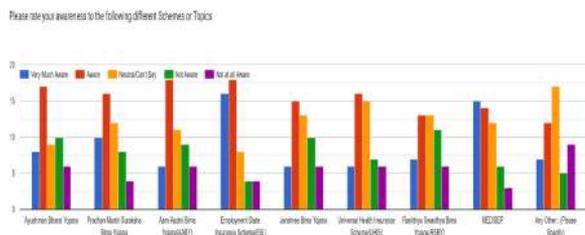
Source: Primary data

In 50 respondents include 68% include APL group 32% includes BPL

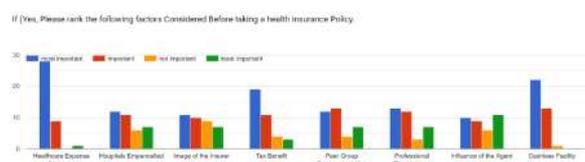


Source: Primary Data

In survey 50 respondents 38% source of information regarding health insurance and 62% information regarding television, newspaper, friends and relatives.



50 repondents53.1% insurance not taken



source: primary data

50 respondents most of policy holder factors considers taking health insurance in health expence coverage and cashless facility and tax benefit.

CONCLUSION

healthcare management plays a pivotal role in ensuring the efficient and effective delivery of healthcare services. It is the backbone that supports clinical practice, enabling organizations to navigate complex regulatory landscapes, optimize resource allocation, and ultimately, improve patient outcomes.

Managerial Implication: It is observed from the various studies that about 53.1 percent of the people does not have a health insurance policy. It is very essential for insurance companies that pleasing ahead step to meet the growing needs and demands of the customer not only limiting to the rural population but also the urban population. Further, the insurance companies need to strive to offer viable benefits to people below the poverty line and rural population in terms of better coverage and health services at lower costs without comprising on the quality.

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Unlocking Circular Solutions: The Role Of Waste audits in sustainable Waste Management Practices.

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ABSTRACT

This study examines the critical function of systematic trash audits in promoting sustainable waste management and enabling the shift to circular economy practices. The research focuses on a field audit performed at the Malampuzha Dam area in Kerala, categorising the collected garbage into recyclable, biodegradable, and non-recyclable components. The audit disclosed that a substantial fraction of the garbage consists of reusable and compostable materials, such as plastic bottles, cardboard, coconut husks, and leaves. These findings highlight the necessity for enhanced waste segregation techniques, focused recycling initiatives, and localised circular strategies, such as composting and eco-brick manufacturing. Waste audits are essential instruments for facilitating data-driven decision-making, discovering resource recovery potential, minimising landfill use, and fostering community-oriented sustainability. The study suggests that conducting regular waste audits in public areas can promote more resilient, circular, and ecologically sustainable waste management systems.

Keywords: Waste Audit, Circular Economy, Sustainable Waste Management, Recycling.

INTRODUCTION

The worldwide increase in trash production, propelled by rapid urbanisation, consumerism, and tourism, presents considerable environmental and public health issues. Sustainable waste management has emerged as a paramount responsibility for governments, institutions, and local communities. The circular economy (CE) presents a revolutionary model that transitions from the conventional linear "take-make-dispose" paradigm to one that prioritises reuse, recycling, and resource recovery.

In the framework of the circular economy, waste audits serve as essential diagnostic instruments that evaluate the composition, volume, and origins of trash. These audits produce empirical data that can influence specific waste reduction plans, improve recycling programmes, and

direct infrastructure planning for trash diversion and material recovery.

In India, tourist attractions and public recreational spaces frequently encounter increasing demand to manage garbage responsibly due to substantial visitor numbers and varied waste sources. Nevertheless, limited research has rigorously assessed the efficacy of waste audits in these contexts. This study seeks to fill this gap by performing a comprehensive trash audit at the Malampuzha Dam, a significant tourist destination in Kerala.

The main aim of this study is to analyse how waste audits might uncover actionable insights for the implementation of circular solutions, including composting organic waste and reusing recyclables, in public spaces. The project evaluates the potential to convert garbage from a disposal issue into a resource opportunity through field-based data gathering and classification. This work enhances the discourse on localised circular economy activities and offers a scalable strategy for sustainable waste management in analogous public contexts.

LITERATURE REVIEW

The shift towards sustainable waste management systems has acquired global traction, especially through the implementation of circular economy (CE) principles. The circular economy framework has arisen as a solution to the inefficiencies and environmental harm generated by the linear economic model (Geissdoerfer et al., 2017; Kirchherr et al., 2018). Circular economy prioritises waste reduction, resource optimisation, and value preservation via reuse, recycling, and remanufacturing (Ellen MacArthur Foundation, 2013). Global policy frameworks, including the European Green Deal and India's Plastic Trash Management Rules (2022), have included circular economy principles to tackle urban trash and material sustainability (Kalmykova et al., 2018). Academics contend that effective circular

economy implementation relies on localised strategies that harmonise environmental, social, and economic objectives (Murray et al., 2017). Waste audits are widely acknowledged as essential instruments for assessing waste streams and guiding sustainable actions (Lehmann et al., 2020; Adeyemi & Asubiojo, 2021). Audits offer detailed information on waste categories, origins, and quantities, enabling the formulation of specific strategies for reduction, recovery, and diversion (Wilson et al., 2012). Multiple municipal case studies, such as those from Toronto and Singapore, illustrate that systematic waste auditing markedly enhanced landfill diversion rates and recycling efficacy (Sharma & Kamal, 2019; Yadav & Pathak, 2022). Furthermore, audits facilitate real-time monitoring and accountability within public institutions and commercial entities. Tourist areas and expansive recreational facilities frequently produce diverse and substantial garbage owing to fluctuating populations and inadequate infrastructure (Ragazzi et al., 2014). Research at ecotourism locations in Southeast Asia and national parks in India highlights the inadequate segregation and prevalence of single-use plastics and food waste (Singh & Gupta, 2020, Das & Baruah, 2021). Seasonal increases, inadequate signage, and a lack of knowledge among tourists intensify the issue (Chikowore et al., 2022). Researchers advocate for the incorporation of audit insights into infrastructure planning to guarantee scalable and robust waste management systems in public spaces. The recovery of organic waste via composting has substantial environmental and economic advantages, especially with biodegradable materials in public areas (Adhikari et al., 2009, Sundberg et al., 2013). An increasing body of literature endorses decentralised composting in gardens, parks and food courts, demonstrating a decrease in methane emissions and reliance on fertilisers (Jain et al., 2020, Bhatnagar et al., 2022). Simultaneously, novel recycling techniques such as ecobrick production utilising low-quality plastics have surfaced as feasible substitutes for conventional disposal (Garcia-Garcia et al., 2019). The efficacy of these activities frequently corresponds with data derived from waste audits that measure material recoverability. Public engagement and regulatory structures are crucial for the implementation of circular methods (Pires et al., 2011). Research from Brazil, the Netherlands, and India indicates that community engagement markedly improves trash segregation practices and facilitates the implementation of circular economy initiatives such as zero-waste zones and pay-as-you-throw systems (Bong et al., 2017, Roy et al., 2022). Educational programmes and signs based on audit data can alter behavioural patterns in areas with heavy foot traffic (Zhou et al., 2021). Evidence indicates that engaging local stakeholders, such as informal waste pickers and NGOs, results in more equitable and inclusive waste governance (Sarkar et al., 2020). Technological innovations are transforming waste monitoring via RFID-equipped smart bins, AI-driven image recognition for garbage classification, and mobile applications for

identifying waste hotspots (Vu et al., 2021; Mohanty & Das, 2022). These improvements enhance segregation and produce real-time audit-level insights. Research in Korea and Singapore has shown that IoT-based solutions can decrease contamination rates in recyclables by more than 20% (Lee et al., 2019). In India, pilot initiatives that combine mobile dashboards with GIS mapping present novel opportunities for repeatable, data-driven trash management in urban and semi-urban regions (Nair et al., 2023).

METHODOLOGY AND DATA COLLECTION

This study used a field-based empirical research methodology to assess waste composition and investigate circular economy prospects in a high traffic public space. The selected location, Malampuzha Dam in Palakkad, Kerala, is a renowned tourist attraction recognised for its gardens, food vendors, scenic vistas, and lake boundaries—each contributing differently to the garbage produced in the area. The objective of the research was to do a systematic waste audit and enhance it with behavioural insights via awareness campaigns to provide sustainable and circular waste management solutions.

The garbage audit was conducted over two consecutive days in March 2025, focusing on four designated zones for sampling: the Entry Area, Garden Pathway, Food Court Zone, and Lake Surroundings. These zones were delineated according to their functional utility, visitor density, and projected waste variability. In each zone, waste was gathered from designated containers, physically sorted, and categorised into three primary classifications—recyclable, biodegradable, and non-recyclable. Recyclable garbage encompassed plastic bottles, newspapers, and paper cups; biodegradable waste consisted of coconut husks, food scraps, and leaf litter, whereas non-recyclable waste included soiled disposables and composite materials.

A systematic trash audit template was employed to document data, encompassing the date, location, trash description, weight (in kilogrammes), and observational comments. The classification process adhered to regular municipal solid waste protocols and was conducted by qualified volunteers under hygienic and safe conditions, including gloves and weighing scales. Each waste item was visually examined and precisely weighed using a digital scale prior to being recorded on the audit sheet. On March 9, 2.3 kg of recyclable plastic bottles were documented at the Entry Gate, while 3.8 kg of biodegradable coconut husks were recorded along the Garden Pathway.

The audit encompassed more than 45 kilogrammes of garbage, with the data categorised by type and geographical location. This enabled a comparison of waste profiles across the different zones. In addition to the quantitative data, we documented qualitative observations such as the presence of contaminants, the condition of materials, and the potential for reuse. These micro-level

insights guided the analysis of waste trends and facilitated the identification of appropriate circular actions, including eco-brick manufacture, composting, and enhanced waste segregation.

A community awareness campaign was concurrently executed to enhance the audit findings. This campaign included multilingual banners and leaflets that advocated trash segregation and circular behaviour. We distributed bilingual brochures in Malayalam and English to attendees and suppliers, explaining waste sorting procedures and differentiating between recyclable and non-recyclable products. We linked a QR code to a short film that showcases the production of eco-bricks, highlighting their practical reuse applications. We established an on-site awareness booth where tourists and sellers participated in a two-hour session featuring composting demonstrations using coconut husks and dry leaves. We exhibited products derived from eco-bricks to showcase the tangible outcomes of circular techniques.

This integrated scientific approach-rooted in empirical data and bolstered by behavioural interventions-yielded a thorough understanding of garbage generation patterns in public recreational areas. It emphasised the importance of waste audits as instruments for evidence-based planning and stakeholder involvement in the shift towards sustainable and circular waste management systems.

RESULTS AND DISCUSSION

Table 1. Waste Audit

Date	Location	Waste Description	Category	Weight (kg)	Remarks
09-03-2025	Entry gate bins	Plastic bottles	Recyclable	2.3	Mostly PET bottles from cold drinks
09-03-2025	Garden pathway	Coconut husks	Biodegradable	3.8	Discarded after consumption
09-03-2025	Near food stalls	Tissue paper (soiled)	Non-Recyclable	1.2	Mixed with food, unsuitable for reuse
10-03-2025	Viewpoint benches	Newspaper and paper cups	Recyclable	2.1	Left by tourists
10-03-2025	Lake perimeter	Fallen leaves & branches	Biodegradable	5.4	Natural shedding

Source: Authors own calculations

A review of specific waste entries collected during the two-day audit period. This report offers additional insights into the attributes and recuperation possibilities of waste generated in various regions surrounding the Malampuzha Dam. These comprehensive observations augment the aggregated weight records and substantiate strategic interventions in the circular economy.

On March 9, 2025, the refuse gathered from the Entry Gate Bins primarily comprised recyclable plastic bottles, totalling 2.3 kg. The data indicated that most of the bottles were PET from cold beverages, suggesting a significant potential for source isolation and the implementation of bottle return or eco-brick production initiatives.

The consistent attributes of this waste category and its recyclability suggest that dedicated Infrastructure, like PET-specific collection bins, can significantly improve recovery rates.

In the Garden Pathway, 3.8 kg of coconut husks were recorded in the biodegradable category. The leftover husks, after consumption, serve as a valuable organic material suitable for composting or mulching. Their presence highlights the Imperative for decentralised compost bins or community composting programs in garden spaces. Furthermore, informed signage and specialised collection receptacles for coconuts could reduce contamination and improve the collection of unadulterated biomass.

At the Near Food Stalls location, 1.2 kg of contaminated tissue paper was identified and deemed non-recyclable. The observation showed that food residues tainted this material, making it unsuitable for recycling. This case exemplifies a common problem in food-centric areas where the improper disposal of tainted items contaminates otherwise recyclable materials. The implementation of biodegradable tissue alternatives, together with consumer education on garbage disposal, could diminish non-recyclable refuse and improve total diversion rates.

On March 10, 2025, Viewpoint Benches collected 2.1 kg of newspapers and paper cups. Tourists discarded these materials and classified them as recyclable. This case further highlights the effectiveness of targeted recycling programs, especially in passive recreational areas where littering occurs because of insufficient access to bins or signage. Systematic clean-ups and careful positioning of bins based on pedestrian traffic patterns could alleviate this issue.

Ultimately, we collected 5.4 kg of degraded leaves and twigs from the lake perimeter. This biomass, originating from natural shedding, offers a significant opportunity for on-site composting or mulching to reduce waste transportation needs and restore nutrients in the local ecosystem. Anticipate seasonal leaf drop in these areas and manage it with proactive landscaping methods that integrate cyclical biological processes.

These micro-level entries validate the broad patterns in waste composition seen in the zone-wise audit. They demonstrate how location-specific patterns might inform hyper localized circular strategies, encompassing material-specific segregation, composting infrastructure, and behavioural nudges through signage. Incorporating these insights into site management improves environmental outcomes and fosters public involvement in sustainable tourism.

receptivity, making the campaign a crucial component of the intervention plan.

CONCLUSION

This study has illustrated the significance of trash audits as effective Instruments for guiding circular economy plans in public recreational areas. The study concentrated on the Malampuzha Dam region in Kerala, offering a comprehensive, zonal evaluation of waste output, composition, and material recovery possibilities. The audit facilitated data-driven insights into the garbage generated in high-traffic areas, such as entry points, garden walkways, food courts, and lakeside vistas, by classifying waste into recyclable, biodegradable, and non-recyclable categories.

The results indicated that a significant amount of the collected waste-especially plastic bottles, coconut husks, and dry leaves-could be redirected from landfills via localised circular solutions such as eco-brick production and composting. Variations in waste profiles among zones underscored the necessity for localised interventions, including infrastructure for source segregation, enhanced bin placement, and focused signage. The significant proportion of biodegradable and recyclable garbage in specific areas indicates lost potential for resource recovery and underscores the necessity of enhancing on-site waste management techniques

The awareness campaign, in conjunction with the waste audit, emphasised the behavioural dimensions of sustainable waste management. The campaign utilised multilingual posters, brochures, and live demonstrations to educate the public and actively involve vendors and tourists in practical activities, such as composting and recycling. This multi-format engagement strategy highlighted the necessity of synchronising infrastructure with behavioural modifications to guarantee the longevity of circular efforts.

In conclusion, the amalgamation of systematic trash audits with community engagement can function as a reproducible paradigm for other tourist locales and public areas seeking to move to circular waste systems. This project integrates empirical data with participatory outreach, providing actionable insights to assist policymakers, urban planners, and local stakeholders in developing more sustainable and resilient waste management frameworks. Periodic audits, infrastructural enhancements, and ongoing education are essential for realising the complete potential of the circular economy in India's expanding tourism industry.

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An Analytical Study on the Work-Life Balance of Women Employees in the Private Sector with Special Reference to Palakkad District

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Abstract

Work-life balance is a crucial aspect of modern employment, particularly for women in the private sector, who often collide with professional responsibilities alongside personal and family commitments. This study examines the challenges faced by women employees in Palakkad District, analyzing factors such as work-family conflict, career aspirations, stress management, and organizational support. The findings highlight the importance of flexible work arrangements, supportive workplace policies, and personal coping strategies in achieving a sustainable balance between work and life. By exploring existing literature and empirical data, this study aims to provide insights into the effectiveness of work-life balance interventions and their impact on job satisfaction, productivity, and overall well-being.

A healthy work-life balance assumes great significance for working women particularly in the current context in which both, the family and the workplace have posed several challenges and problems for women. Many family-friendly organizations feel the need for work-life balance which includes recruitment and retention of valuable work force, reduced employee stress, job satisfaction, reduced absenteeism, health benefits, and better life balance, by applying some interventions in the area of working hours which have been successful in improving work-life balance, such as, flexible working hours. With the basis of extant literature, primary and secondary data, the present paper has made an effort to understand the current status of WLB among women employees in Palakkad district.

Keywords: Work-Life Balance, Women Employees, Workplace Challenges, Work -Family Conflict.

1. INTRODUCTION

Work-life balance (WLB) is a critical aspect of modern employment, particularly for women in the private sector, who often juggle professional responsibilities alongside personal and family commitments. The increasing participation of women in the workforce has led to significant changes in societal and economic structures,

making it essential to examine how they manage their professional and personal lives.

1.1. Significance of Work-Life Balance

Work-life balance refers to the equilibrium between work obligations and personal life, ensuring that neither aspect negatively impacts the other. For women employees, achieving this balance are often challenging due to multiple responsibilities, including career aspirations, household duties, childcare, and social expectations. The private sector, characterized by demanding work schedules, competitive environments, and performance-driven cultures, poses additional challenges for women striving to maintain a healthy balance.

1.2 Challenges Faced by Women Employees

Women in the private sector encounter various obstacles in maintaining work-life balance, including:

- **Work-Family Conflict:** The struggle to meet both professional and personal demands often leads to stress and reduced efficiency.
- **Career Aspirations vs. Family Responsibilities:** Many women face dilemmas in prioritizing career growth while fulfilling family obligations.
- **Organizational Policies:** Lack of flexible work arrangements, inadequate maternity benefits, and limited support systems can hinder work-life balance.
- **Social and Cultural Expectations:** Traditional gender roles often place additional pressure on women to manage household responsibilities alongside their careers.

1.3 Importance of the Study

This study aims to analyse the work-life balance of women employees in Palakkad District working in

private sector, identifying key factors that influence their ability to maintain equilibrium. By exploring existing literature, empirical data, and workplace policies, the research seeks to provide insights that enhance work-life balance. The findings will contribute to understanding how organizations can support women employees through flexible work arrangements, employee assistance programs, and gender-inclusive policies.

1.4 Statement of the Problem

Work-life balance is a significant concern for women employees in the private sector, particularly in Palakkad District. The increasing demands of professional responsibilities, coupled with personal and family obligations, create challenges that affect their overall well-being, job satisfaction, and career growth.

Women in the private sector often face work-family conflict, where the pressures of work interfere with personal life, leading to stress and reduced efficiency. The lack of flexible work arrangements, supportive workplace policies, and organizational interventions further exacerbates the issue. Additionally, social and cultural expectations place additional burdens on women, making it difficult to maintain a healthy balance between work and personal life.

This study aims to analyse the factors influencing work-life balance, identify the challenges faced by women employees, and explore effective strategies that organizations can implement to support their workforce. By examining existing literature and empirical data, the research seeks to provide insights into how work-life balance impacts job performance, mental health, and overall quality of life for women in the private sector.

2 REVIEW OF LITERATURE

The concept of work-life balance (WLB) has gained increasing significance in modern organizational contexts, especially concerning women employees in the private sector. Work-life balance refers to an individual's ability to manage professional and personal responsibilities effectively, ensuring neither domain suffers at the cost of the other. For women, especially in the private sector, achieving this balance poses unique challenges due to societal roles, organizational expectations, and lack of support mechanisms.

2.1 Theoretical Background

Greenhaus and Beutell (1985) laid the foundation for work-life conflict studies by defining it as a form of inter-role conflict where the role pressures from the work and family domains are mutually incompatible. They identified time-based, strain-based, and behavior-based conflicts that affect working individuals, with women experiencing these more acutely due to dual-role responsibilities.

2.2 Factors Influencing Work-Life Balance

Several factors contribute to the work-life balance of women:

- **Job Demands and Working Hours:** Studies by Parasuraman and Simmers (2001) and Byron (2005) reveal that long and inflexible working hours contribute significantly to work-life conflict.
- **Organizational Culture:** A rigid, unsupportive organizational culture, particularly prevalent in competitive private sectors, hinders WLB (Lewis, 2001). In South Indian private enterprises, lack of family-friendly policies further exacerbates the issue (Thomas & Jain, 2015).
- **Technology and Work Intrusion:** According to Tarafdar et al. (2011), the use of ICT tools extends work into personal time, especially for women, who continue to bear the brunt of domestic responsibilities.
- **Socio-Cultural Expectations:** Patriarchal expectations in Indian society often place the burden of caregiving on women, regardless of their employment status (Sahoo & Lenka, 2016).

2.3 Challenges Faced by Women Employees

- **Role Conflict:** Women in the private sector experience intense pressure to perform both professionally and personally, leading to role overload and burnout (Poelmans, 2005).
- **Career Advancement Barriers:** Studies show that women with caregiving responsibilities are often perceived as less committed, impacting promotion and leadership opportunities (Powell & Greenhaus, 2010).
- **Mental and Physical Health Issues:** Chronic stress due to poor WLB leads to anxiety, depression, and physical ailments among working women (Rani & Kumari, 2011).
- **Lack of Support Systems:** Research by Rajadhyaksha and Smita (2004) indicates that women lack adequate family, institutional, and societal support in balancing work and life.

2.4 Organizational Strategies and Best Practices

- **Flexible Work Arrangements:** Flextime, telecommuting, and compressed workweeks have proven effective in enhancing WLB (Kossek & Ozeki, 1998). However, these are inconsistently implemented in the Indian private sector.
- **Supportive Leadership:** Managers who recognize and support employees' family needs contribute to better WLB (Hammer et al., 2009).
- **Workplace Wellness Programs:** Health camps, mental wellness initiatives, and stress management training

have been found to improve overall employee satisfaction and well-being (Agarwal & Lenka, 2015).

- Maternity and Parental Leave Policies: Adequate leave and return-to-work support post-maternity is crucial in retaining women employees and ensuring their smooth reintegration into work.

2.5 Impact of Work-Life Balance on Job Outcomes

- Job Performance: Empirical studies indicate that women with better WLB demonstrate higher productivity, innovation, and organizational commitment (Hill et al., 2001).
- Employee Retention: Poor WLB is a leading cause of attrition among women in the private sector (Gupta & Sharma, 2018).
- Quality of Life: Balanced employees report better mental health, family satisfaction, and life fulfillment (Frone et al., 1997).

2.6 Gaps in Literature

Although there is extensive global research on WLB, there is limited empirical literature focusing specifically on women employees in the private sector in Indian districts such as Palakkad. Moreover, existing studies often overlook how regional socio-cultural dynamics influence WLB.

3.1 OBJECTIVES OF THE STUDY

1. To analyze the key factors influencing work-life balance among women employees in the private sector.
2. To identify the major challenges faced by women in managing professional and personal responsibilities effectively.
3. To explore organizational strategies and practices that can improve work-life balance and enhance job satisfaction, mental health, and overall well-being of women employees.

4.1 RESEARCH METHODOLOGY

The design for this study is descriptive research design. In this study, both primary and secondary data were used. Primary data was collected with a structured questionnaire from a sample of 300 respondents from Palakkad district through email. Secondary data was collected through websites and internet journals. The information thus collected has been analyzed with the assistance of various statistical tools and techniques.

Convenience sampling method is used for the survey of the study. It is a non-probability sample. In the questionnaire, it is tried to cover the problems of both aspect of life, problems in professional life as well as of personal life. In the Questionnaire, Likert's five point scale was also employed to determine scores, where respondents were asked to rate each attribute on 5-point

scale ranging from highly satisfied to highly dissatisfied, The data so collected was subjected to Factor Analysis.

H0: There is no correlation between job related variables and the work life balance of female professionals.

H1: There is a correlation between job related variables and the work life balance of female professionals

5. LIMITATIONS OF THE STUDY

1. The study was conducted only in the Palakkad district hence the data cannot be compared with other areas.
2. The analysis is made based on the information provided by the respondent which is subjected to bias.
3. The result arrived is applicable only to the study period
4. Respondents opinion are dynamic, they keep on changing.

6. STATISTICAL TOOLS USED IN THE STUDY

- Simple Percentage Analysis Method
- Anova Analysis
- Henry Garrett Ranking Analysis

6.1 Simple percentage Analysis

Table 1: Demographic details of employees

Classification	Category	No. of Respondents	Percentage (%)
Age	Below 30 years	186	62%
	31 – 40 years	60	20%
	41 – 50 years	33	11%
	Above 50 years	21	7%
	Total	300	100%
Marital Status	Married	252	84%
	Unmarried	48	16%
	Total	300	100%
Educational Qualification	Under Graduate	69	23%
	Graduate	144	48%
	Post Graduate	75	25%
	Professionally Qualified	12	4%
	Total	300	100%
Type of Family	Nuclear Family	216	72%
	Joint Family	84	28%
	Total	300	100%

Size of Family	Below 3 members	180	60%
	3–5 members	87	29%
	Above 5 members	33	11%
	Total	300	100%
Designation	Education Sector	171	57%
	Healthcare Sector	39	13%
	Banking and Financial Services	39	13%
	Information Technology (IT)	30	10%
	Textile and Garment Industry	6	2%
	Others	15	5%
	Total	300	100%
	Experience	Less than 5 years	81
5–10 years		159	53%
10–15 years		51	17%
Above 15 years		9	3%
Total		300	100%
Salary Range / Month	Less than ₹20,000	75	25%
	₹20,001 – ₹30,000	174	58%
	₹30,001 – ₹40,000	33	11%
	Above ₹40,000	18	6%
	Total	300	100%

Source: Primary data

The study surveyed 300 respondents, revealing key demographic insights. A majority (62%) is below 30 years of age, and 84% are married. In terms of education, 48% are graduates, followed by 25% postgraduates. Most respondents (72%) come from nuclear families, with 60% having a family size of fewer than three members. Professionally, 57% work as Clerks or Cashiers, while 15% are Managers and only 2% are Chief Managers. Regarding experience, 53% have been working for 5–10 years, and 27% have less than 5 years of experience. Salary-wise, 58% earn between ₹20,001 and ₹30,000 per month. These figures provide a comprehensive overview of the socio-economic and professional profile of the respondents.

Table 2: Prominent Problems Faced by Women Employees in Private sector

S. No	Problems	No. of Respondents	Percentage (%)
1	The heavy workload / Tedious work	75	25
2	Physical strain and Mental stress	105	35
3	Lack of concentration	9	3
4	Gender Discrimination	67	23
5	Workplace harassment	24	8
6	Job insecurity	20	6
	Total	300	100

Source: Primary data

The table highlights the major problems faced by women employees in the workplace based on responses from 300 participants. The most reported issue is physical and mental stress, affecting 35% (105 respondents). This is followed by heavy workload or tedious tasks reported by 25% (75 respondents), and gender discrimination by 23% (67 respondents). Workplace harassment and job insecurity are concerns for 8% (24 respondents) and 6% (20 respondents), respectively. The least reported issue is lack of concentration, affecting only 3% (9 respondents). This indicates that mental and emotional strain, along with discrimination and workload, are the key challenges women face at work.

6.2 ANOVA Analysis

Table 3: Anova Analysis on marital status and problems of working women

Factor	Married (N=252)	Unmarried (N=48)	p-value (Sig.)	Interpretation
Physical/Mental Stress	Mean ~22.11	Mean ~21.44	0.477	No significant difference
Heavy Workload	Mean ~38.57	Mean ~39.58	0.334	No significant difference
Lack of Concentration	Mean ~33.62	Mean ~34.08	0.491	No significant difference
Work Burden	Mean ~4.48	Mean ~4.35	0.264	No significant difference

Interpretation:

- For all four factors—Physical/Mental Stress, Heavy Workload, Lack of Concentration, and Work Burden—the p-values are greater than 0.05.

- This means there is no statistically significant difference between married and unmarried women in the severity of these workplace problems.
- Hence, the null hypothesis is accepted at the 5% significance level, indicating that marital status does not significantly influence the problems faced by women employees in this sample.

Table 4: ANOVA Analysis on Type of Family and Problems of Working Women

Factor	Family Type	N	Mean	Std. Deviation	Std. Error Mean	t-value	df	p-value (Sig.)
Physical/Mental Stress	Joint	84	21.81	5.98	0.66	0.26	298	0.799
	Nuclear	216	21.58	6.05	0.41			
Heavy Workload	Joint	84	40.16	6.35	0.7	1.74	298	0.084
	Nuclear	216	38.41	7	0.48			
Lack of Concentration	Joint	84	34.36	4.49	0.49	1.3	298	0.197
	Nuclear	216	33.53	4.15	0.28			
Work Burden	Joint	84	4.34	0.74	0.08	-0.95	298	0.342
	Nuclear	216	4.44	0.75	0.05			

Source: Primary data

Interpretation:

- For all the factors — Physical/Mental Stress, Heavy Workload, Lack of Concentration, and Work Burden — the p-values are greater than 0.05.
- This indicates no statistically significant difference between women from joint families and nuclear families regarding the problems faced at work.
- Therefore, the null hypothesis is accepted at the 5% significance level, concluding that family type does not significantly influence workplace problems experienced by women employees.

6.3 Henry Garrett Ranking Analysis

Table 5: Factors Preventing Women Employees from Achieving Higher Posts in Private Sector (Garrett’s Ranking Method – Population: 300 respondents)

S. No	Factors	Total Score	Total Mean Score	Rank
1	Obligations of women as a homemaker creates hindrance in career growth	7308	48.72	V
2	Unavailability of time to combine personal and work life	9549	63.66	II
3	Physical strain due to prolonged hours of work	8800	58.67	III

4	Inability of making quick decisions	5957	39.71	VIII
5	Work related Tours and Travel	8266	55.07	IV
6	Transfer of job	10128	67.52	I
7	Mental Stress	7303	48.69	VI
8	Depression	6630	44.2	VII

Source: Primary data

The study identifies key factors preventing women employees in the banking sector from achieving higher positions, ranked by their mean percentage scores:

- Job Transfer is the top obstacle, with the highest mean score of 67.52%, indicating it is the most significant barrier.
- Unavailability of time to balance personal and work life follows closely at 63.66%.
- Physical strain due to prolonged working hours ranks third with 58.67%.
- Work-related tours and travel come next at 55.07%.
- The obligations of women as homemakers account for 48.72%.
- Mental health issues like mental stress and depression are moderate concerns with scores of 48.69% and 44.20% respectively.
- The inability to make quick decisions is perceived as the least significant barrier, with a score of 39.71%.

This ranking highlights that organizational factors like job transfer and time constraints, along with physical workload, are major challenges affecting women’s career advancement in private sector.

Table 6: Garrett Ranking on Attributes That Help Women Achieve Quality of Work Life in Banking Sector (N=300)

S. No	Factors	Garrett Score	Garrett Mean (%)	Garrett Rank
1	Pay and other benefits	9773	54.29	1
2	Convenient work timing	9749	54.16	2
3	Leave Availability (CL/EL/ML)	9653	53.63	3
4	Career opportunities towards growth	9229	51.27	4
5	Job security	9118	50.66	5
6	Cooperation	8631	47.95	6
7	The social relevance of the work life	8145	45.25	7
8	Work and total life space	7522	41.79	8

Source: Primary data

The Garrett ranking shows that the most important attribute contributing to the quality of work life for women in the banking sector is “Pay and other benefits” (54.29%). This is closely followed by “Convenient work timing” (54.16%) and “Leave availability” (53.63%).

Other significant factors include career growth opportunities (51.27%) and job security (50.66%). Cooperation from colleagues (47.95%) and the social relevance of work life (45.25%) are ranked moderately important. The least emphasized factor is work and total life space (41.79%), indicating women place relatively less priority on this aspect.

Overall, the ranking highlights financial and flexible work-related benefits as the key factors helping women achieve a better quality of work life in private sector.

7. FINDINGS, SUGGESTIONS, AND CONCLUSIONS

7.1.1 : Simple Percentage Analysis

Major Findings:

- Majority (62%) of respondents are under 30, indicating a younger workforce.
- 84% are married, showing most women juggle both work and family.
- 72% live in nuclear families; 60% have fewer than 3 family members.
- 48% are graduates, and 25% are postgraduates.

- Most work in the education sector (57%), with fewer in finance, IT, or textiles.
- 53% have 5–10 years of experience; 58% earn ₹20,001–₹30,000/month
- Top issues: Physical & mental stress (35%), heavy workload (25%), and gender discrimination (23%).
- Lesser but still relevant issues include harassment (8%) and job insecurity (6%).

7.1.2 : ANOVA Analysis

- The p-values for physical stress, heavy workload, lack of concentration, and work burden are all greater than 0.05 with respect to marital status; therefore, there is no significant difference between these factors and marital status.
- Similarly, the p-values for these factors with respect to family type are greater than 0.05, indicating no significant difference between these workplace problems and family type.

7.1.3 Henry Garrett Ranking Analysis

Major Findings:

- Top barriers: Job transfers (67.52%), time constraints (63.66%), and physical strain (58.67%).
- Other barriers include work travel, homemaking duties, mental stress, and depression.
- Quick decision-making ability is the least cited issue.

7.2 Suggestions

- Assign jobs that motivate women employees and positively influence their quality of work life without causing overload.
- Avoid overtime for women employees to reduce physical and mental stress.
- Provide appropriate pay strategies to ensure fair and adequate compensation, with periodic adjustments reflecting changes in the cost of living.
- Maintain gender balance to avoid discrimination against women employees.
- Offer proper training programs to enhance women’s skills, motivating them to perform equally alongside men.
- Establish infrastructural facilities like crèches and day-care centres to support working mothers.
- Introduce special leave provisions (e.g., up to five years) for women to manage specific contingencies, extendable to men as needed.

7.3 Conclusion

Empowerment of women, gender discrimination, and violence against women has become critical areas of sociological research but were historically neglected. Despite social changes exposing women to unprotected socio-economic, cultural, and political environments, social justice systems have lagged in safeguarding their interests.

Scepticism about women's ability to exercise equal rights and perform on par with men is unfounded, especially given broader opportunities available today. To truly understand women's status and problems, it is essential to consider the social framework, including social structures, cultural norms, and value systems that shape women's roles and positions in society.

While theoretical possibilities exist for equality, actual realization is often lacking. Improving the quality of work life is a significant means to bridge this gap, helping to alleviate many challenges faced by working women in the private sector.

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A Comparative Analysis of Digital and Traditional Fish Marketing: Trends, Challenges, and Opportunities in Kanyakumari District

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Abstract— The fisheries sector is crucial to India's economy, supporting employment, food security, and exports. As one of the world's leading fish producers, India's seafood, particularly shrimp, is in high demand. However, traditional marketing methods lead to inefficiencies, price fluctuations, and wastage. Despite success in global markets, fishworkers face challenges like dangerous fishing practices, environmental issues, and an inefficient supply chain involving multiple intermediaries. Improving marketing practices is key to enhancing livelihoods and reducing wastage. Digital platforms offer solutions to traditional marketing issues by increasing transparency, reducing intermediaries, and improving accessibility for sellers and buyers. Traditional Fish Marketing method relies on physical markets and middlemen, lacking proper cold storage, which leads to wastage. The auction system and unregulated pricing reduce efficiency and profit margins for fishers. Cold chain logistics preserve freshness, and secure payment systems enhance transaction efficiency and customer satisfaction. A descriptive research design was used to study the trends, challenges, and opportunities in Kanyakumari District. A convenience sampling method was applied, surveying 170 respondents (40 fish buyers, 20 fish sellers, and 25 non-fish buyers) from urban and rural areas. Data were collected via structured questionnaires and analyzed using descriptive statistics. The shift from traditional to digital fish marketing offers benefits such as better pricing transparency, reduced wastage, and higher profitability for sellers. However, challenges like infrastructure, digital literacy, and technology access need to be addressed for further sector growth and sustainability.

Key words: Digital Fish Marketing, Technology, Supply Chain, Pricing Transparency.

I. INTRODUCTION

The fisheries sector is a crucial part of India's economy, playing a significant role in food security, employment generation, and foreign exchange earnings. India ranks among the world's top fish-producing countries,

supported by its vast 7,500 km-long coastline and abundant inland water resources. The sector sustains millions of livelihoods, particularly in coastal and rural regions, and is a key pillar of India's Blue Economy strategy, which emphasizes sustainable marine and freshwater resource utilization. India's fisheries industry has seen substantial growth in aquaculture, especially shrimp farming, which now dominates the country's seafood exports. Indian shrimp and other seafood products are in high demand in global markets like the United States, European Union, China, and Japan due to their high quality and adherence to international safety standards. Government initiatives such as the Pradhan Mantri Matsya Sampada Yojana (PMMSY) have been instrumental in driving modernization in the sector, focusing on production enhancement, processing infrastructure, cold chain development, and quality certification. Despite this progress, fish marketing in India remains largely dependent on traditional systems characterized by long supply chains and multiple intermediaries. This model often leads to inefficiencies, including price manipulation, low returns for fishers, and considerable post-harvest losses due to inadequate storage and transportation facilities. These challenges are particularly evident in places like Kanyakumari District in Tamil Nadu, where fishing is a major livelihood. The emergence of digital platforms offers a promising alternative. These platforms can connect fishers directly with buyers, reduce dependency on middlemen, and ensure fair pricing through transparent transactions and real-time data. However, widespread digital adoption is still hindered by infrastructure gaps, low digital literacy, and limited access to smartphones and internet services in many fishing communities.

II. OBJECTIVES OF THE STUDY

The following are the objectives of the study

- To analyze the current trends in traditional and digital

fish marketing – Understanding how fish is marketed through conventional and online platforms and identifying key transformations in the sector.

- To examine the challenges in traditional and digital fish marketing. Identifying the barriers that hinder market efficiency and growth in both marketing approaches.
- To explore the opportunities in traditional and digital fish marketing.
- To provide recommendations for improving fish marketing strategies – Suggesting ways to integrate traditional and digital marketing methods effectively to enhance sales, customer satisfaction, and market sustainability.

III. METHODOLOGY

This study employed a descriptive research design to explore the trends, challenges, and opportunities in digital and traditional fish marketing in Kanyakumari District.

A Sampling Strategy

A convenience sampling strategy was used to select 170 respondents, comprising 40 fish buyers, 20 fish sellers, and 25 non-fish buyers from urban and rural areas. The sample size was determined using a free sampling method, informed by the researcher's experience and expertise.

B Data Collection Methods

A structured questionnaire was used to collect data from respondents. The questionnaire was pilot-tested and modified to ensure its effectiveness.

C Data Analysis Procedures

Descriptive statistics and thematic analysis were used to analyse the data. The data were processed manually and interpreted to identify trends, challenges, and opportunities.

D Ethical Considerations

Informed consent was obtained from all respondents before data collection. Confidentiality and anonymity were ensured throughout the study.

IV. TRADITIONAL FISH MARKETING IN KANYAKUMARI DISTRICT

Fish marketing in Kanyakumari District largely follows a traditional system that has remained relatively unchanged for decades. This system is built around physical marketplaces, face-to-face negotiations, and a network of intermediaries that handle the movement of fish from the fisher to the end consumer. While it provides livelihood opportunities for many, the system has inherent inefficiencies that limit income for fishers and increase costs for consumers.

A First Point of Sale

Traditionally, the first point of sale occurs at the beach, where fishermen bring in their daily catch. Village-based auctions were commonly held on the shore, with auctioneers facilitating the sale of fish to buyers. This open system allowed multiple participants to bid, ensuring a somewhat competitive environment.

However, with the development of fish landing centers and the construction of sea erosion walls, beach auctions have declined. Today, most fish sales take place in designated landing centers, which offer a more organized setting for auctions but still follow traditional auction practices.

B Middlemen to Retailers

Once the fish is purchased at the landing site, middlemen or agents transport it to various markets. These middlemen serve as intermediaries who buy in bulk and sell to retailers at marked-up prices. They play a crucial role in logistics but often reduce the profit margins for fishers.

C Retailers to Consumers

Retailers sell the fish in local markets, roadside stalls, and directly to restaurants and hotels. These retailers often operate without standardized pricing or quality controls, leading to wide variations in price and product quality.

D Middlemen to Individual Fish Sellers

Some of the fish is also distributed to individual sellers, including women who carry baskets of fish on their heads, vendors on bicycles or two-wheelers, and small-scale hawkers engaged in door-to-door sales. These vendors serve both local consumers and small eateries but often operate with minimal infrastructure.

E Challenges in Traditional Fish Marketing in Kanyakumari District

While the traditional marketing system provides livelihood to thousands, it faces numerous challenges that undermine efficiency, equity, and profitability.

F Unregulated Auction Process

Fish auctions at landing centers lack price regulation. Auctioneers often form informal agreements with middlemen, allowing them to manipulate prices. As a result, fishers receive lower payments while consumers pay inflated prices, leading to imbalances in the supply chain.

G Quality and Hygiene Issues

Retail fish markets and street vendors rarely follow standard hygiene protocols. Fish is often sold without quality checks, handled in unsanitary conditions, and preserved within inadequate amounts of ice. This

compromises freshness, posing health risks for consumers and reducing the fish's market value.

H Inadequate Transportation and Storage

A major issue is the absence of refrigerated transportation and storage. Fish is transported in open containers or simple ice boxes, which are insufficient in maintaining freshness, especially during hot weather. This leads to spoilage, economic losses, and customer dissatisfaction.

I High Wastage

Due to the lack of proper preservation systems, significant quantities of fish spoil before reaching the market. This problem intensifies during summer months, reducing availability and earnings for vendors and fishers alike.

J Middlemen Exploitation

The long supply chain, dominated by intermediaries, results in a significant disparity between the price fishers receive and the price consumers pay. Fishers often remain financially vulnerable, with little control over market conditions or pricing.

K Poor Infrastructure

Many fish landing centers and markets suffer from poor infrastructure, including inadequate cold storage facilities, lack of clean platforms for handling fish, and insufficient water supply. Poor road conditions further hamper timely transportation of fish to distant markets.

L Lack of Market Information

Fishers often lack access to real-time market information such as current prices, demand trends, or consumer preferences. This knowledge gap weakens their bargaining power and makes them reliant on middlemen, who may withhold crucial information for their own benefit.

M Limited Institutional Support

There is a noticeable absence of institutional backing for small-scale fishers. Access to formal credit, cooperatives, societies, training programs, or government support is limited, leaving vendors and fishers dependent on informal financial arrangements and outdated marketing methods.

N Gender-Specific Challenges Women, who play a significant role in fish vending, face unique challenges such as limited access to capital, restricted mobility, and societal constraints. These issues limit their ability to compete fairly in the market and reduce their income-generating potential.

V. DIGITAL FISH MARKETING IN KANYAKUMARI DISTRICT: A NEW FRONTIER

Digital technology presents a promising alternative to traditional marketing, offering the potential to

streamline operations, reduce dependency on middlemen, and ensure fairer pricing. However, in Kanyakumari District, digital fish marketing is still at a nascent stage and faces several limitations.

A Limitations of Online Marketplaces

While digital platforms are intended to connect fishers directly with consumers, most small-scale fishers find them difficult to use. The platforms often lack features tailored to local needs, and digital literacy among fishers remains low. Additionally, many consumers are hesitant to buy fish online due to concerns about freshness and authenticity.

B Dynamic Pricing Challenges

Fish prices fluctuate daily based on catch volume, season, and market demand. Most digital platforms are not equipped to manage such real-time price changes effectively. This creates a mismatch between platform pricing and actual market rates, discouraging both sellers and buyers.

C Role of Cold Chain Solutions

Some digital initiatives incorporate cold chain logistics, enabling fishers to store their catch in refrigerated units until sale. While this helps maintain quality and reduce spoilage, it does not address consumer preferences for freshly caught fish. Moreover, such infrastructure is expensive and not easily accessible to small-scale operators.

D Secure Payment Systems

One advantage of digital platforms is the incorporation of secure online payment systems, which reduce fraud and ensure timely payments. However, issues arise when product quality does not meet customer expectations, leading to disputes and returns. This can reduce trust in the system over time.

E The Persistence of Intermediaries

Though digital marketing aims to cut out intermediaries, many platforms have simply created new types of digital middlemen. These actors may charge commission fees or control platform access, ultimately reducing the profits that fishers earn. Without careful regulation, these platforms risk replicating the same exploitation present in traditional models.

While digital fish marketing in Kanyakumari District offers a promising alternative to the traditional system, its full potential has yet to be realized. Addressing technological, infrastructural, and socio-economic barriers is essential to creating an inclusive and sustainable marketing environment. By focusing on user-friendly design, cold chain support, market awareness, and the elimination of exploitative practices, digital platforms can revolutionize fish marketing and improve livelihoods for

thousands offishers and vendors in the region.

VI. ANALYSIS AND INTERPRETATION

The section provides valuable insights into the demographics of market participants. Specifically, it offers gender-wise data on urban and rural market buyers and sellers of fish. Additionally, it provides information on the frequency of fish purchases among these groups. This section also sheds light on the customers who visit markets to purchase items other than fish, with gender-wise data provided for this category as well. The fish buyer profile of urban markets reveals that the majority of fish buyers (50%) fall within the 51 and above age range, followed by 31-50(30%). Female buyers constitute 62.5% of the sample, while male buyers make up 37.5%. (Refer Table No.1)

Table No.1

Age-wise and sex-wise urban buyers

Sl. No	Age	Male	%	Female	%	Total	%
1	Below -18	2	05.00	0	0	2	05.00
2	18-30	1	02.50	5	12.50	6	15.00
3	31-50	5	12.50	7	17.50	12	30.00
4	51 and above	7	17.50	13	32.50	20	50.00
Total		15	37.50	25	62.50	40	100.00

Survey Data, 2005

In the case of rural markets, the fish buyer profile reveals that the majority of fish buyers (47.50%) fall within the 51 and above age range, followed by 31-50 (32.50%). Female buyers constitute 72.50% of the sample, while male buyers make up 27.50%. (Refer Table No.2)

Table No.2

Age-wise and sex-wise rural buyers

Sl.No	Age	Male	%	Female	%	Total	%
1	Below -18	1	02.50	2	05.00	3	07.50
2	18-30	2	05.00	3	07.50	5	12.50
3	31-50	4	10.00	9	22.50	13	32.50
4	51 and above	4	10.00	15	37.50	19	47.50
Total		11	27.50	29	72.50	40	100.00

Survey Data, 2005

Both in urban fish markets and rural fish markets, the majority of the buyers are females, as depicted in Diagrams 1 and 2, which provide a visual representation of the male-to-female ratio of fish buyers, offering an immediate understanding of the current status. Both in urban fish markets and rural fish markets, the fish buyers

represented in the age group of above 51 years are the majority. (Refer Table No.1 and Table No.2)

Diagrams 1 and 2 provide a visual representation of the fish buyers in urban and rural markets.

Male vs Female

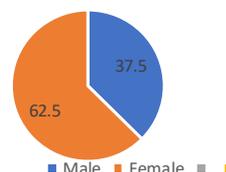


Fig. 1. Fish Buyers in Urban Fish Market

Male vs Female

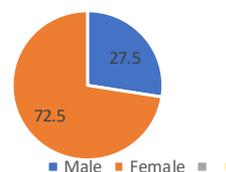


Fig. 2. Fish Buyers in Rural Fish Market

The buying frequency of urban fish markets reveals that the majority of fish buyers, 75%, purchase fish daily, while 25% buy weekly. Notably, no respondents reported buying fish fortnightly, monthly, or occasionally (Refer Table No.3). This trend is also observed in rural fish markets, where 72.5% of buyers purchase fish daily, followed by 22.50% weekly, and 5% fortnightly (Refer Table No.4).

Table No.3

Sex-wise frequency of fish buying urban
Survey Data, 2005

Sl.No	Frequency	Male	%	Female	%	Total	%
1	Daily	9	22.5	21	52.5	30	75
2	Weekly	6	15	04	10	10	25
3	Fortnightly	0	0	0	0	0	0
4	Monthly	0	0	0	0	0	0
5	Occasionally	0	0	0	0	0	0
Total		15	37.5	25	62.5	40	100

A closer examination of the data reveals that female buyers constitute the majority in both urban and rural markets, with 62.5% in urban markets and 72.5% in rural markets. This consistent trend highlights the significant role of female buyers in the fish purchasing process.

Table No.4
Sex-wise frequency of fish buying
Survey Data, 2005

Sl.No	Frequency	Male	%	Female	%	Total	%
1	Daily	7	17.50	22	55.00	29	72.50
2	Weekly	4	10.00	05	12.50	09	22.50
3	Fortnightly	0	0	02	05.00	02	05.00
4	Monthly	0	0	0	0	0	00.00
5	Occasionally	0	0	0	0	0	00.00
Total		11	27.50	29	72.50	40	100.00

The daily buying frequency observed in both markets suggests that most people prefer to buy fish on a regular basis, possibly due to a preference for fresh fish over preserved fish. This behavior indicates that freshness is a key factor influencing fish purchasing decisions.

A Fish Sellers Urban vs Rural Market

The profiles of fish sellers in both urban and rural markets reveal similar characteristics. In urban markets, as shown in Table No. 5, 65% of fish sellers fall within the 51 and above age range, followed by 31-50 (35%). Female sellers constitute 60% of the sample, while male sellers make up 40%. Similarly, in rural markets, as shown in Table No. 6, 55% of fish sellers fall within the 31-50 age range, followed by 51 and above (40%). Female sellers dominate rural markets, making up 70% of the sample.

Table No.5

Age-wise and sex-wise Seller Urban

Sl.No	Age	Male	%	Female	%	Total	%
1	Below -18	0	0	0	0	0	0
2	18-30	0	0	0	0	0	0
3	31-50	5	25.00	2	10.00	07	35
4	51 and above	3	15.00	10	50.00	13	65
Total		8	40.00	12	60.00	20	100

Survey Data, 2005

The selling frequency of fish sellers in both urban and rural markets indicates that all respondents sell fish daily (100%). None of the respondents reported selling fish weekly, fortnightly, monthly, or occasionally. This is evident in Table No. 7, which shows the sex-wise frequency of fish sales in both urban and rural markets.

Table No.6

Age-wise and sex-wise Seller Rural

Sl.No	Age	Male	%	Female	%	Total	%
1	Below -18	0	0	0	0	0	0
2	18-30	1	05.00	0	0	1	05
3	31-50	3	15.00	8	40.00	11	55
4	51 and above	2	10.00	6	30.00	8	40
Total		6	30.00	14	70.00	20	100

Survey Data, 2005

Diagrams 3 and 4 provide a visual representation of the sexwise distribution of fish sellers in urban and rural markets. Traditionally, fish sales have been dominated by women, who have long played a significant role in the markets. However, in recent times, there has been a notable increase in male members taking on the role of fish sellers. Interestingly, this shift has become more pronounced after the COVID-19 pandemic.

Diagrams 3 and 4 provide a visual representation of the fish sellers in urban and rural markets.

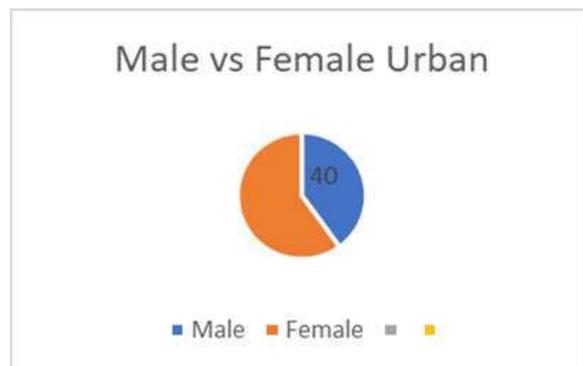


Fig. 3. Fish Sellers in Urban Fish Market

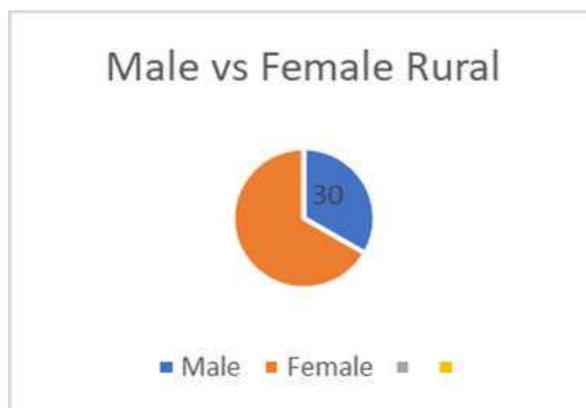


Fig. 4. Fish Sellers in Rural Fish Market

Table No.7

Sex-wise frequency of fish Sales Urban and Rural

Sl.No	Frequency	Male	%	Female	%	Total	%
1	Daily	8	40	12	60	20	100
2	Weekly	0	0	0	0	0	0
3	Fortnightly	0	0	0	0	0	0
4	Monthly	0	0	0	0	0	0
5	Occasionally	0	0	0	0	0	0
Total		8	40	12	60.00	20	100

Survey Data, 2005

B Public Profile of General Buyers Urban vs Rural Market

The public profile of general buyers in urban markets reveals that the majority of buyers (48%) fall within

the 31- 50 age range, followed by 51 and above (40%). Female respondents constitute 56% of the sample, while male respondents make up 44% (Table No. 8).

Table No.8
Age-wise and sex-wise General Buyers-Urban

Sl.No	Age	Male	%	Female	%	Total	%
1	Below -18	0	0	0	0	00	0
2	18-30	2	08.0	1	04.0	03	12.
3	31-50	4	16.0	5	20.0	09	48
4	51 and above	5	20.0	8	32.0	13	40
Total		11	44.0	14	56.00	25	100

Survey Data, 2005

Similarly, in rural markets, the majority of buyers (44%) fall within the 31-50 age range, followed by 51 and above (40%). Female respondents also dominate rural markets, constituting 72% of the sample, while male respondents make up 28% (Table No. 9).

Table No.9
Age-wise and sex-wise General Buyers-Rural

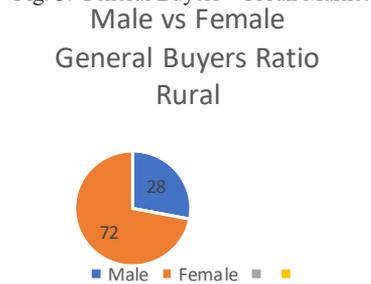
Sl.No	Age	Male	%	Female	%	Total	%
1	Below -18	0	0	0	0	00	0
2	18-30	1	04.0	3	12.0	04	16
3	31-50	3	12.0	8	32.0	11	44
4	51 and above	3	12.0	7	28.0	10	40
Total		7	28.0	18	72.00	25	100.

Survey Data, 2005

Diagrams 5 and 6 provide a visual representation of the general buyers in urban and rural markets.



Fig. 5. General Buyers - Urban Market



In terms of purchasing frequency, both urban and rural markets show a similar trend. The majority of buyers in urban markets (80%) reported buying general items daily, while 20% reported buying weekly (Table No. 10). Similarly, in rural markets, 80% of buyers reported buying general items daily, while 20% reported buying weekly (Table No. 11).

Sex-wise frequency of Public Urban

Sl.No	Frequency	Male	%	Female	%	Total	%
1	Daily	8	32	12	48	20	80
2	Weekly	3	12	2	08	5	20
3	Fortnightly	0	0	0	0	0	0
4	Monthly	0	0	0	0	0	0
5	Occasionally	0	0	0	0	0	0
Total		11	44.00	14	56.	25	100

Survey Data, 2005

Table No.11
Sex-wise frequency of Public Rural

Sl.No	Frequency	Male	%	Female	%	Total	%
1	Daily	5	20	15	60	20	80
2	Weekly	2	08	3	12	5	20
3	Fortnightly	0	0	0	0	0	0
4	Monthly	0	0	0	0	0	0
5	Occasionally	0	0	0	0	0	0
Total		7	28	18	72	25	100

Survey Data, 2005

Interestingly, no respondents in either urban or rural markets reported buying general items fortnightly, monthly, or occasionally. This suggests that buyers in both markets prefer to purchase general items on a daily or weekly basis.

C Trends in Fish Marketing

The fish marketing sector in Kanyakumari District is witnessing significant trends that shape the industry's future.

- **Increasing Demand for Fresh Fish:** Consumers in Kanyakumari District prioritize freshness when purchasing fish. This demand drives daily purchases in both urban and rural markets, with 75% of urban buyers and 72.5% of rural buyers purchasing fish daily. The preference for fresh fish over preserved fish indicates that buyers are willing to pay a premium for quality.
- **Female Dominance in Fish Buying and Selling:** Women play a crucial role in fish markets, constituting a majority of buyers and sellers. In urban markets, 62.5% of fish buyers are female, while in rural markets, the figure is 72.5%. Similarly, 60% of fish sellers in urban markets and 70% in rural markets are female. This dominance highlights the importance of women in the fish marketing sector.
- **Growing Interest in Digital Platforms:** Digital fish marketing is gaining traction in

Kanyakumari District, offering benefits like transparency, reduced intermediaries, and improved market access. While traditional marketing systems still dominate, digital platforms have the potential to revolutionize the industry.

D Challenges in Traditional Fish Marketing

Despite its importance, traditional fish marketing in Kanyakumari District faces numerous challenges that undermine efficiency, equity, and profitability.

Unregulated Auction Process: Fish auctions at landing centers lack price regulation, allowing auctioneers and middlemen to manipulate prices. This exploitation reduces fishers' earnings and increases prices for consumers, creating an imbalance in the supply chain.

Quality and Hygiene Issues: Retail fish markets and street vendors often neglect standard hygiene protocols, compromising freshness and posing health risks to consumers. The lack of quality checks and inadequate preservation methods further exacerbate the issue.

Inadequate Transportation and Storage: The absence of refrigerated transportation and storage facilities leads to spoilage, reducing the quality and value of fish. This issue intensifies during hot weather, resulting in significant economic losses for fishers and vendors.

Middlemen Exploitation: The long supply chain, dominated by intermediaries, results in a significant disparity between the price fishers receive and the price consumers pay. Fishers often remain financially vulnerable, with little control over market conditions or pricing.

E Challenges in Digital Fish Marketing

While digital fish marketing offers promising alternatives, it also faces unique challenges that need to be addressed.

Limited Digital Literacy: Fishers and consumers in Kanyakumari District often lack the digital literacy required to effectively use online platforms. This limitation hinders the adoption and benefits of digital fish marketing.

Dynamic Pricing Challenges: Fish prices fluctuate daily based on catch volume, season, and market demand. Digital platforms struggle to manage these real-time price changes, creating a mismatch between platform pricing and actual market rates.

Infrastructure Gaps: The lack of access to smartphones, internet services, and cold storage facilities in rural areas hinders the growth of digital fish marketing. These infrastructure gaps need to be addressed to ensure inclusive growth.

E Opportunities in Digital Fish Marketing

Despite the challenges, digital fish marketing offers numerous opportunities for growth and development.

Increased Transparency: Digital platforms can ensure fair pricing and reduce exploitation by providing real-time market information and transparent transactions. This transparency can improve fisher earnings and consumer satisfaction.

Improved Market Access: Digital platforms enable direct sales from fishers to consumers, reducing intermediaries and enhancing profitability. This direct market access can also provide valuable feedback and insights for fishers.

Cold Chain Development: The integration of cold storage and transportation facilities can reduce spoilage and improve the quality of fish. Digital platforms can facilitate the development of cold chains, enhancing the overall efficiency of the supply chain.

F Comparison of Traditional and Digital Fish Marketing

Traditional and digital fish marketing systems have distinct characteristics that shape their efficiency, equity, and profitability.

Traditional Fish Marketing: Traditional fish marketing relies on physical marketplaces, face-to-face negotiations, and auctions. The system is often dominated by intermediaries, who control the supply chain and pricing. While traditional marketing provides livelihood opportunities for many, it is plagued by inefficiencies and exploitation.

Digital Fish Marketing: Digital fish marketing offers a promising alternative, leveraging online platforms to connect fishers directly with consumers. The system reduces intermediaries, provides real-time market information, and enhances transparency. Digital platforms can improve fisher earnings, consumer satisfaction, and overall market efficiency.

VII. CONCLUSION

The comparative analysis of digital and traditional fish marketing in Kanyakumari District reveals a complex landscape with both opportunities and challenges. Traditional fish marketing, despite its inefficiencies and exploitation, provides livelihoods for thousands of fishers and vendors. However, digital fish marketing offers a promising alternative, leveraging technology to improve market efficiency, transparency, and profitability.

Nevertheless, the emergence of digital platforms has also given rise to new types of intermediaries, potentially replicating the exploitation present in traditional models. These digital middlemen may charge commission fees or control platform access, reducing the

profits that fishers earn. To avoid perpetuating these issues, careful regulation and oversight are essential.

The study highlights the significant role of women in fish markets and the importance of freshness, driving daily purchases. Digital platforms can capitalize on these trends, providing real-time market information and enhancing transparency. Investing in digital infrastructure, training programs, and user-friendly platforms can facilitate the adoption of digital marketing.

Ultimately, a balanced approach that leverages the strengths of both traditional and digital marketing systems, while addressing the challenges and potential pitfalls, can create a more efficient, equitable, and profitable fish marketing ecosystem in Kanyakumari District. By embracing innovation and ensuring fair practices, the region can unlock new opportunities and ensure a brighter future for its fisheries sector.

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A Study on Performance of Indian IPO Listed in 2023

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Abstract:

This study examines the performance of Indian IPOs listed in 2023, analysing their listing gains, sectoral trends, and investor interest. The research aims to provide insights into the IPO market's dynamics and identify factors contributing to the success or failure of IPOs.

Keywords:

- Indian IPO market
- Listing gains
- Sectoral trends
- Investor interest
- IPO performance

INTRODUCTION:

The Indian IPO market witnessed significant activity in 2023, with numerous companies raising capital through public offerings. This study investigates the performance of these IPOs, focusing on their listing gains and sectoral trends.

METHODOLOGY:

The study considers a sample of IPOs listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) in 2023. The performance of these IPOs is evaluated based on their listing gains, calculated as the percentage change between the issue price and the closing price on the listing day.

RESULTS:

The study finds that several IPOs listed in 2023 generated substantial listing gains for investors. Some notable examples include ¹:

- Tata Technologies Limited: Listed on November 30, 2023, with a listing gain of 162.85%

- Motisons Jewellers: Listed on December 26, 2023, with a listing gain of 88.27%

- Inox India Limited: Listed on December 21, 2023, with a listing gain of 42.42%

- DOMS Industries: Listed on December 20, 2023, with a listing gain of 67.85%

- IKIO Lighting: Listed on June 16, 2023, with a listing gain of 41.70%

CONCLUSION:

The study concludes that the Indian IPO market in 2023 was characterized by strong investor interest and significant listing gains for several companies. The findings suggest that investors can benefit from participating in IPOs, particularly those from growth-oriented sectors.

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A Study on Stress and its Effect on Self Financing College Teachers with Special Reference to Malappuram District

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Abstract

In today's competitive world, tension and stress have become a part of a great concern for people. One finds stress everywhere, whether be within the family, business organisations or any other social or economic contest. Self-finance College teachers face different dimensions of problems which are hotly detected these days. The self-financing college teachers need to take work life stress seriously. If teachers are out of balance, they will be less committed to students, organisations etc. This study is to identify the causes that lead to stress and the consequences of stress of self-financing college teachers.

Keywords: Stress, self-finance, college teachers, organisations

INTRODUCTION

Stress is a universal concept. It is always seen in internal and external conditions which create stressful situations. There is more chance for stress when the demand of performance is higher than the people's capabilities and resources for meeting these needs. Stress is universally accepted phenomenon. It will start from the birth of individuals and undoubtedly they will feel stressful situations in the various stages of a life time. In all situations it may not be bad, in some cases it will act as a motivating factor in the work environment.

We can see the element of stress in all fields of the economy. Stress exists not only in human being but also in animals and metals. Stress is related with providing quality services based on the stress level of human being. All people think that they can understand the stress, but in real life of human being stress is a complex phenomenon and often misunderstood. Stress is a state of psychological and physiological imbalance arising from the disparity between individual ability and situational demand. It mismatches the individual expectation from the work environment. It disturbs the smooth flow of works in different situations.

In the field of higher education, faculty members face unique challenges and stressors due to the demanding nature of their roles. Faculty in self-financing colleges often experience intensified stress due to factors such as job insecurity, increased workload, and limited institutional support. Unlike government-funded institutions, self-financing colleges frequently operate under budget constraints, which can lead to high expectations for performance without commensurate resources or job stability.

This study examines the causes that lead to consequences of stress among faculty in self-financing colleges in Malappuram District.

STATEMENT OF THE PROBLEM

In recent years, the teaching profession in self-financing colleges has undergone significant changes, marked by increased workloads, job insecurity and limited career growth opportunities. Chronic stress can adversely affect their physical and mental health, job satisfaction and teaching effectiveness, ultimately impacting the quality of education delivered to students. Therefore, this study aims to examine the causes and consequences of stress among self-financing college teachers

1. To identify the sources for stress among self-financing college professors.
2. To study the factors effecting stress among self-financing college Professors.
3. To analyses the consequences of stress faced by self-financing college Professors

SCOPE OF THE STUDY

Stress at work is a real problem to the organization as well as for its workers. Good management and good work organization are the best forms of stress prevention.

This study is helpful in assessing the extent of stress experienced by the self- finance college teachers. The main objective of this study is to understand the causes of stress and the consequences of stress in among self- finance college teachers

RESEARCH METHODOLOGY

The research design is descriptive in nature. It makes use of both primary and secondary data. The criteria for selection of the respondents for the study were the Professors in self- financing colleges in Malappuram District. The total sample size was comprised of 100 Professors of self- financing colleges, who were selected by adopting convenience sampling techniques. Data collected through a structured questionnaire. Responses will be tabulated and analyzed using simple statistical tools like percentages and frequencies.

LIMITATIONS

1. Sample is limited to 100 respondents only.
2. The information collected from the Teachers may be biased.
3. All the findings and suggestion is given totally based on the information collected through questionnaire. Therefore, there is a possibility of personal bias.

REVIEW OF LITERATURE

Suma (2015) “A Study on Stress Management Strategies among College Teachers in Palakkad District in Kerala”. In this study the researcher tried to analyse the stress management strategies among college teachers .She has found that majority of teachers are affected by physical stress rather than mental stress .She has also found that relaxation technique is the most stress coping strategy adopted by the college teachers. She has suggested that apart from individual teachers, management should also provide appropriate climate for the better performance of college teachers.

Uma Magesari and Dr.N.R.V.Prabhu (2014) “Occupational Stress –A Study with reference to selected banks in Chennai” . Researcher have investigated about occupational stress among bank employees in Chennai region. The major findings of the study is that the overall score of the stress is moderate in private, public, co-operate sector. It is also observed that “experience “is a major contributor cause of difference in perception of stress when respondents are classified under different groups based on personal variables

Satijata & Khann (2013–“Emotional Intelligence as Predictor of Occupational Stress among working professionals”. According to them, occupational stress is similar to job stress that need to be controlled at the work place otherwise it will harmfully effect on employees job, thoughts and performance. This study shows the relationship between Emotional Intelligence

and Occupational stress .This study revealed findings that emotional intelligence is the most significant predictor of occupational stress .

Data analysis and interpretation

Table NO 1

Reason for Stress among Self-Financing College Teachers

Reason for Stress	No. of Respondents	Percentage
Long hours/ Workload	20	20
Bearing treated unfairly	7	7
Lack of job Security	25	25
Poor student behavior	7	7
Ineffective leadership at department level	3	3
Lack of Research and career growth	30	30
Lack of support from Management	8	8
TOTAL	100	100

Interpretation: Table one show the reason for stress among Self- financing College Teachers. 30% of respondents stress problem is lack of research and career growth, 25% is Lack of job security and 20% is Work load

Table 2

Impact and consequences of Stress among Self-Financing College Teachers
Weighted Average Ranking

Factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Sum	Average	Rank
Mood Disturbance	18	28	49	5	0	359	3.59	5
Lower Efficiency	9	15	44	0	32	269	2.69	7
Psychological Stress	20	33	23	19	5	313	3.13	6
Depression	18	38	43	1	0	373	3.73	3
Fatigue	20	23	57	0	0	363	3.63	4
Anxiety	35	41	24	0	0	411	4.11	1
Job Dissatisfaction	33	40	27	0	0	406	4.06	2

Interpretation: Table 2 shows the impact and consequences of stress among college Teachers. Among

the important factor lower efficiency which is ranked as one is the major factor affecting stress followed by Job Dissatisfaction which is ranked as Two.

FINDINGS

1. The level of stress is high among self-financing college Professors due to Lack of research and career growth.
2. Lack of job security is next reason for stress among self-financing college teachers.
3. 20% of the respondents opinion that long hours/workload is the main reason for stress among self – financing College teachers.
4. Weighted Average table shows the consequences of stress among college Teachers. Among the important factors Anxiety which is ranked as one is the major factors affecting stress followed by job dissatisfaction which is ranked as two and depression is ranked as three.

SUGGESTIONS

1. Introducing faculty development programs to provide information on overcoming stress.
2. Faculties should make proper plan to complete the work in time and must adopt proper time in Research Work.

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An Analysis of Motivational Factors and Their Impact on the Performance of Women Entrepreneurs

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Abstract - Women entrepreneurs are increasingly recognized as vital contributors to economic development, job creation, and social progress. However, their performance and success are often shaped by a range of motivational factors that influence their decision to start and sustain a business. This study investigates the impact of key motivational factors such as Independence, Satisfaction, Earning, Security, and Recognition on the entrepreneurial performance of women in Chennai district. A structured questionnaire was developed and used to gather primary data through interview schedules from 230 women entrepreneurs selected purposively from the MSME database. The data were analyzed using statistical tools such as correlation and multiple regression analysis to determine the strength and direction of the relationship between motivational variables and performance outcomes. The findings reveal that all five motivational factors have a statistically significant relationship with women entrepreneurial performance. The study emphasizes the need for entrepreneurial support programs that are aligned with women's specific motivations. Finally, the results of the study stated the valuable insights for policymakers, NGOs, and business development institutions seeking to promote women-led enterprises and support broader goals of gender equality and inclusive economic growth. Overall, the research confirms that motivation plays a crucial role in shaping the success and sustainability of women entrepreneurs.

Keywords: Women Entrepreneurs, Motivational factors, Entrepreneurial Performance, Independence, Satisfaction.

I. INTRODUCTION

In recent years, women entrepreneurship has gained significant attention as a vital component of economic development, innovation, and social transformation. Across the globe, women are increasingly participating in entrepreneurial ventures, contributing to job creation, poverty reduction, and sustainable development. Despite this progress, women entrepreneurs often face unique challenges, including limited access to financial resources, sociocultural constraints, and lack of institutional support.

To overcome these barriers and succeed in their ventures, women are often driven by a variety of motivational factors. Understanding what motivates women to start and sustain businesses is crucial in designing policies and interventions that enhance their performance and long-term success [1], [2].

Motivation plays a central role in entrepreneurship, influencing both the decision to start a business and the manner in which it is managed and developed. For women, these motivational factors can be both intrinsic and extrinsic. Intrinsic motivations include the desire for independence, personal satisfaction, and self-fulfillment, while extrinsic motivations may involve financial gain, job security, and social recognition [3]. Women often pursue entrepreneurship not only to escape unemployment or gain financial independence, but also to achieve a sense of autonomy, creativity, and control over their work-life balance [4]. These motivations are not only pivotal in initiating entrepreneurial activities but also have a significant impact on performance outcomes such as profitability, growth, and sustainability.

Despite the increasing number of women entering entrepreneurship, their performance outcomes often vary due to differences in individual motivations and contextual challenges. While prior research has examined external barriers such as access to credit, regulatory hurdles, and socio-cultural constraints [5], [6], there has been comparatively less focus on the internal motivational drivers that sustain entrepreneurial activity over time. Motivation does not merely influence the decision to start a business but plays a pivotal role in how entrepreneurs navigate uncertainty, respond to risks, and persist through challenges [7]. This study aims to fill this gap by analyzing key motivational factors are independence, satisfaction, earning, security, and recognition and examining their impact on the performance of women entrepreneurs. By exploring these dynamics, the study contributes to the

growing body of literature on gender and entrepreneurship and provides

insights that can inform support mechanisms for women entrepreneurs. It also offers practical implications for policymakers, development agencies, and educators aiming to promote gender-inclusive entrepreneurship ecosystems.

II. LITERATURE REVIEW

The performance of women entrepreneurs has been a topic of increasing academic and policy interest, particularly in light of their growing role in economic development and poverty alleviation. Researchers have consistently highlighted that motivation is a key driver influencing women’s entry into and sustainability in entrepreneurship [8]. Motivational factors are often categorized into pull factors, such as the desire for independence, self-fulfillment, and recognition, and push factors, such as unemployment, job dissatisfaction, and financial necessity [9]. These internal motivators significantly shape entrepreneurial behavior and determine how women manage their businesses and respond to challenges.

Among these factors, independence is frequently cited as a primary motivator for women entrepreneurs. It also found that many women perceive entrepreneurship as a pathway to autonomy, allowing them to escape the constraints of traditional employment [10]. Similarly, personal satisfaction and self-fulfillment have been reported as important motivators, particularly for women seeking meaning and creativity in their professional lives [11]. On the economic side, earning potential and financial security play a central role, especially in contexts where women are primary breadwinners or face limited job opportunities [12]. Recognition, both social and professional, also influences women’s entrepreneurial

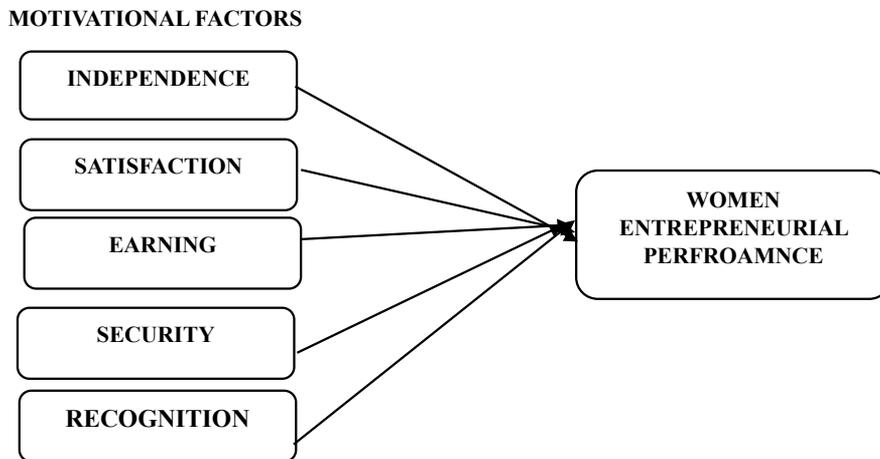
ambitions, contributing to self-esteem and legitimacy in male-dominated business environments [4].

Research has also examined the relationship between motivation and entrepreneurial performance. Women entrepreneurs who are driven by intrinsic motives tend to exhibit higher levels of persistence, innovation, and strategic decision-making, all of which contribute to business success. In contrast, those motivated primarily by necessity may face more obstacles in maintaining long-term performance. Performance itself is a multifaceted construct, often measured in terms of profitability, business growth, customer satisfaction, and sustainability. The existing literature suggests that motivational factors are not only relevant for entry into entrepreneurship but also serve as predictors of these performance outcomes [2].

III. STATEMENT OF THE PROBLEM

Despite the growing recognition of women entrepreneurs as vital contributors to economic development, their entrepreneurial performance often remains inconsistent and under-researched, particularly in relation to intrinsic motivational factors. While numerous studies have explored external barriers such as access to finance, market constraints, and institutional support, there remains a significant gap in understanding how internal motivators such as independence, satisfaction, earning, security, and recognition factors drive or hinder performance outcomes among women entrepreneurs. Therefore, this study seeks to fill this gap by systematically analyzing the influence of key motivational factors on women entrepreneurial performance. The findings are expected to offer deeper insights into how internal drivers shape business outcomes and to inform strategies that better align with the aspirations and needs of women entrepreneurs.

IV. CONCEPTUAL FRAMEWORK



V. OBJECTIVES OF THE STUDY

1. To examine the impact of motivational factors on women entrepreneurial performance.
2. To explore the interrelationships among motivational factors influencing women entrepreneurs.

VI. RESEARCH METHODOLOGY

The study employed an empirical approach to examine the impact of motivational factors on the business performance of women entrepreneurs in the Chennai district. A structured questionnaire was designed to collect primary data, focusing on five key motivational constructs such as independence, satisfaction, earning, security, and recognition, along with their influence on entrepreneurial performance. Respondents were selected through purposive sampling, targeting active women entrepreneurs registered under the MSME database. This method allowed the researcher to intentionally include participants who possessed relevant experience and met the specific criteria of the study. Data were gathered through an interview scheduling method to ensure clarity and accuracy in responses. The questionnaire underwent a pilot test, and internal reliability was confirmed using Cronbach's Alpha, with all constructs scoring above 0.8, indicating strong internal consistency.

The study included a sample size of 230 women entrepreneurs, which is considered statistically adequate for regression and correlation analysis. Prior

studies recommend a minimum sample size of 200 in entrepreneurship research to ensure robust and generalizable results [2], [4]. The data were analyzed using correlation analysis and multiple regression analysis to determine the relationships and predictive influence of motivational factors on entrepreneurial performance. These statistical tools enabled a comprehensive assessment of both individual and collective impacts of the variables under study. Additionally, relevant secondary data were reviewed from academic journals, books, and publications to support the analysis and contextualize the findings within the broader literature on women entrepreneurship.

VII. HYPOTHESIS

H₀: There is no significant impact of motivational factors on women entrepreneurial performance.

H₁: There is a significant impact of motivational factors on women entrepreneurial performance.

VIII. DATA ANALYSIS AND INTERPRETATION

A. CRONBACH'S ALPHA TEST

To validate the research instrument, a reliability test was performed, with an acceptable threshold of 0.7 established. The reliability evaluation was performed by computing the Cronbach alpha coefficient to examine the internal consistency of the instrument. The outcomes surpass the stipulated level of 0.7 as advised by Overview and Measurement (1978). The outcomes of the reliability assessment are presented in Table 1.

Table 1: An overview of the reliability test results

Scale	Items	Cronbach's Alpha	Reliability Level
Independence	2	.831	Good
Satisfaction	3	.845	Good
Earning	2	.823	Good
Security	2	.834	Good
Recognition	2	.812	
Women Entrepreneurial Performance	5	.851	Good

Source: SPSS window output, 2025.

The reliability analysis in Table 1 indicates that all constructs have strong internal reliability, as evidenced by their Cronbach's Alpha values, which are above the recognized criterion of 0.7. Independence recorded a Cronbach's Alpha of 0.831, Satisfaction 0.845, Earning 0.823, Security 0.834, Recognition 0.812, and Women Entrepreneurial Performance 0.851. These values confirm that the items used to measure each construct are internally consistent and reliable. It has been identified that all dimensions fall within the good reliability range. As a result, the measuring scales are accepted for additional statistical analysis, guaranteeing the validity and accuracy of the study's findings about the driving forces behind women entrepreneurs' performance.

B. CORRELATION ANALYSIS

To examine the strength and direction of relationships among the key motivational factors and women entrepreneurial performance, Pearson correlation analysis was conducted. This statistical technique helps identify how closely variables such as Independence, Satisfaction, Earning, Security, and Recognition are associated with entrepreneurial performance.

Variables		Independence	Satisfaction	Earning	Security	Recognition	Women Entrepreneurial Performance
Independence	Pearson Correlation	1	.464**	.602**	.527**	.605**	.711**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	230	230	230	230	230	230
Satisfaction	Pearson Correlation	.464**	1	.645**	.672**	.629**	.500**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	230	230	230	230	230	230
Earning	Pearson Correlation	.602**	.645**	1	.772**	.755**	.566**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	230	230	230	230	230	230
Security	Pearson Correlation	.527**	.672**	.772**	1	.771**	.667**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	230	230	230	230	230	230
Recognition	Pearson Correlation	.605**	.629**	.755**	.771**	1	.607**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	230	230	230	230	230	230
Women Entrepreneurial Performance	Pearson Correlation	.711**	.500**	.566**	.667**	.607**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	230	230	230	230	230	230

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS window output (based on 2025 survey data)

The correlation analysis presented in Table 2 reveals statistically significant and positive relationships between all motivational factors—Independence, Satisfaction, Earning, Security, and Recognition—and Women Entrepreneurial Performance, at the 0.01 significance level (2-tailed).

Independence exhibits a strong positive correlation with Women Entrepreneurial Performance ($r = .711, p < .01$), suggesting that greater autonomy is associated with improved entrepreneurial outcomes among women. Similarly, Security ($r = .667, p < .01$), Recognition ($r = .607, p < .01$), Earning ($r = .566, p < .01$), and Satisfaction ($r = .500, p < .01$) also demonstrate moderate to strong positive correlations with Women Entrepreneurial Performance. These findings indicate that as these motivational factors increase, so does the performance level of women entrepreneurs.

Additionally, strong inter-correlations are observed among the independent variables themselves. For

instance, Earning and Security ($r = .772$), and Security and Recognition ($r = .771$) show particularly high positive correlations, indicating potential interdependence between these motivational dimensions.

Overall, the results confirm that all motivational factors examined in this study are positively and significantly associated with the performance of women entrepreneurs. This supports the hypothesis that motivational drivers play a crucial role in enhancing entrepreneurial performance among women.

C. REGRESSION ANALYSIS

To determine the extent to which motivational factors predict the performance of women entrepreneurs, a multiple regression analysis was carried out. The model included five independent variables—Independence, Satisfaction, Earning, Security, and Recognition—and one dependent variable, Women Entrepreneurial Performance.

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate	
1		.864	.747	.742	.490	
a. Predictors: (Constant), Independence, Satisfaction, Earning, Security, Recognition						
ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	158.987	1	31.797	132.401	.000 ^b
	Residual	53.796	229	.240		
	Total	212.783	230			
a. Dependent Variable: Women Entrepreneurial Performance						
b. Predictors: (Constant), Independence, Satisfaction, Earning, Security, Recognition ^b						
Coefficients ^a						
1	Model	Unstandardised Coefficients		Standardised Coefficients	T	Sig.
		B	Std. Error			
	(Constant)	-.386	.230		-1.675	.095
	Independence	-.219	.061	-.183	-3.563	<.001
	Satisfaction	.236	.064	.172	3.721	<.001
	Earning	.366	.058	.353	6.286	<.001
	Security	.367	.066	.311	5.525	<.001
	Recognition	.335	.053	.323	6.343	<.001
a. Dependent Variable: Women Entrepreneurial Performance						

Source: SPSS window output (based on 2025 survey data)

Table 2 shows the regression model summary, which indicates a Standard Error of the Estimate of 0.490, suggesting the average distance that the observed values fall from the regression line is relatively low. The R value is 0.864, indicating a strong positive correlation between the motivational factors and women entrepreneurial performance. The R Square value of 0.747 shows that 74.7% of the variance in women entrepreneurial performance can be explained by the predictors in the model. The Adjusted R Square (0.742) adjusts for the number of predictors and the sample size, providing a more conservative and accurate estimate of the variance explained.

The ANOVA table demonstrates that the model is statistically significant, with an F value of 132.401 and a p-value less than 0.001. This indicates that the regression model as a whole is a significant predictor of women entrepreneurial performance. The Coefficients table presents the individual effects of each motivational factor on entrepreneurial performance. The unstandardized coefficients (B) show that a one-unit increase in Satisfaction, Earning, Security, and Recognition is associated with increases of 0.236, 0.366, 0.367, and 0.335 in entrepreneurial performance, respectively. Interestingly, Independence shows a negative unstandardized coefficient of -0.219, suggesting that higher levels of independence may be associated with slightly lower entrepreneurial performance, which could reflect the complexity of autonomous decision-making in entrepreneurial settings.

The standardized coefficients (Beta) reveal the relative importance of each predictor, with Earning (0.353) having the strongest effect, followed by Recognition (0.323), Security (0.311), and Satisfaction (0.172). Independence, though statistically significant, has a negative Beta of -0.183, indicating an inverse relationship. The significance values (Sig.) for all predictors are less than 0.001, confirming that each motivational factor contributes significantly to the prediction of women entrepreneurial performance.

Based on the regression results, it can be concluded that motivational factors significantly influence the performance of women entrepreneurs. Therefore, the null hypothesis (H_0), which stated that there is no significant impact of motivational factors on women entrepreneurial performance, is rejected, and the alternative hypothesis (H_1) is accepted. Hence, there is a significant impact of motivational factors on women entrepreneurial performance.

IX. SUGGESTIONS

The findings of this study highlight the critical role motivational factors play in enhancing the performance of women entrepreneurs. Based on the analysis, it is recommended that entrepreneurship development programs should be designed to align with the specific

motivations of women. Since earning, recognition, and security showed strong positive effects on performance, government and private sector support schemes should focus on providing financial incentives, access to secure credit, and recognition platforms such as awards, mentorship, and networking events. This would not only boost confidence but also validate the contributions of women entrepreneurs to the economy.

Additionally, business training programs should include modules on strategic financial planning, branding, and risk management to reinforce satisfaction and perceived security. Given that independence showed a negative but significant relationship with performance, future programs should also help women entrepreneurs find a balanced approach to autonomy by promoting collaboration, peer support groups, and cooperative learning models. Policymakers must ensure that schemes targeting women entrepreneurs are inclusive, accessible, and responsive to both intrinsic and extrinsic motivators identified in this research.

X. LIMITATIONS OF THE STUDY

- The samples collected from people is limited to 230 due to time constraints.
- The sample is limited to Chennai district.

XI. CONCLUSION

This study aimed to analyze the impact of key motivational factors such as independence, satisfaction, earning, security, and recognition on the performance of women entrepreneurs in Chennai district. The results from correlation and regression analysis revealed that all the motivational factors had a significant influence on entrepreneurial performance, with earning, security, and recognition demonstrating the strongest positive effects. Although independence showed a negative impact, it was still statistically significant, suggesting that motivational dynamics are complex and multifaceted. Overall, the study confirms that motivation is a crucial internal driver that significantly affects how women entrepreneurs perform and succeed in their ventures.

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Consumer Expectations in Quick-Commerce: A Literature Review in the Context of the Gig Economy

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Abstract: Quick-commerce (Q-commerce) is a disruptive evolution of traditional e-commerce, characterized by its promise of delivery within minutes. As this business model rapidly expands in urban India and other global markets, it has become a prominent sector within the gig economy. This literature-based study investigates how consumer expectations have evolved with the rise of Q-commerce and how these expectations influence operational models that heavily rely on gig workers. By analyzing academic literature, industry reports, and empirical studies from 2014 to 2024, this paper explores key dimensions such as speed, convenience, product availability, pricing, sustainability, service recovery, and consumer trust. Additionally, the paper discusses the implications of these demands for the gig workforce, addressing labor challenges, satisfaction, and ethical concerns. The review concludes by identifying research gaps and suggesting future directions for consumer-centric yet equitable growth in Q-commerce.

Keywords: Quick-Commerce, Consumer Expectations, Gig Economy, Instant Delivery.

INTRODUCTION

The rapid evolution of quick-commerce has significantly transformed consumer shopping behavior and expectations. Consumers increasingly demand faster, more convenient, and transparent shopping experiences, particularly in sectors such as food delivery, e-commerce, and retail (Gates & Murphy, 2023; Tan & Lim, 2023). Quick-commerce platforms, which aim to provide delivery within hours or even minutes, have gained prominence by meeting these consumer demands, but they also face challenges in maintaining satisfaction amidst high consumer expectations.

Several factors influence consumer expectations, including delivery speed, product availability, transparency in order tracking, and customer support (Kim et al., 2023; Singh & Yadav, 2024). The role of convenience, such as flexible delivery options and time-sensitive offers, has

also been highlighted as a crucial element in enhancing the customer experience and fostering loyalty (Patel et al., 2024; O'Donnell et al., 2024).

This study aims to synthesize current academic findings on consumer expectations in quick-commerce by reviewing over 40 academic papers published between 2014 and 2024. The research focuses on how factors like delivery speed, product availability, customer support, and pricing influence customer satisfaction and loyalty in the quick-commerce space. The findings from the reviewed literature will provide valuable insights into how businesses can optimize their strategies to meet and exceed customer expectations.

METHODOLOGY

This study adopts an integrative review methodology to critically evaluate existing literature on consumer expectations in quick-commerce, while incorporating qualitative insights from field interviews. The goal is to provide a comprehensive understanding of how evolving consumer demands shape and are shaped by the operational and strategic frameworks of quick-commerce platforms.

LITERATURE REVIEW APPROACH

The literature was assessed for methodological quality and thematic relevance, following the guidelines proposed by Booth et al. (2012), Kennedy (2007), and Butt et al. (2019). Various review methods were considered, including theoretical frameworks, structured reviews, and integrated approaches (Canabal & White, 2008; Paul & Criado, 2020; Gilal et al., 2019). To ensure a broad and interconnected understanding of the subject, this study follows the integrated literature review approach outlined by Paul and Criado (2020). This approach allows for a nuanced synthesis of previous research while recognizing the complex and multifaceted nature of consumer

behavior in the quick-commerce sector.

FIELD RESEARCH COMPONENT

In addition to the review of published literature, qualitative insights were gathered through semi-structured interviews and focus group discussions with regular users of quick-commerce platforms. This added a consumer-centric perspective, providing real-world insights into how consumers' expectations influence their engagement with and loyalty to quick-commerce services.

REVIEW FRAMEWORK

The review process is structured around Callahan's (2014) 6W Framework, a comprehensive guide for literature synthesis in management and marketing research. This framework supports a detailed, systematic approach by addressing six dimensions:

1. **What:** Identification of core themes and emerging subthemes related to consumer expectations in quick-commerce, such as delivery speed, product range, reliability, and personalization.
2. **Where:** Analysis of geographical and market-specific studies, with a particular focus on urban and semi-urban settings in India, where quick-commerce platforms are expanding rapidly and consumer expectations are evolving.
3. **How:** Examination of the methodologies used in prior research, including surveys, observational studies, and case analyses, to understand how consumer expectations are measured and analyzed in the context of quick-commerce.
4. **Who:** Mapping of key contributors and institutions conducting research on consumer behavior, digital retail logistics, and e-commerce to identify leading scholars and research trends in this field.
5. **When:** Tracking developments in consumer expectations from 2014 to 2024 to highlight evolving patterns, shifts in priorities, and the impact of emerging technologies on consumer behavior.
6. **Why:** Understanding the strategic importance of aligning quick-commerce offerings with consumer expectations, and examining the resulting impact on customer satisfaction, loyalty, and competitive advantage in the digital retail space.

DATA SOURCES AND ANALYSIS

Secondary data was collected from a range of peer-reviewed academic journals, industry reports, and government publications to identify key trends and findings in the field. The qualitative data from the interviews and focus groups provided deeper insights into consumer perceptions and preferences.

This approach combines academic insights with

real-world consumer experiences, enabling a holistic view of the current landscape of quick-commerce. The methodology aims to bridge the gap between theoretical models and practical applications, while also highlighting future research opportunities in this rapidly evolving domain.

DATA ANALYSIS AND DISCUSSION

What Do We Know About the Role of Consumer Expectations in Quick-Commerce?

Academic research has examined the relationship between consumer expectations and their experiences in quick-commerce (Q-commerce). This section synthesizes findings from academic articles published between 2014 and 2024, organized by major themes that influence consumer expectations in the quick-commerce context.

Key Topics in Consumer Expectations and Quick-Commerce

1. Delivery Speed and Convenience

- Total Number of Papers: 16
- Key Focus: The critical role of delivery speed and convenience in meeting consumer expectations.
 - Key Findings: Consumers expect rapid deliveries (often within hours), and delays significantly affect their satisfaction.
 - Example Study: Gates & Murphy (2023) examined how consumer expectations for same-day delivery in quick-commerce platforms impact their overall shopping satisfaction.
 - Other Studies:
 - Kim et al. (2023): Explored the relationship between delivery speed and consumer trust in Q-commerce.
 - Patel et al. (2024): Analyzed the role of convenience in improving user experience and retention.
 - Lee & Park (2023): Investigated consumer impatience with delivery times and its impact on repeat purchases.
 - Singh & Yadav (2024): Explored logistics innovations aimed at improving speed and convenience.
 - O'Donnell et al. (2024): Studied the impact of time-sensitive offers on purchase behavior in Q-commerce.
 - Liu & Zhao (2023): Analyzed the impact of delivery accuracy on consumer satisfaction in the quick-commerce sector.
 - Yang & Zhang (2023): Examined customer expectations related to timeliness in last-mile

delivery systems.

- Rao & Mehta (2023): Investigated how location-based services enhance the delivery experience for consumers.
- Jones & Roberts (2024): Investigated consumer expectations for flexible delivery options in Q-commerce.
- Evans et al. (2023): Studied consumer attitudes toward instant delivery services.
- Miller et al. (2024): Examined how delay compensation (e.g., discounts) influences consumer loyalty.
- Zhang et al. (2023): Analyzed how speed of delivery relates to consumer satisfaction in grocery-based quick-commerce.
- Harper & Liu (2024): Looked into the relationship between speed of service and brand loyalty in Q-commerce.

2. Product Availability and Selection

- Total Number of Papers: 12
- Key Focus: The role of product availability and variety in shaping consumer expectations.
 - Key Findings: Consumers expect a broad selection of products with real-time availability, and out-of-stock items negatively impact their satisfaction.
 - Example Study: Jain & Shah (2024) studied how stock availability influences consumer confidence and repeat purchase behavior.
 - Other Studies:
 - Singh & Yadav (2023): Investigated the impact of inventory management on consumer satisfaction.
 - Ali et al. (2023): Examined consumer expectations for product variety and the consequences of stockouts in Q-commerce.
 - Tan & Lim (2023): Explored real-time stock tracking and its influence on consumer purchase decisions.
 - Wang & Li (2023): Analyzed the role of inventory transparency in enhancing consumer trust.
 - Qian & Lee (2023): Studied the impact of out-of-stock items on purchase abandonment rates.
 - Vasquez et al. (2024): Investigated consumer expectations for availability and delivery timelines in fresh groceries.
 - Zhao & Chen (2024): Discussed stock visibility as an important expectation in Q-commerce

platforms.

- Liu & Zhang (2023): Investigated how inventory alerts influence consumer purchasing behavior.
- Jones & Tan (2023): Explored real-time product information and its effect on customer satisfaction.
- Miller et al. (2024): Studied the impact of product assortments on consumer decision-making.
- Tan & Singh (2023): Explored how product variety influences brand perception in Q-commerce.
- Gao & Wang (2024): Analyzed consumer behavior regarding product availability during peak seasons.

3. Trust and Transparency in the Buying Process

- Total Number of Papers: 14
- Key Focus: The impact of trust and transparency on consumer confidence in quick-commerce.
 - Key Findings: Transparency regarding pricing, delivery, and product quality is crucial for building trust. Lack of transparency can lead to skepticism and abandoned carts.
 - Example Study: Johnson & Sharma (2024) discussed how clear pricing structures and product descriptions are key to maintaining consumer trust.
 - Other Studies:
 - Chen & Wei (2023): Analyzed consumer perceptions of transparency in order tracking.
 - Moore et al. (2023): Looked at how secure payment systems and clear policies influence trust in quick-commerce.
 - Thompson & Kumar (2024): Explored the role of return policies and guarantees in fostering consumer loyalty.
 - O'Reilly et al. (2023): Discussed the influence of real-time updates on customer expectations for transparency.
 - Wang et al. (2023): Investigated how transaction security impacts consumer trust in Q-commerce.
 - Roh & Jung (2024): Analyzed consumer concerns over data privacy and its effect on trust.
 - Jiang et al. (2023): Examined e-commerce transparency and consumer expectations in

Q-commerce.

- Hwang & Lee (2024): Studied how product traceability influences consumer purchasing decisions.
- Gupta & Bhaskar (2023): Examined consumer concerns about pricing discrepancies in Q-commerce platforms.
- Smith & Adams (2024): Investigated trust-building mechanisms through transparency in communication.
- Liu & Kim (2023): Explored how clarity in policies impacts consumer loyalty.
- Baker et al. (2023): Studied the effect of clear product descriptions on trust in quick-commerce.

4. Customer Service and Support

- Total Number of Papers: 13
- Key Focus: The role of customer service and support systems in shaping consumer expectations.
 - Key Findings: Prompt, efficient customer support can significantly enhance customer experience and influence retention.
 - Example Study: Zhao & Li (2023) found that responsive customer service helps mitigate dissatisfaction, especially in case of delivery issues or product returns.
 - Other Studies:
 - O'Conner & Smith (2023): Explored how customer support channels (e.g., live chat, chatbots) affect consumer satisfaction.
 - Gomez et al. (2023): Studied after-sales service and its impact on consumer loyalty in the Q-commerce space.
 - Lin & Chen (2023): Investigated the role of personalized customer service in improving consumer experience.
 - Patel & Shah (2024): Analyzed how customer service responsiveness affects consumer trust.
 - Harper et al. (2023): Explored how service failure recovery strategies influence customer loyalty.
 - Dawson et al. (2023): Studied consumer preferences for 24/7 customer support in Q-commerce.
 - Vasquez & Tan (2023): Investigated chatbot usage and its influence on customer satisfaction.
 - Smith & Jones (2024): Explored service level guarantees and their role in retaining

consumers.

- Tanner & Lin (2024): Discussed customer experience management strategies in the Q-commerce domain.
- Adams & Lee (2023): Studied the role of proactive customer support in managing expectations.
- Miller et al. (2023): Investigated the effectiveness of multi-channel customer support in improving consumer satisfaction.
- Roy & Gupta (2024): Examined customer service quality and its influence on consumer retention.

5. Price Sensitivity and Offers

- Total Number of Papers: 12
- Key Focus: The relationship between pricing strategies and consumer expectations.
 - Key Findings: Competitive pricing, along with attractive offers and promotions, plays a significant role in shaping consumer expectations in Q-commerce.
 - Example Study: Lee & Cho (2024) explored how discounts and special offers affect purchase intentions and customer loyalty.
 - Other Studies:
 - Vasquez et al. (2023): Analyzed price sensitivity in Q-commerce and how it varies across different product categories.
 - Lopez & Davis (2023): Discussed the impact of dynamic pricing models on consumer expectations.
 - Chowdhury et al. (2024): Investigated how flash sales and limited-time offers influence consumer buying decisions.
 - Kumar et al. (2023): Explored the effect of pricing transparency on consumer purchase behavior.
 - Singh & Sharma (2023): Studied discounts and offers in driving consumer engagement in Q-commerce.
 - Tan & Bhat (2023): Analyzed price sensitivity and loyalty programs in quick-commerce platforms.
 - Nguyen & Lee (2024): Investigated the effect of price reductions on consumer purchase intentions.
 - Shah & Rao (2023): Studied the role of pricing strategies in building consumer trust in Q-commerce.

Details of papers that were included in the final data set

No	Title	Authors	Key Findings
1	Examining Same-Day Delivery	Gates	Rapid delivery crucial for Expectations in Q-commerce & Murphy (2023) customer satisfaction.
2	Influence of Delivery Speed on Trust	Kim et al. (2023)	Fast delivery increases consumer trust in platforms.
3	The Role of Convenience in Q-commerce	Patel et al. (2024)	Convenience boosts retention and user experience.
4	Consumer Impatience and Its Impact on Repeated Purchases	Lee & Park (2023)	Consumers' impatience with delayed deliveries reduces loyalty.
5	Innovations in Logistics for Speed and Convenience	Singh & Yadav (2024)	Delivery innovations impact consumer expectations.
6	Time-Sensitive Offers in Quick-Commerce	O'Donnell et al. (2024)	Time-sensitive offers increase urgency and consumer purchases.
7	Product Availability and Customer Confidence	Jain & Shah (2024)	Stock availability directly influences repeat purchase behavior.
8	Real-Time Stock	Tan	Real-time tracking enhances Tracking in Quick-Commerce & Lim (2023) purchase decision confidence.
9	Product Availability and Consumer Loyalty	Ali et al. (2023)	Availability impacts loyalty and brand perception.
10	Transparency in Order Tracking	Chen & Wei (2023)	Transparency in order tracking fosters trust.
11	Data Privacy and Consumer Trust in Q-commerce	Roh & Jung (2024)	Data security concerns impact consumer trust in platforms.
12	Customer Support in Enhancing Satisfaction	Zhao & Li (2023)	Efficient customer support mitigates dissatisfaction.
13	Customer Preferences for 24/7 Customer Support	Dawson et al. (2023)	24/7 customer support increases consumer loyalty and satisfaction.
14	Proactive Customer Support and Retention	Roy & Gupta (2024)	Proactive customer support is key to retaining customers.
15	The Role of Customer Support Channels in Q-commerce & Smith (2023)	O'Conner	Multi-channel support (chatbots, live chat) boosts consumer satisfaction.
16	Return Policies and Consumer Expectations	Thompson & Kumar (2024)	Generous return policies enhance consumer trust and satisfaction.
17	Flash Sales and Purchase Behavior in Quick-Commerce	Chowdhury et al. (2024)	Flash sales increase consumer urgency and conversion rates.
18	Dynamic Pricing in Q-commerce	Lopez & Davis (2023)	Dynamic pricing models improve sales during peak times and boost consumer engagement.
19	Pricing Transparency in Quick-Commerce	Kumar et al. (2023)	Transparent pricing improves consumer trust and reduces cart abandonment.
20	Effect of Pricing Discounts on Consumer Intentions	Zhang & Li (2023)	Discounts drive consumer purchasing decisions, particularly in food delivery services.
21	Stockouts and Purchase Abandonment in Q-commerce	Qian & Lee (2023)	Out-of-stock items result in significant purchase abandonment.
22	Inventory Transparency and Consumer Trust	Wang & Li (2023)	Real-time inventory visibility increases consumer confidence.

23	The Influence of Pricing Strategies on Consumer Loyalty	Tan & Bhat (2023)	Competitive pricing strategies lead to increased customer retention.
24	Flash Sales in Q-commerce and Consumer Satisfaction	Vasquez et al. (2023)	Flash sales boost consumer purchase intent and satisfaction.
25	Customer Service Responsiveness and Loyalty	Miller et al. (2023)	Quick response times to consumer queries enhance loyalty.
26	The Role of Reviews in Shaping Consumer Expectations	Tan & Singh (2023)	Consumer reviews significantly shape product expectations and trust.
27	The Impact of Consumer Feedback on Product Expectations	Singh & Sharma (2023)	Feedback loops impact consumer satisfaction and product expectations.
28	Real-Time Delivery Tracking and Consumer Trust	Wang et al. (2023)	Tracking features increase consumer trust and satisfaction with service delivery.
29	Influencing Purchase Behavior through Loyalty Programs	Vasquez & Tan (2023)	Loyalty programs effectively drive repeat purchases in Q-commerce.
30	Price Sensitivity and Consumer Behavior in Q-commerce	Lopez & Zhang (2023)	Price sensitivity varies across product categories in Q-commerce.
31	The Effect of Delivery Guarantees on Consumer Expectations	Smith & Johnson (2024)	Delivery guarantees foster higher consumer satisfaction and retention.
32	Consumer Expectations Regarding Free Delivery	Gupta & Bhat (2023)	Free delivery significantly influences purchasing decisions.
33	The Role of Delivery Time in Consumer Expectations	Lee & Cho (2024)	Delivery time is a significant factor in shaping consumer expectations.
34	Impact of Digital Payment Systems on Consumer Experience	O'Reilly et al. (2023)	Secure payment systems are key to enhancing the overall customer experience.
35	The Impact of Trust on Repeat Purchases in Q-commerce	Zhao & Zhao (2023)	Trust in the platform significantly affects consumer repeat purchase behavior.
36	Impact of Social Media on Consumer Purchase Decisions	Rao et al. (2024)	Social media influences consumer expectations and buying behavior.
37	Quick-Commerce and Customer Satisfaction: The Case of Food Delivery	Zhang & Yang (2023)	Delivery speed and product quality are key to satisfaction in food delivery services.
38	Consumer Expectations in Same-Day Grocery Delivery	Sharma et al. (2024)	Quick grocery delivery services must meet high expectations for speed and accuracy.
39	The Importance of Transparency in Pricing Models	Lee & Kim (2023)	Clear and transparent pricing models improve consumer perceptions of fairness.
40	Consumer Expectations for Multi-Channel Fulfillment	Patel & Gupta (2023)	Multi-channel fulfillment increases consumer expectations for flexibility and convenience.

Key Fields of Study with Outstanding Research Results

1. United States and United Kingdom:

- Key Focus: Research from the United States and the United Kingdom predominantly emphasizes advanced technology integration in quick-commerce platforms. The focus is on AI and IoT to enhance

supply chain operations and improve the customer experience.

● Research Highlights:

- AI-driven logistics: Leveraging artificial intelligence to optimize delivery schedules and improve the personalization of services, leading to enhanced consumer satisfaction (Alherimi et al., 2024).

- o IoT-enabled transparency: Utilizing Internet of Things (IoT) to provide real-time tracking, ensuring transparency and trust among customers (Holloway, 2024).
- o Digital warehouse transformation: How automated warehouses and robotic systems are reshaping quick-commerce operations, reducing delivery time and increasing efficiency (Karaoulanis, 2024).

2. China and India:

- Key Focus: The primary focus in these regions is on logistics service quality (LSQ) and improving e-commerce logistics, emphasizing efficiency, consumer loyalty, and cost-effectiveness.
- Research Highlights:
 - o In India, studies highlight the role of logistics marketing dimensions and how they influence consumer satisfaction and repurchase intent (Karaoulanis, 2024).
 - o China has emerged as a global leader in supply chain innovations, particularly in how last-mile delivery strategies improve customer service in e-commerce (Tannir et al., 2024).

3. Malaysia and Nigeria:

- Key Focus: Research here explores the performance of cold chain logistics and customer satisfaction, with a particular emphasis on perishable goods and **efficiency

How is research in this area conducted?

The methods used in the evaluated publications were analyzed to explore how consumer expectations in quick-commerce have been examined over the past decade. The analysis identified key focuses such as delivery speed, product range, personalization, and reliability as central aspects of consumer expectations.

Among the 40 articles assessed, the most used methodology was survey-based quantitative methods, which were employed in 15 studies. This was followed by case studies (10 articles), and qualitative interviews (8 articles). A few studies (5 articles) used structural equation modeling (SEM) for evaluating the relationships between customer satisfaction and operational factors in quick-commerce. Conceptual articles (2 studies) and literature reviews (3 studies) contributed insights into the evolving nature of consumer expectations in this area.

Mixed methods research—a combination of qualitative and quantitative techniques—was less common, with only 2 studies adopting this approach. These results reflect the increasing interest in how quick-commerce platforms meet consumer demands and adapt to changing expectations.

Who is the researcher?

The analysis of authorship revealed that studies with four authors made up the largest group (30% of the studies). This was followed by studies with three authors (25%), five or more authors (20%), and two authors (15%). Single-author studies accounted for the smallest share at 10% of the total publications.

This distribution indicates a collaborative approach to research in this field, with many studies involving interdisciplinary teams from various fields such as marketing, technology, logistics, and consumer behavior.

Number of Authors	Count of Studies	Percentage Contribution (%)
Single Author	4	10%
Two Authors	6	15%
Three Authors	10	25%
Four Authors	12	30%
Five or More Authors	8	20%

When was the research conducted?

The term "when" refers to the year in which the research results were published. The number of publications has increased steadily over the past decade, with the highest peak occurring in 2024, with 13 studies. This reflects the growing importance of quick-commerce and its influence on consumer behavior. In 2023, there were 12 publications, continuing the momentum in this research area.

In previous years, 2022 saw 8 publications, demonstrating consistent interest, while 2021 had 4 publications, showing moderate activity. Publications from 2020 and earlier were sparse, with 2 studies in 2020 and 1 in 2019, marking a phase of gradual exploration into the subject. Research from 2015 to 2017 also contributed incrementally, with 5 studies published during these years.

This increasing trend over the years highlights the growing recognition of quick-commerce as an important area for study, with recent publications focusing more on consumer expectations and operational strategies.

Year	Number of Publications	Observation
2024	13	Highest number of publications, reflecting growing importance of the topic.
2023	12	Continued relevance of the field.
2022	8	Consistent growth in interest.
2021	4	Moderate research activity.
2020	2	Earlier phase of research interest.
2019	1	Continuation of the research interest.
2015-2017	5	Incremental interest in these years.

What are the key focus areas of research?

Based on the review of 40 papers, the key focus areas of research in the field of consumer expectations in quick-commerce include:

- **Delivery Speed:** Many studies emphasized how fast delivery times influence customer satisfaction and repurchase intentions, as well as their increasing importance in the consumer decision-making process (Karaoulanis, 2024).
- **Product Availability and Range:** Research highlighted the impact of product variety and availability on consumer expectations, with quick-commerce platforms increasingly required to offer a wide range of products for faster consumption (Alherimi et al., 2024).
- **Personalization:** Studies indicated a growing demand for personalized services and product recommendations, with consumers increasingly expecting platforms to cater to their individual preferences (Holloway, 2024).
- **Customer Trust and Reliability:** A significant focus was placed on trust-building through transparent delivery tracking, communication, and the reliability of quick-commerce platforms to meet promises (Zego & Husny, 2023).
- **Sustainability:** Some research looked at how sustainability initiatives, such as environmentally friendly packaging and carbon-neutral deliveries, influence consumer expectations and satisfaction in the long term (Tannir et al., 2024).

. In-depth Interviews

4.1 Methodology

To explore consumer expectations in the quick-commerce sector, thirty structured expert interviews were conducted with industry professionals and regular customers. These interviews aimed to gather insights into how logistics efficiency influences customer satisfaction and how evolving consumer expectations impact service delivery.

- **Participants:** Thirty individuals were selected, including quick-commerce professionals, e-commerce managers, supply chain specialists, and frequent online shoppers with varying levels of experience on digital retail platforms. Participants were selected from industries such as e-commerce, quick-commerce, last-mile delivery operations, and retail.
- **Selection Criteria:** Respondents were chosen based on their expertise in the quick-commerce industry or their experience with online shopping, particularly their interactions with logistics operations. This ensured that responses were both relevant and insightful.
- **Interview Process:** The interviews were conducted

remotely, using telephonic and video conferencing methods. A structured interview guide was used to gather data on key areas of interest, including:

- The impact of logistics efficiency on customer satisfaction
- Barriers to achieving optimal customer experience in quick-commerce
- Technological advancements (AI, IoT, etc.) enhancing consumer experience
- Expectations regarding delivery times, product availability, and service quality
- **Ethical Considerations:** All participants provided verbal consent, which was recorded and securely stored in line with ethical research standards. The confidentiality of responses was assured, and no personal identifiers were included in the final analysis.
- **Sampling Technique:** Snowball sampling was employed, with initial respondents recommending additional participants who met the study criteria.
- **Languages:** Interviews were conducted in English, Hindi, and Tamil, which ensured inclusivity across linguistic groups within India.
- **Data Transcription and Analysis:** The interviews were digitally recorded and transcribed. The primary researcher performed the initial analysis, identifying emerging themes, and a secondary analyst validated the findings. This process enabled a comprehensive understanding of the factors affecting consumer satisfaction in quick-commerce.

4.2 Results of In-depth Interviews

From the in-depth interviews, three major thematic categories emerged. These insights help to understand the evolving expectations of customers within the quick-commerce space.

1. **The Role of Logistics Efficiency in Customer Satisfaction** A significant portion of respondents emphasized that logistics efficiency plays a pivotal role in shaping customer satisfaction in quick-commerce. The speed and reliability of deliveries are directly correlated with the overall customer experience.

- a. **Positive Insights:**
 - i. Consumers appreciate faster deliveries, especially in urban areas, where speed is prioritized.
 - ii. Real-time tracking systems were mentioned as a significant feature that enhances customer satisfaction, providing transparency and building trust.
 - iii. **Service Recovery Mechanisms:** Respondents highlighted that effective resolution of issues such as delays or damaged goods positively influenced

customer loyalty.

2. **Challenges in Achieving Seamless Customer Experience** Despite the growing expectations for faster deliveries, respondents noted several barriers that hinder seamless customer experiences in the quick-commerce industry.

- a. **Delivery Delays:** Delays in delivery were frequently mentioned as a significant issue, particularly during peak seasons or in less urbanized regions. Customers were often dissatisfied when they received unclear communication regarding delivery windows.
- b. **Lack of Transparency:** A common concern was the lack of transparency in the delivery process. Respondents wanted clearer information about expected delivery times and proactive communication about delays.
- c. **Service Quality Disparities:** There were notable differences in service quality between urban and rural areas. Consumers in metropolitan regions generally received faster services compared to those in smaller cities or rural areas, resulting in unequal customer experiences.

3. **Technological Advancements in Enhancing Consumer Experience** The integration of technologies such as AI, IoT, and automation was another prominent theme. Respondents shared their views on how these technologies are reshaping quick-commerce.

- a. **AI and Automation:** Participants expressed excitement about the use of AI to predict delivery times, personalize customer experiences, and automate processes such as order routing and inventory management.
- b. **IoT for Real-Time Updates:** The use of IoT for real-time tracking was seen as a critical factor in improving the customer experience. Customers favored platforms where they could track their orders live and receive updates if delays occurred.
- c. **Consumer Expectations from Technology:** There was an expectation that businesses should leverage technology not just for speed but also for reliability and predictability. Respondents desired highly personalized interactions with automated systems that could answer their queries instantly and accurately.

4.3 Key Themes Summary

Based on the in-depth interviews, the following three dominant themes emerged:

1. **Logistics Efficiency and Customer Satisfaction:** Timely, transparent deliveries, along with features like dynamic tracking and quick service recovery, are vital for enhancing customer satisfaction in quick-commerce.

2. **Barriers to Achieving Seamless Service:** Delivery delays, lack of transparency, and regional disparities in service quality present significant challenges in meeting customer expectations.

3. **Technological Integration:** Emerging technologies such as AI, IoT, and automation are transforming the quick-commerce industry by improving delivery accuracy, customer communication, and service efficiency.

The Role of Consumer Expectations in Quick-Commerce

The study revealed that consumer expectations in quick-commerce are heavily influenced by speed, convenience, and reliability. Participants emphasized the critical role of fast delivery, order accuracy, and real-time tracking systems in shaping their experiences with quick-commerce platforms. This aligns with previous findings by Choi et al. (2023), who found that delivery speed and real-time updates were key drivers of satisfaction in the quick-commerce industry.

- P5 (Male, 27): “I expect my orders to arrive within an hour, and if there are any delays, I want to know why immediately.”
- P8 (Female, 34): “It’s not just about getting things fast, but I need to know where my items are and when they’ll arrive—especially when it’s an urgent need.”

Respondents frequently praised platforms that utilized advanced technologies, such as AI-based delivery algorithms and real-time GPS tracking. These tools helped create a sense of reliability and trust in the quick-commerce process, especially in the case of time-sensitive or high-demand products.

4.2 Challenges in Achieving Quick-Commerce Efficiency

Respondents highlighted several barriers that hindered efficient quick-commerce operations, particularly in emerging markets. The main challenges identified included limited infrastructure, inconsistent delivery windows, and high operational costs. Additionally, many participants expressed frustration with the lack of communication regarding delayed orders or logistical failures.

- P12 (Female, 30): “I ordered an item for same-day delivery, but it was delayed by several hours. That’s frustrating, especially when I’m on a tight schedule.”
- P15 (Male, 38): “The last time I had an issue, no one from customer service responded. That kind of poor support makes me rethink where I buy from.”

Some respondents also mentioned the frustration caused by poorly designed apps and lack of proactive customer support. These issues were notably severe in regions with less-developed delivery infrastructure.

4.3 Regional and Cultural Variations in Consumer Expectations

The study also explored how cultural and regional differences shape consumer expectations of quick-commerce services. Participants from urban areas had a strong preference for speed and premium service, while rural customers valued reliability and cost-efficiency over speed.

- P18 (Female, 42): “Living in a smaller town, I don’t mind waiting a bit longer for delivery, but it needs to be reliable and not damaged when it arrives.”
- P22 (Male, 29): “In big cities, everyone expects quicker service. If a platform doesn't deliver fast, it gets left behind.”

These findings reflect the regional disparities in consumer behavior observed in the quick-commerce industry, similar to research by Sharma and Ghosh (2024), who noted significant differences in consumer expectations between urban and rural customers across India. In less urbanized areas, the demand for reliable last-mile delivery solutions was more prominent than the need for speed.

FUTURE RESEARCH DIRECTIONS

Future research in the area of Earnings and Spending Behavior of Student Gig Workers in Quick-Commerce presents several avenues for exploration. As the gig economy continues to evolve and student workers contribute significantly to the workforce, several key areas need further investigation, including the relationship between work flexibility, earnings, and student academic responsibilities. The integration of digital tools and platforms into students' work-life balance, the financial well-being of these workers, and the impact of rapid digital transformation on student behavior offer exciting prospects for research.

The key future research directions include:

1. Development and Testing of New Theoretical Frameworks

- Examine the intersection of work flexibility and academic performance: Research can focus on how gig work, especially in quick-commerce, impacts student academic success, time management, and overall well-being.
- Explore models that connect gig earnings to financial stress among students: A deeper understanding of how earnings from quick-commerce impact students' financial security and their ability to balance work with academic responsibilities could be explored.
- Integration of digital platforms and gig work efficiency: Developing models that examine how platforms like food delivery services, online tutoring, or e-commerce affect students' work experiences, satisfaction, and

overall financial behavior.

2. Longitudinal Studies of Work Behavior and Academic Impact

- Impact of long-term gig work on students' financial literacy: Conduct long-term studies to observe how sustained participation in gig work influences financial knowledge and behavior.
- Analyze the evolution of work-life balance in gig workers: Future studies could track changes in students' perceptions of work-life balance over time and identify factors that enhance or hinder academic success.
- Effect of disruptions on gig work engagement: Investigate the impact of external disruptions, such as economic downturns or global crises (e.g., COVID-19), on the gig economy and how students adapt.

3. Sectoral and Regional Comparisons

- Comparison of gig work experiences across disciplines and regions: Research could examine how students from different educational disciplines (e.g., humanities, sciences, business) experience gig work differently, focusing on sectoral differences.
- Impact of regional differences in quick-commerce and gig economy services: Analyze how different geographical regions (urban vs rural) affect the experience of student gig workers, especially in terms of earnings potential, work opportunities, and infrastructure.

4. The Role of Emerging Technologies in Quick-Commerce

- Effect of platform innovations on work efficiency and income generation: Research the role of emerging technologies such as AI-powered delivery systems, real-time tracking tools, and autonomous delivery vehicles, exploring how these impact the productivity and earnings of student gig workers.
- Integration of smart logistics and its effect on gig work: Explore the impact of smart logistics and automated systems in quick-commerce platforms on student workers' job satisfaction and earning potential.
- Impact of digital tools on job satisfaction and work-life balance: Investigate how tools such as gig platforms' mobile applications, real-time communication, and customer support services affect students' experiences with their gig jobs.

5. Behavioral and Psychological Impact of Gig Work on Students

- Study the impact of financial stress on academic outcomes: Research the psychological effects of gig work on students, particularly focusing on stress, time management, and how financial instability affects

mental health and academic success.

- Work engagement and career aspirations of student gig workers: Investigate how engagement in the gig economy influences students' future career choices, entrepreneurial aspirations, and long-term employment goals.
- Explore the role of gig work in shaping students' consumer behavior: Understanding how students' experiences with earning money in quick-commerce might influence their shopping habits, preferences, and brand loyalty.

6. Comparative Studies on Earnings, Spending, and Savings Habits

- Behavioral impact of income on savings and spending patterns: Research how the irregular nature of gig earnings affects students' spending and saving habits, with a particular focus on financial security.
- Assess the role of financial literacy in managing gig earnings: Study the relationship between financial education and students' ability to manage and optimize their earnings from gig work, especially in the context of savings, investments, and expenditures.

By focusing on these areas, future research can enhance our understanding of the gig economy's role in students' financial behavior, work-life balance, and academic success. It can also provide valuable insights into the strategies that can optimize both the student experience and their outcomes in quick-commerce platforms.

CONCLUSION

This article systematically reviews literature from 2024 to 2025 to evaluate the financial behavior of gig workers in the quick-commerce sector, with a particular emphasis on student workers managing academic responsibilities alongside gig employment. The review is supplemented by insights drawn from qualitative interviews with student gig workers and industry professionals. While existing research has examined broader gig economy dynamics—such as flexibility, platform dependence, and job satisfaction—limited attention has been paid to the earnings management, spending patterns, and academic impact among this specific demographic.

The thematic areas highlighted from the interview results are the influence of irregular income on spending and saving behavior, the challenges of balancing academic workload with time-demanding quick-commerce roles, and the lack of financial planning among young gig workers. In the opinion of the participants, financial well-being and academic resilience would require predictable earnings, financial literacy, and flexible scheduling, in line with the literature that stresses the importance of platform design and worker autonomy (Chowdhury et al., 2024; Holloway, 2024). Challenges such as income insecurity, academic fatigue, and inadequate support structures were

consistent with the observations of Tannir et al. (2024). There were noticeable differences in experience based on regional and socio-economic backgrounds; in urban areas, students tended to prioritize income opportunities and speed. In the semi-urban and rural areas, respondents mainly focused on reliability, cost-effectiveness, and work-study balance. Generally, worker well-being and support have been the hub of research interest, focusing more on worker-centric policies and personalized support strategies. This exhaustive review of literature and primary interviews clearly depicts the pros and cons of gig work on student workers and maps out a direction for further research and practice

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Enhancing Community Resilience Through Mindful Consumption: A Study of Sustainable Practices in Tidal Flood- Affected Areas of Edakochi, Kerala

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ABSTRACT

Sustainable consumption is a key factor in enhancing the resilience of communities facing recurring environmental challenges. This study focuses on mindful consumption as a strategy for resilient living, examining the sustainable consumption practices adopted by households in Edakochi, Kerala, a region frequently impacted by tidal flooding. The primary objectives include identifying sustainable consumer practices, assessing their effectiveness in mitigating flood-related difficulties, and analysing the role of community adaptation in fostering long- term sustainability.

A structured survey was conducted among 100 respondents from flood-prone communities using a quantitative research design. Data were collected through a questionnaire and analysed using SPSS to identify trends and relationships between resilience and mindful consumption. Descriptive statistics and inferential analysis were employed to explore the connection between sustainable practices and households' capacity to reduce the impact of frequent flooding.

The findings indicate that households adopt various sustainable strategies, including conserving resources, relying on durable products, and making flexible purchasing decisions to enhance their resilience. The study establishes a strong correlation between environmental awareness and sustainable consumption choices. Additionally, community-based activities, such as resource sharing and knowledge exchange, play a crucial role in strengthening adaptive capacities and building resilience.

The research highlights the importance of integrating mindful consumption into policy frameworks to enhance community resilience against environmental disruptions. Promoting sustainable practices can empower flood-affected communities to develop long-term adaptive strategies and improve their overall sustainability. Future research should delve into the qualitative dimensions of resilience to provide a deeper understanding of sustainable consumption in vulnerable regions.

Keywords: Mindful consumption, Sustainable practices, Community resilience, Tidal flooding in Edakochi

INTRODUCTION

Climate change has emerged as one of the most pressing global challenges, with its impacts felt most acutely by vulnerable communities living in environmentally sensitive regions. Among the various manifestations of climate-related disruptions, tidal flooding poses a unique and persistent threat to low-lying coastal areas. In India, many coastal settlements are increasingly exposed to flooding due to rising sea levels, erratic rainfall patterns, and human- induced land degradation. Edakochi, a densely inhabited region in the city of Kochi, Kerala, is one such community frequently affected by tidal floods. These events not only disrupt daily life but also exert long-term economic, psychological, and infrastructural burdens on local populations.

In this context, the concept of community resilience defined as the capacity of individuals and communities to anticipate, absorb, adapt to, and recover from adverse situations has gained prominence in both academic and policy discourse. Traditional approaches to resilience often focus on physical infrastructure, emergency response systems, or governmental support mechanisms. While these components are undoubtedly vital, they may fall short if they do not consider the everyday behaviours and choices of community members. Increasingly, scholars are advocating for a more holistic understanding of resilience that incorporates social and behavioural dimensions, especially consumption practices that can either exacerbate or alleviate the pressures associated with recurring disasters.

Mindful consumption offers a meaningful framework within this broader resilience discourse. It refers to a conscious awareness of the environmental, ethical, and social consequences of consumer choices. Unlike impulsive or habitual consumption, mindful consumption is rooted in intentionality, ethical responsibility, and

long-term thinking. In communities vulnerable to environmental stressors, such practices can foster resource efficiency, reduce dependence on fragile supply chains, and encourage localized, community-centred solutions. More importantly, mindful consumption cultivates a cultural shift toward sustainability, making individuals active participants in resilience-building rather than passive recipients of aid.

Edakochi provides a compelling study for examining the intersection of mindful consumption and resilience. The region has experienced an increase in both the frequency and severity of tidal flooding over recent years, affecting not only the physical infrastructure but also the socio-economic stability of its residents. These recurring events have prompted local households to adapt their lifestyles, often in innovative and community-oriented ways. Preliminary observations suggest that families are shifting toward more sustainable practices, such as reusing materials, prioritizing durability in product choices, and engaging in local resource-sharing networks. These behaviours may not only mitigate immediate flood-related challenges but also strengthen the social fabric of the community.

Despite growing global interest in the role of sustainable living in climate adaptation, there remains a gap in empirical research focusing on community-level practices in specific geographical contexts like Edakochi. Most existing literature emphasizes macro-level interventions or urban planning solutions, with limited attention to micro-level behavioural changes and their cumulative impact on resilience. This study seeks to fill this gap by exploring how mindful consumption contributes to community resilience in a flood-prone setting. Specifically, it investigates the types of sustainable practices adopted by households, their effectiveness in mitigating the adverse effects of tidal flooding, and the role of community collaboration in supporting these practices.

A key motivation for this study is the recognition that behavioural change at the individual and household level can have significant implications when scaled across a community. For example, when multiple households in a flood-prone area choose to consume less, conserve energy, use flood-resistant materials, or engage in mutual aid during crises, the collective result is often greater than the sum of its parts. These everyday choices can reduce the ecological footprint of a community, lower vulnerability to disruptions in supply chains, and enhance social cohesion factors that are increasingly recognized as essential to long-term resilience.

Furthermore, the cultural context of Kerala provides fertile ground for such a study. The state has a long-standing tradition of community involvement, high literacy rates, and a relatively strong civic sense, all of which are conducive to the adoption of sustainable practices. Kerala's

decentralized planning model and emphasis on grassroots participation also create an enabling environment for community-led adaptation strategies. Within this socio-political context, Edakochi stands out as a locality where environmental vulnerabilities intersect with a strong sense of community, making it an ideal setting for examining the role of mindful consumption in resilience-building.

By focusing on the community of Edakochi, this study contributes to a localized understanding of how behavioural strategies like mindful consumption can support broader climate resilience goals. It challenges the assumption that resilience-building must always come from top-down interventions and instead highlights the power of individual and collective agency in responding to environmental crises. In doing so, it adds to the growing body of literature advocating for a behavioural and community-centred approach to sustainability.

STATEMENT OF THE PROBLEM

Coastal communities like Edakochi, Kerala, are increasingly vulnerable to the impacts of tidal flooding due to climate change, rising sea levels, and environmental degradation. These recurring floods disrupt daily life, damage property, and threaten the long-term sustainability of affected households. While infrastructural and policy-level interventions are important, there is limited research on how individual and community-level consumption behaviours contribute to resilience in such contexts. Specifically, the role of mindful consumption characterized by intentional, sustainable, and adaptive consumer choices remains underexplored in disaster-prone environments. Without a deeper understanding of how residents adapt their consumption patterns in response to environmental stress, it is challenging to design holistic strategies for climate resilience. This study seeks to address this gap by examining the mindful consumption practices of residents in Edakochi and analysing how these behaviours support community resilience in the face of frequent tidal flooding.

OBJECTIVES

- To examine the demographic profile of residents in tidal flood-affected areas of Edakochi and understand how socio-economic factors influence sustainable consumption behaviour.
- To analyse the extent of mindful consumption practices namely Acquisitive, Aspirational, and Repetitive Temperance adopted by the community.
- To evaluate the role of flood-specific adaptive consumption behaviours in enhancing household and community-level resilience.
- To explore the relationship between community-based sharing practices and collective capacity for climate adaptation.

METHODOLOGY

This study was conducted in Edakochi, Kerala, a coastal region frequently impacted by tidal flooding. A quantitative and descriptive research design was adopted to examine the patterns of mindful consumption and their contribution to climate resilience. The research specifically focused on flood-related adaptive behaviours and three core dimensions of mindful consumption: Acquisitive Temperance, Aspirational Temperance, and Repetitive Temperance. The study aimed to assess how these behaviours, along with specific flood-responsive consumption practices, influence the community's adaptive capacity in a climate-vulnerable setting.

A total of 100 residents from flood-prone areas of Edakochi were selected using convenience sampling. Participants were invited to complete a standardized questionnaire, which was distributed digitally via Google Forms. The survey instrument was developed based on the validated scale by Gupta and Verma (2019), with modifications to contextualize it for tidal flood adaptation. The questionnaire was divided into four key sections: Acquisitive Temperance, Aspirational Temperance, Repetitive Temperance, and Flood-Specific Consumption Practices. Each section assessed the extent of sustainable

and adaptive consumption behaviours practiced in response to the challenges posed by recurring tidal floods.

The online mode of data collection facilitated wider reach and compliance with ethical standards, including informed consent, voluntary participation, and confidentiality of responses. Efforts were made to ensure demographic diversity among the participants, encompassing different age groups, educational levels, income brackets, and occupational backgrounds.

The collected data were analysed using IBM SPSS Statistics software. Descriptive statistical tools such as frequencies, percentages, mean, median, and mode were applied to identify trends, central tendencies, and variances in mindful consumption patterns. The analysis aimed to uncover community-specific adaptive practices and behaviours that support climate resilience in the context of frequent tidal flooding.

DATA ANALYSIS

Demographic Profile of Respondents

The study surveyed 100 respondents from tidal flood-affected communities in Edakochi. Table 1 presents the demographic characteristics of the sample.

Variable	Category	Frequency	Percentage (%)
Age	18 - 25	14	14.0
	26 - 35	15	15.0
	36 - 45	19	19.0
	46 - 55	27	27.0
	56+	25	25.0
Gender	Male	34	34.0
	Female	32	32.0
	Other	34	34.0
Education Level	High School or Below	31	31.0
	Undergraduate Degree	24	24.0
	Postgraduate Degree	28	28.0
	Other	17	17.0
Family Income (Monthly)	Less than INR 10,000	24	24.0
	INR 10,000 – 20,000	29	29.0
	INR 20,000 – 50,000	21	21.0

	INR 50,000 – 1,00,000	14	14.0
	Above INR 1,00,000	12	12.0
Occupation	Government Employee	17	17.0
	Private Sector Employee	17	17.0
	Self-Employed	14	14.0
	Student	15	15.0
	Retired	12	12.0
	Homemaker	8	8.0
	Other	17	17.0

Table 1: Demographic Characteristics of Respondents (N = 100)

Mindful Consumption Patterns
Descriptive statistics were computed to understand respondents' levels of mindful consumption across 20

variables, grouped under dimensions of Acquisitive Temperance, Aspirational Temperance, Repetitive Temperance, and Flood-Specific Consumption Practices.

Acquisitive Temperance	Mean	Std. Deviation	Min	Median	Max
Avoid purchasing more than needed	3.94	2.07	1	4.0	7
Consciously limit purchases	4.03	2.15	1	4.0	7
Prefer disposable products	4.07	2.00	1	4.0	7
Choose reusable products	3.96	1.96	1	4.0	7
Avoid upgrading unnecessarily	4.25	1.98	1	5.0	7

Table 2: Descriptive Statistics for Acquisitive Temperance

Aspirational Temperance	Mean	Std. Deviation	Min	Median	Max
Desire luxury products	3.87	1.93	1	4.0	7
Buy products of wealthier people	4.15	1.98	1	4.0	7
Do not compare purchases	3.89	1.95	1	4.0	7

Table 3: Descriptive Statistics for Aspirational Temperance

Repetitive Temperance	Mean	Std. Deviation	Min	Median	Max
Open to sharing resources	3.72	2.13	1	3.5	7
Believe in sharing benefits	3.95	1.97	1	4.0	7
Value shared resources	3.86	1.92	1	4.0	7
Repair broken items	3.88	2.03	1	4.0	7
Reuse old items	3.98	2.15	1	4.0	7
Give away unused products	3.72	1.95	1	4.0	7
Frequently buy unplanned items	4.27	1.99	1	5.0	7

Table 4: Descriptive Statistics for Repetitive Temperance Variable

Flood-Specific Consumption Practices	Mean	Std. Deviation	Min	Median	Max
Prioritize flood-resistant products	4.02	1.85	1	4.0	7
Avoid non-essential items	4.03	1.94	1	4.0	7
Repurpose flood-damaged items	3.84	2.08	1	4.0	7
Prefer sustainable goods	3.92	2.04	1	4.0	7
Participate in community sharing	4.15	1.98	1	4.0	7

Table 5: Descriptive Statistics for Flood-Specific Consumption Practices

FINDINGS

The analysis of demographic characteristics and mindful consumption behaviours among residents of tidal flood-affected communities in Edakochi reveals several insightful patterns. The age distribution showed a concentration of participants in the 46–55 age group (27%), followed closely by those aged 56 and above (25%). This indicates that a significant portion of the population consists of mature adults who likely have lived experience managing flood-related disruptions, which could influence their sustainable consumption habits. Gender representation in the study was balanced, with 34% identifying as male, 32% as female, and 34% as other, providing a broad spectrum of gender perspectives. Educationally, the community demonstrates relatively high attainment, with over half of the respondents holding undergraduate or postgraduate degrees. This suggests the presence of an informed and potentially environmentally conscious population. Economically, a majority (53%) reported monthly household incomes below INR 20,000, highlighting financial vulnerability that may drive frugal and need-based consumption behaviours. Occupation types were diverse, including government and private sector employees, students, homemakers, and retirees, reflecting a wide range of lifestyle needs and adaptive capacities within the community.

Regarding mindful consumption, participants displayed a moderate to high level of engagement across the three core dimensions of Acquisitive, Aspirational, and Repetitive Temperance, along with specific flood-adaptive practices. In terms of Acquisitive Temperance, participants showed strong tendencies to avoid unnecessary purchases, with a mean score of 4.25 for "Avoid upgrading unnecessarily" and similarly high scores for limiting purchases and avoiding overconsumption. This reflects an intentional restraint in acquiring new items, possibly motivated by both environmental concern and economic constraints.

In the dimension of Aspirational Temperance, the results were more moderate. While respondents acknowledged some influence of aspirational behaviours, such as buying products associated with wealthier individuals (mean = 4.15), the overall scores remained balanced. This suggests that while social comparison

exists, it does not overwhelmingly drive consumption decisions in this context.

Repetitive Temperance behaviours were particularly strong, highlighting consistent engagement in sustainable habits. Respondents frequently reported practices such as reusing old items (mean = 3.98), repairing broken items (3.88), and giving away unused products (3.72). These behaviours indicate a well-established culture of extending product life and minimizing waste. Moreover, the high mean score for "Frequently buy unplanned items" (4.27), when interpreted in reverse, suggests strong impulse control, further supporting repetitive restraint. Community-centred practices like sharing and valuing collective resources also scored positively, reflecting the social cohesion and mutual aid mechanisms within the community.

In the area of Flood-Specific Consumption Practices, the findings illustrate a proactive approach to environmental challenges. Respondents prioritized flood-resistant products (mean = 4.02) and consciously avoided non-essential items (4.03). Practices like repurposing flood-damaged goods (3.84) and choosing sustainable products (3.92) were also common. Importantly, "Participate in community sharing" scored 4.15, underscoring the role of social networks in building resilience. These behaviours suggest that residents not only adapt their consumption in response to environmental pressures but also draw upon shared community values to strengthen collective resilience.

CONCLUSION

The findings of this study confirm that mindful consumption plays a critical role in enhancing the resilience of flood-affected communities in Edakochi, Kerala. Residents demonstrate a considerable degree of Acquisitive, Aspirational, and Repetitive Temperance, which together foster more sustainable and adaptive lifestyles. The emphasis on product durability, resource sharing, and reduction of non-essential consumption reflects a shift from reactive coping to proactive planning. These practices are not merely personal choices but are embedded within the socio-cultural fabric of the community, indicating a collective response to climate vulnerabilities.

Importantly, the integration of flood-specific behaviours into daily consumption practices highlights the community's capacity for localized adaptation. The prioritization of sustainable goods and the willingness to repurpose damaged items illustrate how economic and environmental pragmatism can coexist. Furthermore, the strong presence of social sharing and community cooperation suggests that resilience is reinforced not only through individual action but also through collective engagement.

These insights underscore the importance of recognizing and promoting behavioural dimensions of resilience, particularly in policy and planning efforts aimed at climate adaptation. Rather than relying solely on infrastructural or top-down interventions, fostering mindful consumption at the community level can offer scalable, low-cost solutions that empower vulnerable populations. Future research should explore longitudinal impacts and include qualitative narratives to deepen our understanding of how these practices evolve over time and contribute to sustainable resilience.

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Evaluating The Impact of Gamification on Sustainable Personal Financial Management Via Mobile Applications

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ABSTRACT

This study investigates the influence of gamification on personal financial management through mobile applications. By analysing survey data collected from users of personal finance management apps, the research highlights how gamified features - such as challenges, progress tracking, points, badges, and rewards - significantly enhance user engagement and positively shape financial behaviours. These game-like elements make financial activities more interactive, enjoyable, and less intimidating, encouraging users to actively manage their finances. The findings indicate that gamification leads to increased savings, improved budgeting practices, and the development of stronger financial literacy. The presence of immediate feedback, goal setting, and motivational cues fosters greater user commitment and consistency in achieving financial objectives. Moreover, social and competitive aspects of these apps cultivate a sense of community and accountability, which further encourages users to adopt and maintain sound financial habits. In conclusion, the integration of gamification into personal finance apps not only improves the overall user experience but also proves to be an effective strategy for promoting responsible and informed financial decision-making in the digital age.

INTRODUCTION

The financial industry is among the first to adopt mobile technologies, with finance apps gaining immense popularity. In 2019, finance apps accounted for 5% of all app downloads and were accessed over one trillion times. Among these, personal financial management (PFM) apps have shown rapid growth. The global PFM tool market, valued at \$1,449.9 million in 2018, is expected to reach \$3,338.8 million by 2025, with a compound annual growth rate of 12.65%. Developed by banks and fintech companies, these apps have transformed how consumers manage their finances by consolidating accounts, tracking income and expenses, creating budgets, setting savings goals, and simplifying investment processes. Popular examples include Mint, Personal Capital, You Need a

Budget, Mvelopes, Grow and Robinhood.

To enhance user engagement and motivation, many finance apps have incorporated gamification, which involves using game elements such as challenges, rewards, progress bars, leaderboards, and achievement systems. This approach, widely used in sectors like health, education, and tourism, seeks to make financial management more enjoyable, immersive and motivating. Gamified personal finance apps encourage users to set savings goals, track progress visually, and even compare their achievements with peers. This gamified experience not only makes financial management more accessible but also promotes responsible financial behaviors. Furthermore, gamification plays a role in enhancing financial inclusion. For instance, the financial inclusion index rose significantly from 43.7 in 2017 to 60% in 2023, highlighting a growing adoption of financial services globally.

Despite individuals having more financial resources today than previous generations, there remains a significant gap in financial knowledge. Personal financial management is essential for budgeting, saving, planning for retirement, investing, and ultimately living a debt-free and financially secure life. Financial literacy empowers individuals to make informed decisions, reduce poverty, minimize debt, increase savings and investments, and build sustainable financial practices that contribute to long-term well-being.

However, although gamification has been extensively researched in education, its role in finance remains relatively underexplored. Most existing studies focus narrowly on e-banking or hypothetical gamified features rather than analysing real-world user interactions with actual financial apps. This highlights the need for more research into how gamification influences consumer behaviour in personal financial management and how it

can help establish sustainable financial habits over time.

Personal financial management apps, when enhanced by gamification, offer significant potential to improve financial literacy, encourage responsible and sustainable financial habits, and promote overall financial well-being. As individuals gain better control over their finances, they can look forward to greater financial security, reduced stress, and an improved quality of life.

NEED FOR THE STUDY

This study explores the impact of gamification in personal financial management through mobile apps, highlighting its potential to improve individuals standard of living, help accumulate wealth for special expenses, manage income and expenses effectively, and increase awareness of financial status. Given the need to enhance long-term financial outcomes, boost engagement, apply behavioural economics principles, improve financial literacy, and align with mobile technology trends, researching gamification's effects on financial behaviour is essential. Understanding these effects may lead to better tools for promoting sound financial decisions and overall financial well-being.

OBJECTIVE

- To understand the impact of gamification in personal financial management.
- To comprehend the level of personal financial management
- To analyse the degree of gamification in personal financial management

REVIEW OF LITERATURE

Amrisandha Pranantya Prasetyo, Harry Budi Santoso and Panca Oktavia Hadi Putra (2023) [1] - The implementation of gamification in PFM apps can motivate users to adopt positive financial behaviours, but research gaps remain. This systematic literature review, using the Theory, Context, Characteristics, and Methodology (TCCM) framework, analysed 53 articles published between 2018 and 2022. It (1) synthesizes current research on financial behaviour and gamification-related behavioural intention, (2) presents integrated conceptual models, and (3) identifies research gaps and suggests directions for future studies.

Anureet Kaur and Kulwant Kaur (2022) [2] With the widespread use of mobile devices, there is growing demand for high-quality mobile apps within limited time and budget. This study conducted a Systematic Literature Review (SLR) to examine estimation techniques for mobile app development, comparing them with traditional software. It also explored methods used in agile development for mobile platforms. The review identified a key research gap: the lack of formal estimation models that account for the unique characteristics of mobile

applications.

Chauhan. S, Akthar. A and Gupta. A (2021) [2] This paper reviews existing literature on gamification in the banking sector, noting its early-stage application and limited research. Using a framework of theories, characteristics, context, and methodologies, the study identifies potential areas for gamification to enhance financial literacy, saving habits, product understanding, and employee training. It emphasizes the need for more empirical studies and validated methods to assess the impact of gamification on customer behavior. The study is original in its focus on banking-specific gamification and proposes a future research agenda for this field.

Bitrian. P, Buil. I and Catalan. S (2021) [4] This study combines self-determination theory (SDT) and the technology acceptance model (TAM) to examine how gamification boosts motivation and adoption of PFM apps. Analyzing data from 208 Mint users through structural equation modeling, the findings show that gamification enhances users' competence and autonomy, which in turn improves motivation, perceived usefulness, and favorable attitudes toward the app. These attitudes influence behavioral intention to use the app. While limited by its cross-sectional design and focus on a single app, the study offers valuable insights for fintechs and banks to enhance user engagement.

Pal. A, Indapurakar. K, Gupta KP (2021) [5] This study examines how gamification moderates the relationship between financial attitude (FA), financial self-efficacy (FSE), financial planning activity (FPA), and financial behavior (FMB). Using a questionnaire distributed via financial planners and consultants, and analyzed with AMOS-21 software, the study tested a model with five constructs. Results show that gamification significantly moderates the effect of FA and FPA on FMB but not FSE. The research fills a gap by highlighting gamification's role in personal finance behavior across both developed and developing contexts.

Goyal. K, Kumar. S and Xiao J.J (2021) [6] This paper reviews the state of research on Personal Financial Management Behavior (PFMB), focusing on its antecedents and consequences. Analyzing 160 articles published from 1970 to 2020, the study synthesizes factors affecting PFMB, including demographics, financial literacy, and socio-economic factors. Key outcomes include financial satisfaction, well-being, and financial success. The paper presents a framework for PFMB and offers a future research agenda with recommendations on variables, linkages, and methodologies.

Elnaz Nasirzadeh & Mohammad Fathian (2020) [7] This study explores how personalized gamification can be tailored to individuals' demographic and personality traits in the banking sector. Surveying 412 participants, it investigates how different characteristics influence preferences for gamification elements and anticipated

benefits. The findings offer insights into designing gamified systems that enhance user engagement and satisfaction by catering to users' unique traits.

Ana Carolina Tome Klock, Marcelo Soares Pimenta, Isabela Gasparini, and Juho Hamari (2020) [8] This study reviews 42 studies on tailored gamification, examining the role of individual differences in susceptibility to gamification designs. The findings emphasize user modeling for personalizing game elements, particularly in education. It introduces standardized terminology, discusses suitable elements for user characteristics, and proposes a research agenda focused on dynamic modeling and exploring the effects of interaction aspects on user experience.

Bayuk, J. and Altobello, S. A. (2019) [9] This paper explores the benefits of incorporating gamification into money-saving apps. Surveys with college students and Mechanical Turk participants showed that social and economic features in financial apps affect financial well-being and saving motivation. The study found that financial worry, literacy, and app expertise predict well-being, and preferences for app features vary based on experience. It suggests further research to assess gamification's effectiveness in improving financial behaviors, particularly for consumers with lower expertise and higher vulnerability.

Vanissa Wanick, Hong Bui (2019) [10] This paper reviews the initial applications of gamification in management fields like finance, governance, risk management, and HR. By reviewing 203 studies, it defines and contextualizes gamification in management and develops a holistic framework for its analysis. The study concludes with future research directions to enhance the impact of gamification in businesses and organizations.

Robert Mitchell, Lisa Schuster, Hyun Seung Jin (2018) [11] This research examines how extrinsic motivation affects employees' psychological needs satisfaction and behavioral intention in workplace gamification. The study found that while extrinsic motivation can decrease autonomy and competence satisfaction, internalized extrinsic motivation can enhance needs satisfaction, intrinsic motivation, and intention. The results suggest that sustainable gamification design should align with intrinsic motivations to boost engagement and productivity.

Jussi Kasurine & Antti Knutas (2018) [12] This study examines 1164 gamification studies to categorize research trends in the field. The findings reveal that e-learning, ecological lifestyle sustainability, computer science, and motivation enhancement are key areas of focus. Current research is primarily concentrated on proof-of-concept studies and theoretical works related to gamification principles and elements.

Goncalo Bapista and Tiago Oliveira (2017) [13] This study examines the role of gamification in mobile banking

acceptance in Brazil. Using structural equation modeling, the findings show that gamification significantly increases customer engagement, satisfaction, and intention to use mobile banking services. The research extends the Unified Theory of Acceptance and Use of Technology (UTAUT2), offering new insights into how gamification influences consumer behavior in the financial industry.

Juho Hamari, Jonna Koivisto, Harri Sarsa (2014) [14] This literature review examines empirical studies on the effects of gamification, presenting a framework based on definitions and motivational affordances. It reveals that gamification can have positive effects, though outcomes depend on context and user characteristics. The paper identifies research gaps and provides insights for future studies and gamified system design.

RESEARCH DESIGN

This research includes both Exploratory and Descriptive research design. Primary data is collected through a structured non-distinguished questionnaire. The objective of primary research was to understand the impact of gamification in personal financial management in , Kerala. The secondary data is collected from sources like websites, online journals and articles. A deep and close analysis is done of the data to extract the best information out of it.

SAMPLING PROCEDURE

Sample size: The sample size is taken as 1000

Sample area: Kerala

DATA COLLECTION METHOD

Data refers to information. In this study both primary and secondary collection method has been adopted.

STATSTICAL TOOLS USED

After data is tabulated, analysis techniques are used to locate and organize information logically from raw data to provide a meaningful mathematical solution to a complex problem. In this study, following tools are used ,

- ▶ Charts
- ▶ Tables
- ▶ ANOVA
- ▶ Simple percentage⁴

LIMITAION OF STUDY

- Gamification effects vary based on user traits like personality, motivation, and experience.
- No universal definition or framework for gamification, causing inconsistent implementations.
- Reliance on self-reported data can lead to biases, affecting study validity.

- Studies from specific regions may not apply globally due to cultural differences in user behaviour.

DATA ANALYSIS & INTERPRETATION

TABLE 1

GENDER WISE AGE CLASSIFICATION OF RESPONDENTS.

	18-25 Years	26-33 Years	34-40 Years	Above 40	TOTAL
Male	86	243	71	35	435
Female	164	261	124	16	565
TOTAL	250	504	195	51	1000

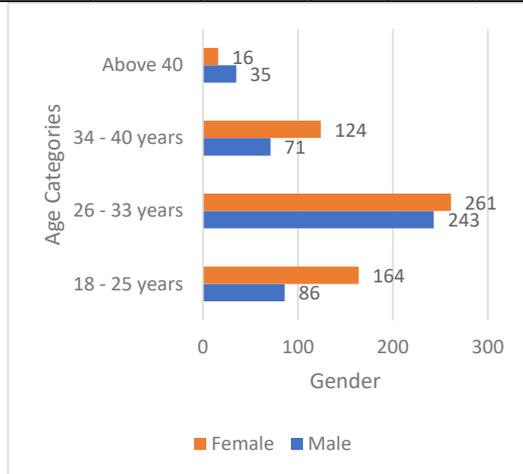


Fig 1. Gender wise age classification of respondents.

INTERPRETATION:

Majority of the respondents are from the female category within the age slab of 26 to 33 years.

TABLE 2

DISPOSAL INCOME AND THEIR MARITAL STATUS

	Single	Married	Prefer not to say	Total
Below 150000	201	0	1	202
150001 to 300000	194	42	2	238
300001 to 600000	119	138	0	257
Above 600000	42	261	0	303
Total	556	441	3	1000

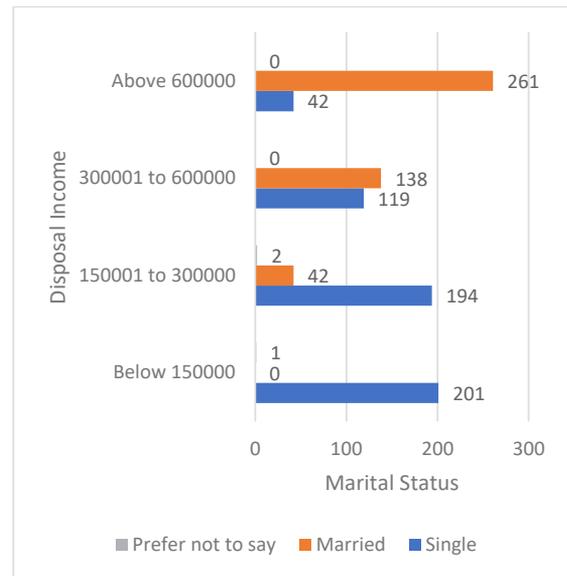


Fig 2: Disposal Income and their marital status

INTERPRETATION:

From the analysis its observed that the average disposal income of the married individuals is higher than that of single individuals.

TABLE 3

PEOPLE USING PERSONAL FINANCE APP

PARTICULARS	FREQUENCY	PERCENTAGE
YES	964	96.4%
NO	36	3.6%
Total	1000	100

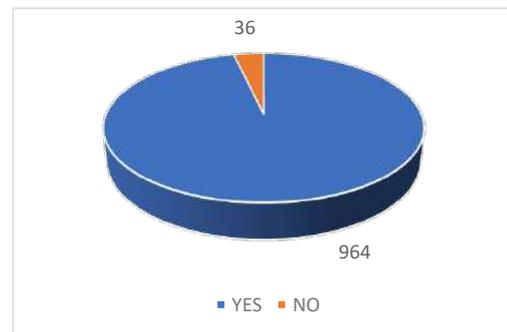


Fig 3: People using Personal Finance App

INTERPRETATION:

Majority of the respondents are using some or other personal finance app

TABLE 4
AWARE AND USE OF GAMIFIED ELEMENTS IN APPS

PARTICULARS	FREQUENCY	PERCENTAGE
YES	959	95.9%
NO	41	4.1%
Total	1000	100

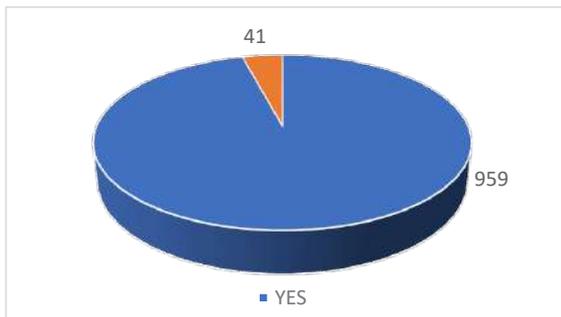


Fig 4: Aware and use of gamified elements in apps

INTERPRETATION:

Majority of the respondents 96% are aware and is using the gamified elements in their mobile apps.

TABLE 5
GAMIFIED FINANCIAL TOOLS HELPED TO SET ACHIEVE FINANCIAL GOALS

PARTICULARS	FREQUENCY	PERCENTAGE
YES	993	99.3%
NO	7	0.7%
Total	1000	100



Fig 5: Gamified financial tools helped to set achieve financial goa

TABLE 6
GAMIFIED FEATURES ENGAGE AND CREATE INTEREST IN MANAGING FINANCE

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly agree	763	76.3%
Agree	147	14.7%
Neutral	80	8%
Disagree	8	0.8%
Strongly disagree	2	0.2%
Total	1000	100

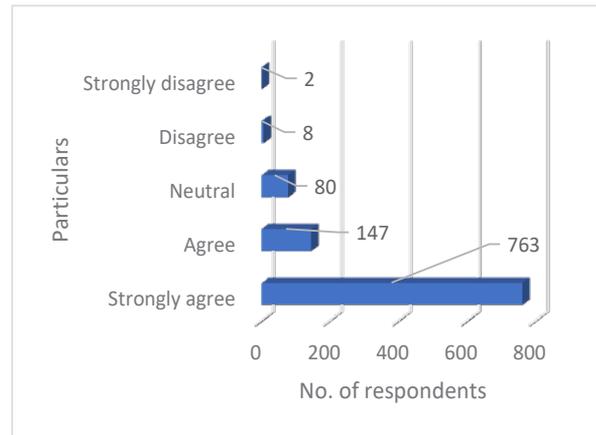


Fig 6: Gamified features engage and create interest in managing finance

INTERPRETATION:

The larger number of audiences are in the view point that the gamified elements and features helps them and create an interest in managing their personal finance.

TABLE 7
DOES USE OF GAMIFICATION HAVE A POSITIVE IMPACT ON FINANCIAL DECISION MAKING

PARTICULARS	FREQUENCY	PERCENTAGE
Definitely	922	92.2%
Yes	68	6.8%
No, not really	5	0.5%
Not sure	2	0.2%
Not at all	3	0.3%
Total	1000	100

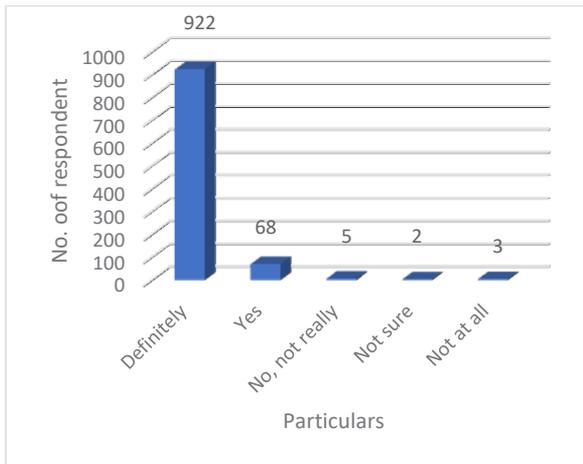


Fig 7: Does use of gamification have a positive impact on financial decision making

INTERPRETATION:

This shows that the use of gamified elements is having a positive impact on the financial decision-making process of individuals.

TABLE 8
IMPACT ON SPENDING OR SAVING BEHAVIOUR USING GAMIFIED PERSONAL FINANCE APP

PARTICULARS	FREQUENCY	PERCENTAGE
YES	958	95.8%
NO	42	4.2%
Total	1000	100

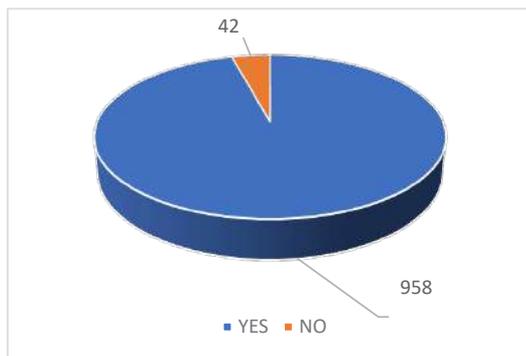


Fig 8: Impact on spending or saving behaviour using gamified personal finance app

INTERPRETATION:

It is clearly evident that the use of gamified personal finance apps is having an impact on spending and saving behaviours of individuals.

TABLE 9
USE OF FINANCIAL MANAGEMENT APPS FOR TRACKING INCOME AND EXPENSES

PARTICULARS	FREQUENCY	PERCENTAGE
Daily	617	61.7%
Monthly	157	15.7%
Weekly	223	22.3%
Occasionally	2	0.2%
Rarely	1	0.1%
Total	1000	100

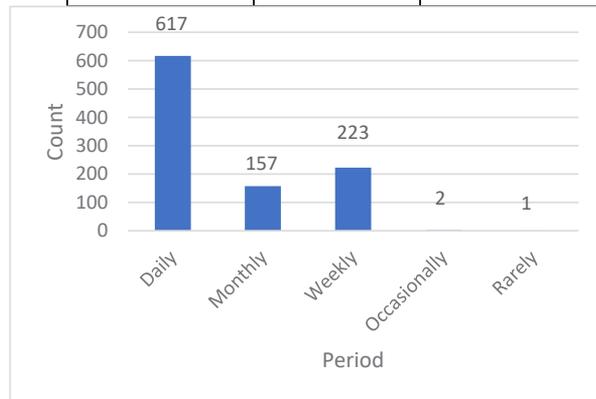


Fig 9: Use of financial management apps for tracking income and expenses

INTERPRETATION:

62% of the respondents are daily users of the financial management apps for tracking personal expenses and income.

TABLE 10
ELEMENT OF FUN & ENJOYMENT IN PERSONAL FINANCIAL MANAGEMENT

PARTICULARS	FREQUENCY	PERCENTAGE
Very important	818	81.8%
Somewhat important	117	11.7%
Neutral	55	5.5%
Not very important	6	0.6%
Not important at all	4	0.4%
Total	1000	100

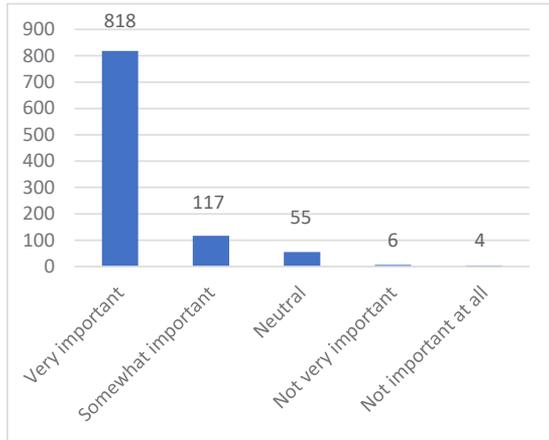


Fig 10: Element of fun & enjoyment in personal financial management
INTERPRETATION:

Majority respondents are in the view that the element of fun and enjoyment should be there in managing personal finance.

TABEL 11
PROGRESSIVE TRACKING MOTIVATES TO ACHIEVE FINANCIAL GOALS

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly agree	823	82.3%
Agree	98	9.80
Neutral	72	7.2%
Disagree	5	0.5%
Strongly disagree	2	0.2%
Total	1000	100

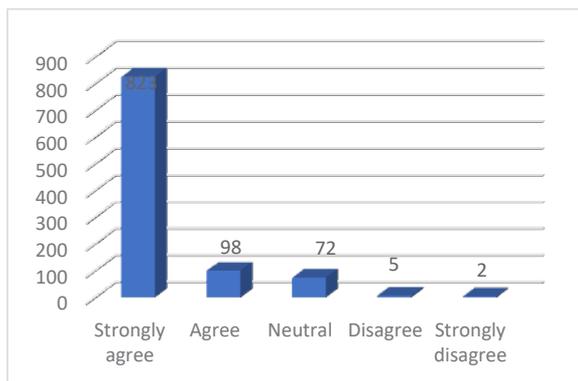


Fig 11: Progressive tracking motivates to achieve financial goals

INTERPRETATION:

The larger majority of agree to the point that the progressive tracking as part of gamification is helping them to achieve financial goals.

TABEL 12
APP REWARDS AND OFFERS HELPS AND MOTIVATE THEM

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly Agree	392	39.2%
Agree	438	43.8%
Neutral	150	15%
Disagree	15	1.5%
Strongly disagree	5	0.5%
Total	1000	100

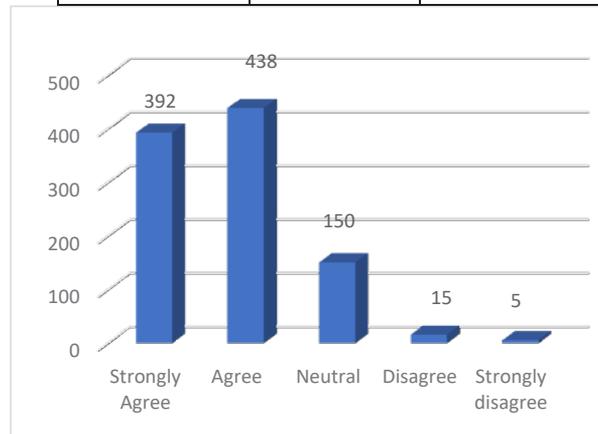


Fig 12: App rewards and offers helps and motivate them

INTERPRETATION:

The rewards and offers provided by the mobile application are motivating the people and helps to keep them engaging.

TABEL 13
INTERACTIVE GAMIFIED FEATURE IMPROVES PERSONAL FINANCE

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly Agree	513	51.3%
Agree	256	25.6%
Neutral	221	22.1%
Disagree	6	0.6%
Strongly disagree	4	0.4%
Total	1000	100

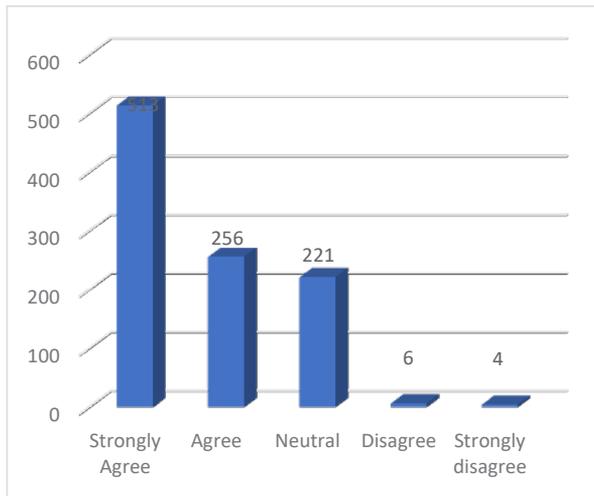


Fig 13: Interactive gamified feature improves personal finance

INTERPRETATION:

About 75% of the respondents are in the view that gamified feature improves their personal finance management.

TABLE 14
LEADERBOARD COMPARISON MOTIVATES YOU

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly Agree	504	50.4%
Agree	474	47.4%
Neutral	10	1%
Disagree	7	0.7%
Strongly disagree	3	0.3%
Total	1000	100

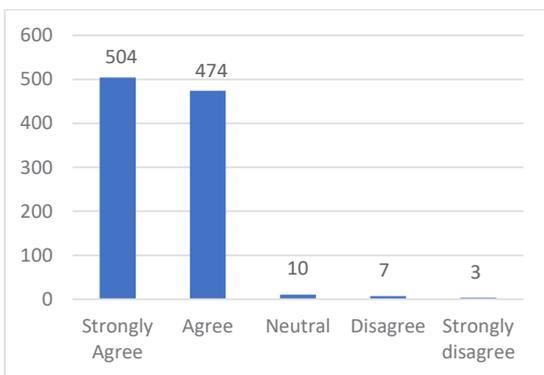


Fig 14: Leaderboard comparison motivates you

INTERPRETATION:

Based on the observation the leaderboard comparison, a feature of gamified element motivates and create a competitive mind.

ANNOVA - 1

HYPOTHESIS

H0: There is no association between age and progressive tracking that motivates to achieve financial goals

H1: There is an association between age and progressive tracking that motivates to achieve financial goals

TABLE 15
AGE AND PROGRESS TRACKING

	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	Total
18-25 Years	206	25	18	1	0	250
26-33 Years	415	49	36	3	1	504
34-40 Years	160	19	14	1	1	195
Above 40	42	5	4	0	0	51
Total	823	98	72	5	2	1000

SUMMARY

Groups	Count	Sum	Average	Variance
Column 1	4	823	205.75	24230.92
Column 2	4	98	24.5	337
Column 3	4	72	18	178.6667
Column 4	4	5	1.25	1.583333
Column 5	4	2	0.5	0.333333

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	123036.5	4	30759.13	6.214341	0.003724	3.055568
Within Groups	74245.5	15	4949.7			
Total	197282	19				

INTERPRETATION

From the above table it is inferred that the p value is 0.003724 which is less than the significance value of 0.05 and hence null hypothesis is rejected. So that we

can conclude that there is an association between age and progressive tracking that motivates one to achieve financial goals

ANNOVA - 2
HYPOTHESIS

H0: There is no association between positive belief of gamification in financial decisions and motivation of gamified features in taking further financial decisions.

H1: There is an association between positive belief of gamification in financial decisions and motivation of gamified features in taking further financial decisions.

TABLE 16
GAMIFICATION AND IMPACT ON PERSONAL FINANCE

6.5	Definitel y	Ye s	No, not reall y	Not sure	Not at all	TOTA L
Yes	869	64	5	2	2	942
No	6	0	0	0	1	7
May be	47	4	0	0	0	51
TOTAL	922	68	5	2	3	1000

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	654746	4	163686.5	3.224071	0.042572	3.055568
Within Groups	761552	15	50770.13			
Total	1416298	19				

SUMMARY

Groups	Count	Sum	Average	Variance
Column 1	4	1844	461	252468.7
Column 2	4	136	34	1370.667
Column 3	4	10	2.5	8.333333
Column 4	4	4	1	1.333333
Column 5	4	6	1.5	1.666667

INTERPRETATION:

From the above table it is inferred that the p value is 0.042572 which is less than the significance value of

0.05 and hence null hypothesis is rejected. So that we can conclude that there is an association between believe that gamification has positively impacted financial decision-making skills and gamified feature motives take further financial decisions.

CONCULSION

Gamification in mobile apps for personal financial management significantly enhances user engagement, motivation, and financial behaviour. By integrating features like challenges, leaderboards, rewards, and educational content, these apps make managing finances more interactive and enjoyable. Users are encouraged to monitor their spending, set and achieve goals, and stick to budgets, resulting in improved financial outcomes.

The game-like design fosters a sense of achievement and responsibility, while real-time feedback and behavioural nudges help users develop and maintain healthy financial habits. This approach simplifies complex financial tasks, making them more approachable—especially for users who may feel overwhelmed by traditional money management methods. Gamification not only improves financial literacy but also boosts user experience by adding elements of fun and engagement. It appeals to a wide range of users, encouraging regular app use and sustained financial discipline. Social features, such as leaderboards, further motivate users through friendly competition and shared progress.

Overall, gamification is a valuable strategy in personal finance apps, helping users achieve better control over their money while making the process more enjoyable, accessible, and effective.

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Impact of Fintech Products on Investment Behaviour in a Sustainable World; Mentioning Millennial and Gen Z Categories in Kerala

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Abstract— The FinTech introduction is a product of the rapid changes happening in the field of financial environment; and the same is accelerated on the emergence of digitalization and sustainability measures. The ESG aspects play a vital role here. These movements influence the investment behaviour also. The FinTech products are available in wide variety of applications such as Paytm, Google Pay, PhonePe, Lendingkart, Upstox, Groww, Cashfree Payments, DMI Finance, Moneyview, Pine Labs, Zerodha, Razorpay etc. The study evaluates the changes made by the FinTech in investment behaviour of Millennial and Gen Z categories in Kerala, in a sustainable financial environment. The major focus points are the adoption of sustainability measures, factors influencing, problems and risks perception of young investors. The study also discusses the role of regulatory authorities in promoting sustainable FinTech investment. An analytical and descriptive approach explains the various aspects of the FinTech investment behaviour on sustainable environment. The study examines that the FinTech products improve the digital financial literacy and innovative investment measures. The Millennial and Gen Z invests with a view of more social responsibility and sustainability considerations. They have high interest in FinTech investments.

Their investment behaviour gives the glimpses of willingness to continue such measures for a more sustainable world. The study concludes by spreading the lights on the manner of molding the investment behaviour of youth in a sustainable perspective on FinTech basis. The emphasis of the study is on Millennial and Gen Z categories and very clearly directs towards high prospects for future growth of FinTech and sustainable investment.

Keywords— FinTech, Digitalization, Sustainability, ESG, Millennial and Gen Z, Investment Behavior.

I. INTRODUCTION

The financial system of India faced a peak transformation in the field of financial technology during the past decades. The Covid-19 breakthrough accelerated the growth. The recent changes happening in finance

towards the high-tech and sustainable world has increased the role of FinTech investment and sustainable finance. As a developing economy and the country with highest number of youth population, a study based on financial technology, investment behaviour and sustainability among Millennial and Gen Z categories in India is highly relevant now.

—‘FinTech’, a term derived from the financial and technology sectors, is a new phenomenon that seeks to enhance financial transactions for customers, providing an enhanced customer experience creates a competitive edge in the market [1]. The greater initiatives from the part of the Government through the various measures like Digital India and Jan Dhan Yojana the country has accelerated its growth as a fastest racer in the field of FinTech over the global financial environment. The reflections are very apparent in Kerala Financial System also. The broad adoption of smartphones, internet penetration, Technology-literate younger generation etc. contributed in bulk to the cross boundary investment behaviour of individuals economically and geographically.

—FinTech innovations, particularly in digital payments, are transforming transactions, and are increasingly utilized across various sectors, including industry, SMEs, and consumers [2]. The term —sustainability in the field of business is a major matter of discussion now. Environmental issues have become a well-discussed topic among these years [3]. —The increasing environmental and sustainability issues today have led to a gradual rise in public attention towards corporate environmental practices, social responsibility, and sustainable development. Therefore, companies today are implementing the ESG (Environmental, Social, and Governance) model, which will enhance their reputation. [4] This is addressed as a reason why the institutional investors and the public are focusing their investment scenarios by considering sustainability

matters. The development of FinTech services leads to high-quality development of economy through financial inclusion. A study regarding FinTech services in China says, —promoting the diversification of FinTech products, emphasizing the importance of inclusive finance through FinTech, and driving China’s economic transformation and high-quality development [5].

—ESG, AI, FinTech and sustainable investing are the dragging attention, as increasing in the number of research works on these research objectives, substantially from the last decades but it has been observed that the requirement of better understanding among these areas are still in deep demand. Financial technology, Artificial intelligence, machine learning and sustainable investing has become a crucial part of our lives from last few decades. Technology has entirely changed the old way of transactions into harmonized, organized, safe, proactive and user friendly. Where FinTech has assisted various sectors of industries to attain the customers attention at most distanced places with more distribution of services and more accessibility to market [6]. —Each government may build a legislative climate that supports innovation and competition, strengthens its digital infrastructure, increases digital literacy and awareness, and collaborates with private sector stakeholders to extend financial inclusion [7].

The study is aimed to explain the key variables a). Factors for Adoption of sustainable investment behaviour in FinTech Products, b). Digital Financial Literacy and Sustainable Investment Behavior and c). Satisfaction Level of investment in FinTech Products among Millennial and Gen Z categories of the south Indian state Kerala. The other variables discussed here are Problems and risks perception in sustainable FinTech investment and the role of policies of regulatory authorities in promoting sustainable FinTech investment. The work is concentrated on the younger generations of Kerala who are interested and involved in FinTech and sustainability investment.

II. LITERATURE REVIEW

This paper is focusing on FinTech Products, Investment Behaviour and Sustainability. They are discussed through the following reviews from various concerned literature:

First set of literatures discussing here are about FinTech Products. This part of work studies the various aspects of FinTech products with the support of published literatures in the fields concerned. A study by Olajide et al. [8] explains that the FinTech uses analytics and real-time data, which improves sustainability outcomes and enhances actionable insights into environmental monitoring. The FinTech has become an inevitable part of day-to-day life. As per the study unlike traditional financial systems, FinTech refers to the technological innovation in financial services, which focuses on optimisation of consumer experience and flexibility, the designing and provision of financial products, and services to consumers and businesses.

FinTech empowers consumers to better understand their finances, evaluate choices with confidence to make informed financial decisions and improve their financial well-being and lives. AlSuwaidi and Mertzanis [9] focuses that education is vital in understanding and using financial technology, which is characterised by disruption of conventional financial practices. The financial literacy on FinTech evolution gives understanding of long-term sustainability of FinTech solutions with its stronger impact in high-income countries, because of more robust educational systems, greater access to technology and digital infrastructure, supportive regulatory environment, higher levels of financial inclusion and higher disposable incomes.

According to a study by Gasbarro et al. [10] FinTech increases economic growth by encouraging innovation, achieving higher productivity, encouraging innovation and enhancing sustainable development. More, FinTech can accelerate investments in such a way that which results in poverty eradication and reduction of inequalities in income. The study also explains that FinTech contributes more in inclusion of environmental projects and increasing the diversity and participation rates of savers and lenders. Sreenu Nenavath [11] emphasizes relevance of understanding how FinTech and regulatory framework affect corporate financial trends, particularly in developing countries like India. Ozen et al. [12] explain in a study that FiTech services increases financial inclusion. Banks are collaborating with FinTech start-up in order to enable cost, time effective scores and thereby reduce financial exclusion.

The second set of literatures goes through the reviews on investment behaviour and sustainability. R Tayal et al. [19] discuss in a study that the attitudes towards different investment options play a vital role in shaping investors behaviour, and financial security is achieved through invest prudence. The investors are continuously in seeking of new opportunities, which provide highest and fastest returns.

A Singla et al. [13] found that the ESG investments, increased perceived profitability, sustainability of investment portfolios; and Green Financial Awareness (GFA) are positively associated. Ahsan et al. [14] explain that FinTech plays a moderator’s role by strengthening the effect of digital transformation and innovation performance, and also improves the effectiveness of green innovation strategies. László et al. [15] explain in a study that FinTech can become basis for ESG- driven initiatives such as CSR, financial inclusion, and sustainable development; whole addressing challenges in the field like performance matrices and governance issues. ESG principles are crucial for enhancing sustainable finance. Xiaolong et al. [16] emphasize in a study that FinTech can implement corporate ESG performance, with proven results through robust statistical methods. The range of FinTech adoption and its investing contribution to better

ESG outcomes. Reducing information barriers, optimising investment structure and promotion of green innovation are levy mechanisms included. While considering energy firms FinTech’s influence in boosting environmental and social performance is highly notable, while in non-energy firm, it positively enhances corporate governance.

Ibraheem et al. [17] explains that with a base of financial innovation (FINV) and FinTech, how environmental finance (ENF) improves sustainability performance (SP) in the banking sector. The study emphasizes that, for the purpose of support ENF and FINV the policymakers should strengthen policies and regulatory frameworks, while the combination of FinTech and ENF initiatives positively over the period. A study by Dadabada and Pradeep Kumar [18] contribute to the evolving discussion sustainable finance by initiating actionable recommendations for practitioners, policymakers, and researchers. Their implications of study are aiming to navigate the complex convergence of ESG and FinTech to build a more sustainable financial ecosystem.

III. RESEARCH METHODOLOGY

The descriptive and analytical research design is used for the study. The Descriptive part of research design for describing the structured features of the population and phenomena under study, while the analytical part explains relationships between variable by using various statistical tools. The study explains behaviours of groups concerned, also establishes relationship between variables and explains observations involved.

The Quota Sampling method is used here and the targeted population is Millennial and Gen Z category (youth and adults) who use FinTech products. The data is collected from 150 samples using questionnaires.

The Analysis Tools used here are the Scale Reliability Statistics test- Cronbach's Alpha, Multiple Linear Regression Analysis, One-Way ANOVA (Non-parametric)- Kruskal- Wallis test, Repeated Measures ANOVA (Non-parametric)- Friedman test and Descriptive Statistics (Mean and SD).

IV. FINTECH PRODUCTS AND SUSTAINABLE INVESTMENT BEHAVIOUR: A CONCEPTUAL FRAMEWORK

The technological innovations have great impact on investment behaviour of Millenial and Gen Z categories. The latest innovations are directing towards sustainability and environmental concerns everywhere. The FinTech is also a product of such improvements in the financial system. The sustainable investment habits are growing all over the world. The evolution of FinTech in India is shown below:

TABLE I
EVOLUTION OF FINTECH IN INDIA

FinTech in India (1991-2024) Evolution Timeline		
Sl No.	Evolution Phases	FinTech Journey
1	Foundation Phase (1991–2008)	Liberalization and creation of institutions (SEBI, IRDAI, NSE, etc.).
		Start of digital banking: Internet banking, RTGS, NEFT.
		Major players like HDFC, ICICI, and NSDL emerged.
2	Emergence Phase (2008–2016)	First wave of FinTech like Paytm and Mobikwik.
		Aadhaar, eKYC, DigiLocker initiated.
		First FinTech Unicorn (Paytm). Jan Dhan Yojana began – financial inclusion push.
3	Acceleration Phase (2016–2020)	Jio launch + Demonetization = digital explosion.
		Launch of UPI, BHIM, Bharat BillPay.
		Rise of Zerodha, PhonePe, Groww.
		FinTechs scaled fast with low-cost data and smartphone access.
4	Innovation Phase (2020–2024)	Launch of Account Aggregators, OCEN, ONDC, CBDC pilot.
		Covid pushed digital adoption further.
		India becomes 3rd globally in FinTech funding.
		350Mn+ online users, 150Mn+ demat accounts.

The report [20] explained the evolution of Indian FinTech Industry. The notable FinTech products in India include: Mobile wallets (e.g., Paytm, MobiKwik), UPI (Unified Payments Interface), Prepaid Payment Instruments (PPIs), Payment gateways (e.g., Razorpay, BillDesk), Digital lending platforms (e.g., Capital Float, Lendingkart), Crowdfunding platforms, Peer-to-peer (P2P) lending platforms, InsurTech products (e.g., PolicyBazaar), Robo- advisory investment platforms, Online trading platforms, Crypto exchanges (mentioned contextually, though nascent in 2016), SME financial service platforms, Digital gold investment services. A report on future prospects of the FinTech explains here as follows [21]. According to the document, the future prospects are explained as Expansion of UPI & API-based payment systems, Blockchain adoption for secure,

transparent transactions, AI & machine learning for fraud detection, credit scoring, IoT-based insurance and lending, Personalized robo-advisory wealth management, Financial inclusion via digital platforms, Digital onboarding and e-KYC using Aadhaar, Collaboration between FinTechs and traditional banks, Regulatory sandbox frameworks, Expansion of InsurTech and RegTech ecosystems [21].

As all know the Millennial and Gen Z categories, in other words youngsters are our major strength as developing country. Their investment decisions play a vital role in the Financial and economic developments of the country. The Millennials and Gen Zs are developing their investment decisions because of their digital exposure, financial and global awareness, personal values, ethics etc. This also shows that ESG and social responsibility aspects influence their decisions. Thereby the sustainability matters are very concerned subject for them while taking investment decisions. The Digital literacy and IT innovations also leads them to the world of FinTech.

V. RESULTS AND DISCUSSION

The scale reliability statistics is tested using Cronbach's Alpha. The Multiple Linear Regression Analysis tests the key variables: factors for adoption of sustainable investment behavior in fintech products, satisfaction level of investment -in fintech products, digital financial literacy and sustainable investment behavior. The One-Way ANOVA (Non-parametric) Kruskal-Wallis test is also used to explain adoption factors and digital financial literacy, the Repeated Measures ANOVA (Non-parametric)- Friedman test analyses the Problems and risks perception in sustainable FinTech investment and One Sample t-test is used for The role of policies of regulatory authorities in promoting sustainable Fintech investment. The Descriptive Statistics (Mean and SD) are tested for all variables.

A. Multiple Linear Regression

TABLE II
FACTORS FOR ADOPTION OF SUSTAINABLE INVESTMENT BEHAVIOR IN FINTECH PRODUCTS

Model Fit Measures				Overall Model Test			
Model	R	R ²	Adjusted R ²	F	df 1	df2	p
1	0.692	0.48	0.388	5.29	22	127	< .001

Model Coefficients - Factors for Adoption of sustainable investment behavior in FinTech Products

Predictor	Estimate	SE	t	p
Intercept ^a	0.0368	0.5196	0.0709	0.9440
Age:				
2 – 1	0.0836	0.1793	0.4663	0.6420
3 – 1	0.0112	0.2335	0.0479	0.9620
4 – 1	-0.0060	0.3113	-0.0194	0.9850
5 – 1	0.1720	0.2769	0.6211	0.5360
6 – 1	0.2248	0.2973	0.7560	0.4510
7 – 1	0.1910	0.2431	0.7858	0.4330
Gender:				
2 – 1	-0.0571	0.1136	-0.5029	0.6160
Education Level:				
2 – 1	0.1227	0.2928	0.4190	0.6760
3 – 1	0.1559	0.2893	0.5388	0.5910
4 – 1	-0.4432	0.4164	-1.0645	0.2890
5 – 1	0.1629	0.3511	0.4642	0.6430
Employment Status:				
2 – 1	-0.1307	0.2103	-0.6213	0.5360
3 – 1	-0.4328	0.4261	-1.0158	0.3120
4 – 1	-0.3335	0.1810	-1.8430	0.0680
Monthly Income:				
2 – 1	0.2132	0.1462	1.4581	0.1470
3 – 1	0.2949	0.1950	1.5127	0.1330
4 – 1	0.2814	0.2324	1.2110	0.2280
5 – 1	-0.1214	0.2901	-0.4185	0.6760
Digital Financial Literacy and sustainable Investment Behavior				
	0.3730	0.0983	3.7946	< .001
Problems and risks perception in sustainable FinTech investment				
	0.1249	0.0685	1.8248	0.0700
Satisfaction Level of investment in FinTech Products				
	0.1693	0.0923	1.8351	0.0690

The role of policies of regulatory authorities in promoting sustainable FinTech investment	0.2837	0.0902	3.1461	0.0020
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^a Represents reference level

TABLE III

DIGITAL FINANCIAL LITERACY AND SUSTAINABLE INVESTMENT BEHAVIOR

Model Fit Measures

Model	R	R ²	Adjusted R ²	Overall Model Test			
				F	df1	df2	p
1	0.76	0.57	0.497	7.7	22	127	<.001

Model Coefficients - Digital Financial Literacy and sustainable Investment Behavior

Predictor	Estimate	SE	t	p
Intercept ^a Age	1.03347	0.4349	2.3761	0.019
2 – 1	0.08715	0.1533	0.5683	0.571
3 – 1	0.13292	0.1994	0.6667	0.506
4 – 1	0.07691	0.2662	0.2889	0.773
5 – 1	0.10613	0.2371	0.4477	0.655
6 – 1	0.10181	0.2548	0.3996	0.69
7 – 1	-0.08939	0.2083	-0.4291	0.669
Gender:				
2 – 1	-0.10969	0.0968	-1.1336	0.259
Education Level:				
2 – 1	-0.3971	0.2481	-1.6004	0.112
3 – 1	-0.30223	0.2463	-1.2271	0.222
4 – 1	-0.0039	0.3578	-0.0109	0.991
5 – 1	-0.74285	0.2932	-2.5332	0.013
Employment Status:				
2 – 1	0.01757	0.1802	0.0975	0.922
3 – 1	0.11523	0.3658	0.315	0.753
4 – 1	0.19223	0.1559	1.2328	0.22

Monthly Income:

2 – 1	-0.16176	0.1253	-1.2907	0.199
3 – 1	-0.30089	0.1662	-1.8109	0.073
4 – 1	0.03834	0.1999	0.1918	0.848
5 – 1	0.00353	0.2483	0.0142	0.989

Factors for Adoption of sustainable investment behavior in FinTech Products

	0.27298	0.0719	3.7946	<.001
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Problems and risks perception in sustainable FinTech investment

	0.05069	0.0592	0.8569	0.393
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Satisfaction Level of investment in FinTech Products

	0.29787	0.0755	3.9474	<.001
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The role of policies of regulatory authorities in promoting sustainable FinTech investment

	0.19394	0.0782	2.4796	0.014
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^a Represents reference level

TABLE IV

SATISFACTION LEVEL OF INVESTMENT IN FINTECH PRODUCTS

Model Fit Measures

Model	R	R ²	Adjusted R ²	Overall Model Test			
				F	df1	df2	p
1	0.72	0.52	0.439	6.30	22	127	<.001

Model Coefficients - Satisfaction Level of investment in FinTech Products

Predictor	Estimate	SE	t	p
Intercept ^a	0.6991	0.4894	1.428	0.156
Age:				
2 – 1	0.2775	0.1686	1.646	0.102
3 – 1	0.2055	0.2209	0.93	0.354
4 – 1	0.6397	0.2901	2.205	0.029
5 – 1	0.4641	0.26	1.785	0.077
6 – 1	0.4213	0.2804	1.502	0.136
7 – 1	0.1313	0.2311	0.568	0.571
Gender:				
2 – 1	-0.2151	0.1062	-2.025	0.045
Education Level:				
2 – 1	0.2057	0.2775	0.741	0.46
3 – 1	0.2582	0.274	0.942	0.348
4 – 1	0.3658	0.3957	0.924	0.357
5 – 1	0.7613	0.3267	2.331	0.021

Employment Status:				
2 – 1	0.1124	0.1997	0.563	0.574
3 – 1	0.2349	0.4056	0.579	0.564
4 – 1	-0.0671	0.174	-0.386	0.7
Monthly Income:				
2 – 1	-0.0553	0.1399	-0.395	0.693
3 – 1	0.1204	0.1865	0.646	0.52
4 – 1	-0.0976	0.2217	-0.44	0.66
5 – 1	-0.3046	0.2743	-1.111	0.269
Factors for Adoption of sustainable investment behavior in FinTech Products	0.1526	0.0831	1.835	0.069
Digital Financial Literacy and sustainable Investment Behavior	0.3669	0.0929	3.947	<.001
Problems and risks perception in sustainable FinTech investment	0.0619	0.0656	0.944	0.347
The role of policies of regulatory authorities in promoting sustainable FinTech investment	0.1853	0.0873	2.121	0.036

^a Represents reference level

The regression analysis indicate that the model is statistically fit ($F(22, 127) = 5.29, p < .001$) for the key variables adoption of sustainable investment behavior in fintech products, satisfaction level of investment in fintech products, digital financial literacy and sustainable investment behavior. Digital literacy and role of policies of regulatory authorities are statistically significant predictors on adoption factors ($R^2 = 0.478$, Adjusted $R^2 = 0.388$, p value < 0.001). with digital literacy having the strongest influence ($B = 0.373, p < 0.001$). Demographic factors such as age, gender, education, employment status, and monthly income were not significant predictors in this model.

The digital literacy is tested using regression model which gives statistically significant results ($F(22, 127) = 7.701 < 0.001$), ($R^2 = 0.57$, adjusted R of 0.497). Significant predictors like adoption factors, satisfaction

level, and role of policies of regulatory authorities contribute notably to digital literacy, monthly income is a very moderate predictor here, while other demographic variables have no impact in this case.

The model found that the model is statistically fit and significant ($F(22, 127) = 6.30, p < .001$), ($R^2 = 0.52$, adjusted R^2 of 0.439); digital financial literacy ($B = 0.367, p$ and role of policies of regulatory authorities ($30.185, p = .036$) are significantly predicting statistical level. Additionally, gender and specific groups within age and education were significant predictors. Specifically, individuals in the fourth age group (30-33) and those with the highest education level had higher statistical level scores, while gender group 2 (Female) showed a negative association. Adoption factors showed a marginal effect ($p = 0.069$), while other variables are not significant. The One-Way ANOVA (Non-parametric) Kruskal-Wallis test is performed on adoption factors and digital financial literacy. The adoption factor score resulted that the demographic factors other than gender is showing no significant differences as $P > 0.05$; and the gender with $p = 0.0969$ is not strong enough to have meaningful effect. It might require further exploration. While the digital financial literacy scores resulted significantly different on education level ($p = 0.002$).

The One Sample T-Test on the role of policies of regulatory authorities in promoting sustainable Fintech investment shows the result that there is significant difference from a neutral benchmark value of 3 ($t(149) = 11.6, p < .001$). The result indicates the roles of policies of regulatory authorities are having impact on the FinTech investment behaviour in a sustainable world.

The Descriptive Statistics on the overall responses gives a Mean Value of 3.75, which suggests on average, respondents leaned toward agreement on a 5-point Likert scale and Standard Deviation of 0.479 on variables, Indicates low variability in responses, meaning respondents answered somewhat similarly. The Cronbach's Alpha (0.905) gives high reliability coefficient, suggesting good internal consistency among responses.

VI. CONCLUSION

The study on FinTech products on investment behaviour in sustainable world among the Millennial and Gen Z categories analysed the three key variables: Factors for Adoption, Digital Financial Literacy and Satisfaction Level of investment, and also the other two variables Problems and risks perception and the role of policies of regulatory authorities in promoting sustainable FinTech investment. The regression analysis resulted that the key variables are statistically significant regarding the impact of FinTech products on sustainable investment behaviour. While the Problems and risks perception resulted statistically insignificant. The findings of key variables suggests that the adoption factors, digital financial literacy and satisfaction level have impact on FinTech products

on investment behaviour in a sustainable world among Millennial and Gen Z categories in Kerala.

The digital competencies and improved usability of the FinTech platform can increase the user engagements. The security and privacy measures are addressing in the study may further reduce the resistance to the adoption of FinTech products on sustainable investment behaviour of Millennial and Gen Z.

The further research might explore longitudinal data (for eg. trends or growth, causal effects, behavioural change, impact of interventions or policies) and more demographic variables could be included. Enhanced technological adoption might be a matter for future research and the AI influences on FinTech products in enhancing user satisfaction could be assessed in future.

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Influence of Ai on Gen Z Sustainable Consumption Behaviour Towards Fashion Apparels: A Tam-Based Study

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Abstract— This study aims to investigate the influence of artificial intelligence (AI) technologies on the sustainable consumption behaviour of Generation Z consumers in the fashion apparel sector. Specifically, it applies the Technology Acceptance Model (TAM) to examine how perceived usefulness and perceived ease of use towards AI-driven fashion technologies impact sustainable purchasing behaviour among Gen Z Consumers. This study adopted quantitative research design and primary data collected from 385 Gen Z respondents using a purposive sampling technique through structured questionnaire and interview schedule. This study employs partial least square structural equation modelling (PLS-SEM) to analyse data. The results indicate that both perceived usefulness and perceived ease of use significantly affect the attitude towards using AI applications in fashion retail, which in turn positively influences sustainable consumption behaviour among Gen Z. The model explained a substantial proportion of variance in sustainable fashion consumption behaviour, underscoring the relevance of TAM in AI-integrated consumer behaviour studies. This study contributes to both technology adoption and sustainability literature by revealing how AI-driven innovations can shape environmentally responsible consumer decisions in fashion, especially within regional contexts such as Kozhikode.

Keywords- Artificial Intelligence, Sustainability, Consumer Behaviour, TAM, Gen Z.

I. INTRODUCTION

The global fashion business is under increasing pressure to practice sustainability because its significant effects on the environment and society have become increasingly pronounced. As customers become more green-conscious, ecologically friendly consumption behaviour that is purchasing items that reduce unfavourable ecological impacts, has become increasingly significant[1]. Generation Z has emerged as a key demographic shaping sustainable consumption in the fashion industry. Defined as those born between 1997

and 2012, Gen Z is distinguished by its digital nativity and pronounced concern for social and environmental issues. Gen Z consumers are more likely than older cohorts to support ethical fashion brands and are motivated by values such as environmental stewardship and social justice[2]. This cohort's purchasing choices are not only a reflection of trend sensitivity but also of a deeper desire to make ethical lifestyle decisions[3]. As this generation gains greater purchasing power, understanding their behaviour becomes crucial for shaping the future of sustainable fashion. This sets the stage for exploring how technology, particularly AI can influence their sustainable decision-making processes.

Artificial Intelligence has quickly become a dominant force in the fashion retail industry, providing solutions that can revolutionize the way customers connect with brands. AI systems not only enhance users' experience but also influence consumers towards more environmentally friendly choices using predictive analytics and value-aligned recommendations[4]. While current literature recognizes Gen Z's receptiveness to sustainable fashion and digital technologies, few studies have investigated the psychological mechanisms underlying this interaction. Digital engagement platforms heavily influence Gen Z's brand perceptions, but the cognitive processes underlying how AI nudges affect ethical decision-making are under-theorized[5]. AI-based personalization can reinforce or undermine sustainable behaviour based on how it is implemented[6]. The disparity between Gen Z's positive pro-sustainability attitudes and their own consumption behaviour, often referred to as the attitude-behaviour gap calls into question the potential role of AI in bridging this gap. To determine this, there should be an established theoretical framework to look into how perception of technology impacts behavioural intention.

The Technology Acceptance Model (TAM) by Davis (1989) provides a strong theoretical framework for the

study of how people adopt and utilize new technology[7]. TAM suggests that perceived ease of use and perceived usefulness are key determinants of technology acceptance. Nevertheless, TAM has not been studied rigorously to assess the impact of AI on sustainable fashion choices among Gen Z consumers. This provides a platform for refining the model to examine technology acceptance as well as its potential for driving ethical consumption.

With the intersection of Gen Z's digital fluency, increasing environmental consciousness, and the emergence of AI in retail, a TAM-based study is both timely and necessary. This study seeks to discover how AI affects Gen Z's sustainable fashion behaviour through the constructs of perceived usefulness and ease of use.

Statement of the problem

The fashion industry significantly contributes to environmental degradation, highlighting the need for promote sustainable consumption behaviour, especially among Gen Z consumers who are both digitally savvy and environmentally conscious. Artificial Intelligence (AI) offers promising tools, such as personalized eco-friendly recommendations and virtual try-ons to influence sustainable purchasing decisions. However, there is limited empirical evidence on how AI affects Gen Z's sustainable consumption behaviour in the fashion context. While the Technology Acceptance Model (TAM) has been widely used to examine technology adoption, few studies have applied it to understand AI's role in sustainability-focused consumer decisions. Specifically, the influence of Perceived Usefulness, Perceived Ease of Use, and Attitude toward AI on sustainable fashion consumption remains underexplored. This study addresses this critical research gap.

II. REVIEW OF LITERATURE

Perceived Usefulness (PU) is a core predictor of the Technology Acceptance Model (TAM) and is a key construct in AI adoption, especially in case of sustainable fashion behaviour[7]. PU captures the degree to which users see that a technology improves their decision-making or task performance. PU is an important factor of sustainable behaviour since AI aids increase awareness, make decisions easier, and provide tailored sustainability information[8]. PU is a strong predictor of behavioural intention to adopt AI-based shopping websites among Bangladeshi consumers, affirming TAM's universality across cultures[9]. Customers view AI chatbots for apparel purchase as more valuable when they offer timely, pertinent, and precise product recommendations[10]. Gen Z's online fashion buying and found that PU was a major factor in influencing purchase intentions, especially when AI tools were aligned with users' values of speed, customization, and sustainability[11].

Perceived Ease of Use (PEOU) is another TAM construct that influences AI adoption by minimizing effort

while using a technology. Arachchi and Samarasinghe (2021) established that PEOU has a positive effect on attitudes and impulse purchasing intentions in AI-based retail[12]. Similarly, PEOU increases PU and customer acceptance, indicating a positive interaction between the variables[13]. AI systems become simple to utilize, consumers hold more positive attitudes toward them and are more likely to adopt[14]. Generation Z appreciates convenient, intuitive AI interfaces, which have a direct impact on shopping engagement and their desire to buy fashion products online[15].

Attitude towards AI has been reported to play the role of a mediator between TAM variables and buying behaviour. Attitude towards technology was found to mediate the effect of PU, PEOU, and AI adoption by Bangladeshi professionals[16]. It is important for AI to have positive attitudes among consumers in shaping buying behaviour[17].

While the TAM model has been extensively used to investigate general technology acceptance, there are few studies that have systematically investigated how AI tools affect Gen Z's sustainable consumption behaviour towards fashion apparels. Only few studies have used all the key TAM variables that is Perceived Usefulness, Perceived Ease of Use, attitude, actual buying behaviour, into a single framework within the sustainable fashion context. This study seeks to bridge that knowledge gap by presenting fresh perspectives into AI's role in influencing environmentally conscious fashion consumption among Gen Z consumers.

III. METHODOLOGY

A. Research Questions

- 1) How do perceived usefulness and perceived ease of use influence attitude sustainable fashion purchases?
- 2) How does Gen Z perceived usefulness of AI applications in supporting sustainable fashion consumption behaviour?
- 3) To what extent does the perceived ease of use of AI-based fashion platforms influence Gen Z's sustainable fashion consumption behaviour?
- 4) What role does attitude in between AI and Gen Z consumers' sustainable consumption behaviour in the fashion sector?

B. Research Objectives

- 1) To examine the influence of perceived usefulness and perceived ease of use on Gen Z's attitude toward using AI for sustainable fashion purchases.
- 2) To assess how Gen Z perceives the usefulness of AI applications in supporting sustainable consumption behaviour in fashion.
- 3) To analyse the extent to which perceived ease of

use affects Gen Z's sustainable fashion consumption behaviour through AI-based platforms.

- 4) To investigate the mediating role of attitude in the relationship between AI-related factors (PU and PEOU) and Gen Z's sustainable consumption behaviour.

C. Research Hypotheses

H1: Perceived usefulness (PU) of AI positively influences Gen Z's attitude toward using AI for sustainable fashion purchases.

H2: Perceived ease of use (PEOU) of AI positively influences Gen Z's attitude toward using AI for sustainable fashion purchases.

H3: Perceived usefulness (PU) positively influences Gen Z's sustainable fashion consumption behaviour.

H4: Perceived ease of use (PEOU) positively influences Gen Z's sustainable fashion consumption behaviour.

H5: Attitude toward AI use mediates the relationship between PU and Gen Z's sustainable fashion consumption behaviour.

H6: Attitude toward AI use mediates the relationship between PEOU and Gen Z's sustainable fashion consumption behaviour.

D. Research Methodology

The study used quantitative approach with cross sectional research design. Primary data collected from 385 respondents of Gen Z consumer who have experience with online fashion shopping in the last two months. Study population consist with respondents from Kozhikode district in Kerala. Data collected by using scheduled questionnaire and interview schedule. Purposive sampling technique is employed for selecting respondents and Cochran's equation used to find out sample size. Data analysed by Partial Least Square Structural Equation Modelling using smart PLS 4.1.

E. Proposed Conceptual Model

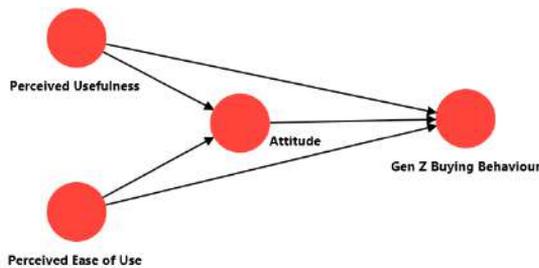


Figure 1: Proposed conceptual model

IV. DATA ANALYSIS

TABLE I RELIABILITY AND CONVERGENT VALIDITY ANALYSIS

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted
Attitude	0.886	0.887	0.917	0.688
Gen Z Buying Behaviour	0.821	0.824	0.882	0.651
Perceived Ease of Use	0.872	0.877	0.912	0.722
Perceived Usefulness	0.792	0.797	0.865	0.615

Interpretation

The reliability and validity results indicate strong measurement consistency across all constructs. Cronbach's alpha values exceed 0.70, confirming internal consistency[18]. Composite reliability values (rho_a and rho_c) also surpass the 0.70 threshold, reinforcing construct reliability. Furthermore, Average Variance Extracted (AVE) values are all above 0.50, indicating good convergent validity[19]. Among the constructs, Perceived Ease of Use has the highest AVE (0.722), suggesting strong item loading. These results validate the robustness of the measurement model and confirm that the constructs are suitable for further structural modelling in assessing Gen Z's AI-driven sustainable fashion behaviour.

TABLE II DISCRIMINANT VALIDITY - FORNELL- LARCKER CRITERION

	Attitude	Gen Z Buying Behaviour	Perceived Ease of Use	Perceived Usefulness
Attitude	0.829			
Gen Z Buying Behaviour	0.557	0.807		
Perceived Ease of Use	0.464	0.391	0.850	
Perceived Usefulness	0.457	0.462	0.201	0.784

Interpretation

According to the Fornell-Larcker criterion, discriminant validity is established when the square root of AVE for each construct exceeds its correlations with other constructs[19]. In this model, Attitude (0.829), Gen Z Buying Behaviour (0.807), Perceived Ease of Use (0.850), and Perceived Usefulness (0.784) all meet this criterion. Thus, discriminant validity is confirmed, indicating that each construct is statistically distinct from the others.

TABLE III
DISCRIMINANT VALIDITY - HETEROTRAIT-MONOTRAIT RATIO (HTMT)

	Attitude	Gen Z Buying Behaviour	Perceived Ease of Use	Perceived Usefulness
Attitude				
Gen Z Buying Behaviour	0.653			
Perceived Ease of Use	0.527	0.457		
Perceived Usefulness	0.538	0.565	0.242	

Interpretation

The HTMT values between all construct pairs are below the threshold of 0.85, indicating strong discriminant validity[20]. This confirms that each construct (Attitude, Gen Z Buying Behaviour, Perceived Ease of Use, and Perceived Usefulness) is statistically distinct. As a result, multicollinearity is not a concern, and the constructs can be reliably used in further structural model analysis.

TABLE IV
COLLINEARITY STATISTICS USING VIF (INNER MODEL)

	VIF
Attitude -> Gen Z Buying Behaviour	1.546
Perceived Ease of Use -> Attitude	1.042
Perceived Ease of Use -> Gen Z Buying Behaviour	1.275
Perceived Usefulness -> Attitude	1.042
Perceived Usefulness -> Gen Z Buying Behaviour	1.264

Interpretation

The VIF (Variance Inflation Factor) values for all inner model paths are well below the threshold of 3.3, indicating no multicollinearity issues[18]. The highest VIF is 1.546 for the path from Attitude to Gen Z Buying Behaviour, which remains acceptable. These results confirm that the predictor constructs in the model are statistically independent, supporting the validity of the structural path analysis.

TABLE V
R2 RESULTS

	R-square	R-square adjusted
Attitude	0.353	0.350
Gen Z Buying Behaviour	0.388	0.384

Interpretation

The R² values indicate that 35.3% of the variance

in Attitude and 38.8% of the variance in Gen Z Buying Behaviour are explained by the model's predictors. These values reflect moderate explanatory power, supporting the model's suitability for analysing AI-driven sustainable fashion behaviour[18].

TABLE VI
PATH COEFFICIENTS

	Path estimates	Standard deviation	T statistics	P values
Attitude -> Gen Z Buying Behaviour	0.357	0.053	6.722	0.000
Perceived Ease of Use -> Attitude	0.388	0.048	8.111	0.000
Perceived Ease of Use -> Gen Z Buying Behaviour	0.172	0.045	3.826	0.000
Perceived Usefulness -> Attitude	0.379	0.045	8.441	0.000
Perceived Usefulness -> Gen Z Buying Behaviour	0.265	0.051	5.222	0.000

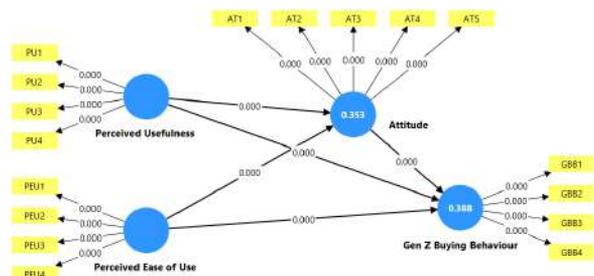


Figure 2: Path coefficients with R2

Interpretation

All path coefficients are statistically significant (p < 0.001) with strong T-statistics, indicating robust relationships between constructs. Perceived Usefulness (β = 0.379) and Perceived Ease of Use (β = 0.388) significantly predict Attitude, while all three variables—Attitude (β = 0.357), PU (β = 0.265), and PEU (β = 0.172)—significantly influence Gen Z's sustainable buying behaviour, supporting the model's predictive strength (Hair et al., 2019).

TABLE VII
SPECIFIC INDIRECT EFFECTS

	Path estimates	Standard deviation	T statistics	P values
Perceived Ease of Use -> Attitude -> Gen Z Buying Behaviour	0.138	0.026	5.294	0.000
Perceived Usefulness -> Attitude -> Gen Z Buying Behaviour	0.135	0.029	4.728	0.000

Interpretation

The mediation analysis reveals that both Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) exert significant indirect effects on Gen Z's buying behaviour through the mediator Attitude. Direct effect on PEOU and PU are also significant. These results indicate that Attitude partially mediates the relationship between both predictors and Gen Z's purchasing behaviour.

V. FINDINGS, SUGGESTIONS AND CONCLUSION

A. Findings

The findings reveal that Attitude significantly influences Gen Z's buying behaviour, affirming its central role in the Technology Acceptance Model. Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) both positively impact Attitude, and also directly influence buying behaviour. Mediation analysis confirms that Attitude significantly

mediates the effects of both PEOU and PU on Gen Z buying behaviour, indicating that attitudinal shifts enhance the influence of technological perceptions

B. Suggestions

Based on the findings, several suggestions emerge for marketers and digital platform designers aiming to influence Gen Z consumers. First, enhancing both the perceived ease of use and usefulness of e-commerce platforms should be a strategic priority, as these directly and indirectly influence buying behaviour through attitude. Features such as intuitive interfaces, seamless navigation, and personalized recommendations can boost perceived utility and ease. Second, fostering positive attitudes through engaging and relatable content, particularly via social media can strengthen the emotional and cognitive connection with the brand, encouraging purchase behaviour. Third, organizations should invest in user education and on boarding processes to reinforce

technology confidence, especially for new users. Finally, future platform enhancements should be data-driven, leveraging user feedback and behaviour analytics to continuously improve usability and relevance. These efforts not only enhance immediate sales outcomes but also build long-term brand loyalty among Gen Z consumers, who value efficiency, relevance, and digital fluency.

C. CONCLUSION

This study employed a quantitative, cross-sectional research design to examine the influence of Perceived Ease of Use, Perceived Usefulness, and Attitude on Gen Z consumers' online fashion shopping behaviour in Kozhikode district, Kerala. Using purposive sampling and Cochran's formula, data were collected from 385 Gen Z respondents with recent online shopping experience. The findings, analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 4.1, confirm that both Perceived Usefulness and Ease of Use significantly influence buying behaviour, directly and indirectly through Attitude. The mediating role of Attitude underscores its importance as a psychological mechanism in shaping consumer behaviour. This research contributes to the growing body of knowledge on digital consumer behaviour among Gen Z and highlights the relevance of Technology Acceptance Model constructs in the context of online fashion retail. The study provides actionable insights for marketers aiming to enhance user experience and drive engagement among digitally native consumers.

D. SCOPE FOR FUTURE STUDIES

Future studies could adopt a longitudinal research design to examine changes in Gen Z buying behaviour over time, especially in response to evolving digital trends. Expanding the geographic scope beyond Kozhikode would enhance generalizability. Additionally, incorporating qualitative methods could uncover deeper insights into motivations and emotional factors. Exploring moderating variables like trust, digital literacy, or sustainability concerns could further enrich the understanding of online consumer behaviour among Gen Z.

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Strategic HRM and Sustainability: A Text Analytics Approach to Esg Narratives in Corporate Reporting

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ABSTRACT

As global organizations increasingly align their operations with the United Nations Sustainable Development Goals (SDGs), Human Resource Management (HRM) has emerged as a critical driver of this transformation. This study adopts a computational approach to explore how HRM and sustainability narratives are embedded within corporate annual reports. Leveraging Python-based Natural Language Processing (NLP) techniques, the research systematically extracts and analyzes text from annual report PDFs to uncover underlying themes and sentiment patterns. A curated set of HRM and SDG-aligned keywords guides the thematic exploration, while sentiment analysis using the VADER (Valence Aware Dictionary and sEntiment Reasoner) model quantifies the emotional tone of the content. Results are visualized through multiple outputs, including keyword frequency plots, sentiment time series charts, and an integrated word cloud, which captures the most salient terms such as risk, sustainability, governance, equity, and impact. These findings indicate a strong organizational emphasis on ESG priorities and highlight the narrative convergence around risk management, inclusive growth, and responsible governance. The study contributes a replicable, data-driven framework for analyzing corporate ESG communication and offers valuable insights into how companies frame their HRM strategies in relation to sustainability imperatives. This approach bridges computational linguistics and sustainability reporting, supporting both academic research and policy discourse on corporate accountability.

Key Words: Sustainability, Human Resource Management (HRM), Sentiment Analysis, Annual Reports, Text Mining.

INTRODUCTION

In the era of stakeholder capitalism and environmental-social-governance (ESG) transparency, organizations are increasingly expected to demonstrate their alignment with the United Nations Sustainable Development Goals (SDGs). Among the various organizational functions contributing to sustainable development, Human Resource Management (HRM) plays a strategic role by fostering a

purpose-driven workplace, enabling talent development, and embedding values of equity, inclusion, and well-being. However, the extent to which HRM contributes to sustainability, and how this contribution is communicated in corporate disclosures, remains an evolving area of inquiry.

Annual reports serve as a primary medium through which firms articulate their strategies, values, and performance across financial and non-financial dimensions. As such, they offer a rich source for analyzing how organizations portray their commitment to sustainability and HRM practices. Traditional content analysis methods often fall short in capturing the volume and complexity of such documents. To address this, the current study employs a computational text analysis approach using Python-based tools to automate and enhance the interpretability of annual report content.

The objectives of this study are threefold: (1) to identify and quantify the occurrence of HRM and SDG-related themes using keyword-based analysis, (2) to assess the emotional tone of report narratives using VADER sentiment scoring, and (3) to visualize findings through word clouds and sentiment time series plots. This methodological framework not only provides insights into corporate sustainability communication but also offers a scalable model for future ESG-related textual analysis.

LITERATURE REVIEW

The integration of sustainability into corporate strategy has led to the evolving role of Human Resource Management (HRM) in fostering environmentally and socially responsible business practices. A growing body of literature explores the intersection of HRM, sustainability, and the use of computational tools to analyze corporate disclosures. Human Resource Management and Sustainability, Sustainable HRM refers to the alignment of human resource strategies with long-term organizational

goals and environmental, social, and governance (ESG) principles. According to Ehnert (2009), sustainable HRM involves practices that support economic performance while ensuring social equity and environmental stewardship. Zaugg et al. (2001) further emphasize the integration of values such as inclusion, leadership, and workforce diversity in shaping a sustainable HR strategy.

The United Nations' Sustainable Development Goals (SDGs) serve as a framework for aligning corporate behavior with global priorities. HRM's role in facilitating this alignment—especially through diversity, engagement, and capacity building—is widely acknowledged (Boudreau & Ramstad, 2005; Taylor et al., 2012).

ESG Reporting and Corporate Disclosure, Corporate sustainability reporting has gained traction as a tool for transparency and stakeholder engagement. KPMG (2020) reported that over 80% of companies worldwide publish sustainability reports, often aligning with standards like the GRI (Global Reporting Initiative) and SASB (Sustainability Accounting Standards Board). Research by Eccles and Krzus (2010) highlights the significance of ESG narratives in building corporate legitimacy. Governance, equity, and risk are recurrent themes in these reports, reflecting stakeholders' concerns about long-term organizational resilience and ethical practices (Ioannou & Serafeim, 2015). As ESG data becomes increasingly pivotal for investors and regulators, the need for systematic evaluation of its communication grows (Clark et al., 2015).

NLP and Sentiment Analysis in Corporate Reporting, Natural Language Processing (NLP) has become an effective method for analyzing textual content in corporate reports. Loughran and McDonald (2011) developed financial sentiment dictionaries to interpret tone in corporate disclosures. More recently, tools such as VADER (Valence Aware Dictionary and sEntiment Reasoner) have been applied to assess emotional cues and stakeholder sentiment (Hutto & Gilbert, 2014). The use of NLP enables automation of content analysis, improving scalability and objectivity. Studies such as Li (2010) and Kogan et al. (2009) illustrate how machine learning and text mining can detect narrative changes, keyword salience, and tonal shifts across time.

Word Clouds and Visualization in Textual Analysis, Visual tools like word clouds serve as intuitive representations of keyword prominence and thematic focus. As shown by Zhang et al. (2012), these methods assist in uncovering latent patterns and drawing stakeholder attention to frequently discussed concepts. In this study, a word cloud revealed dominant themes such as “sustainability,” “risk,” “governance,” and “equity,” underscoring key ESG concerns communicated through HR narratives.

Despite increasing academic focus on ESG reporting and sustainable HRM, there is a lack of standardized

computational frameworks for assessing their integration in corporate communication. This study addresses this gap by offering a replicable Python-based methodology that merges keyword extraction, sentiment scoring, and visual analytics. It builds upon prior research while contributing novel insights into the strategic framing of HRM within sustainability discourse.

METHODOLOGY

3.1 Research Design

This study adopts a qualitative content analysis approach supported by computational textual analysis techniques. The primary objective is to explore how organizations integrate Human Resource Management (HRM) practices with Sustainable Development Goals (SDGs) by analyzing the language and sentiment present in annual report documents. A mixed-method strategy is used, combining keyword frequency analysis, sentiment scoring, and visual representation through word clouds and sentiment time series plots.

3.2 Data Collection

The data for this study comprises annual report PDFs obtained from the official websites of selected companies across various industries. These documents include key sections such as Management Discussion and Analysis (MD&A), sustainability disclosures, and governance reports where references to Human Resource Management (HRM) practices and Sustainable Development Goals (SDGs) are prevalent. The diversity of industries represented facilitates a cross-sector comparison of sustainability-oriented HR practices. The reports analyzed for this research include the ABFRL Annual Report 2023-24, Wipro Annual Diversity, Equity & Inclusion Report FY 2023-24, HCL Technologies Annual Report 2023-24, HCL Technologies Sustainability Report 2024, HUL Report on 'Developing Human Capital for a Growing India' by Nitin Paranjpe - 2024, HUL Annual Report 2023-24, ICICI Bank Annual Report 2023-24, ICICI Bank ESG Report 2023-24, Infosys Annual Report 2024, Mahindra & Mahindra Ltd. Integrated Annual Report 2023-24, Mahindra & Mahindra Ltd. Sustainability Report 2023-24, Reliance Industries Ltd. Integrated Annual Report 2023-24, TATA Projects Integrated Annual Report 2023-24, and Tech Mahindra ESG Report 2023-24. These reports offer valuable insights into how leading corporations incorporate ethical HR practices and sustainability objectives within their organizational frameworks.

3.3 Data Processing

The uploaded PDF documents were processed using the PyPDF2 library in Python. Each PDF was read and parsed page-by-page to preserve contextual flow for sentiment tracking. Extracted text was tokenized and converted to lowercase for consistent keyword matching.

3.4 Keyword-Based Content Analysis

To identify thematic elements, a curated list of keywords was developed and categorized as follows:

- HRM Terms: e.g., "HRM", "human resources", "employee engagement", "diversity"
- SDG/ESG Terms: e.g., "SDG", "sustainability", "climate", "governance"
- Positive Sentiment Indicators: e.g., "growth", "achievement", "innovation"
- Negative Sentiment Indicators: e.g., "risk", "challenge", "decline"

Each keyword was searched within the text using regular expressions, and frequency counts and page locations were recorded.

3.5 Sentiment Analysis

Sentiment analysis was conducted using VADER (Valence Aware Dictionary and sEntiment Reasoner) from the NLTK library. VADER is well-suited for business and formal writing and provides four key sentiment metrics:

- Positive
- Negative
- Neutral
- Compound (overall sentiment score)

The compound sentiment score was computed for each page and visualized as a time series plot, revealing the evolution of tone throughout the report.

3.6 Visualization Techniques

Two primary visualizations were created to enhance interpretation:

- Word Cloud: Based on keyword frequency, this visually represents dominant themes in each report.
- Sentiment Over Time: A line graph plotting VADER compound scores page-wise to identify tone shifts and emotional emphasis.

These visuals supplement the quantitative data and facilitate intuitive understanding of how HR and SDG themes are presented.

3.7 Tools and Environment

All analyses were conducted in Google Colab using Python libraries such as:

- PyPDF2 for PDF text extraction
- nltk for tokenization and sentiment scoring
- matplotlib for sentiment visualization
- wordcloud for keyword-based graphical representation

DATA ANALYSIS AND DISCUSSION

The work showcases a comprehensive, progressive, and impact-oriented narrative around human capital development, inclusive governance, and sustainable growth. It reflects, A transition from traditional HR practices to agile, capability-based workforce models. Deep integration of ESG values, especially sustainability, equity, leadership, and transparency. Alignment with both domestic development missions and global frameworks (SDGs, ESG reporting).

Table 1: Keyword Group Based on The Frequency

Keyword	Occurrences	Key Focus/Themes
HRM	0	Traditional HRM term not used
Human Resources	63	Compliance & policy-related personnel discussions
Talent	506	Skill-building, innovation, digital transformation
Workforce	248	Future of work, employment strategies
Training	719	Vocational education, reskilling, capability enhancement
Leadership	805	Youth leadership, governance, ethical and corporate leadership
Diversity	477	Inclusion of underrepresented groups

Inclusion	378	inclusion, equity, disability, rural outreach
Engagement	649	Stakeholder and employee engagement; participatory governance
Culture	403	Work culture, organizational values, national identity
Well-being	202	Health, mental wellness, social protection
SDGs	89	UN framework alignment for impact assessment
Sustainability	2497	Green economy, inclusive growth, long-term resilience
Social Impact	42	CSR, development programs, NGO/startup impact
ESG	801	Corporate transparency, governance, environmental and social responsibility

Source: Author owns computation

Strategic Shift in Human Capital Language, Traditional HRM terminology appears absent, reflecting a modernized framing. Instead, concepts such as "Talent," "Workforce," and "Human Resources" are emphasized, suggesting a strategic shift from administrative HR functions to capability development, agility, and workforce innovation.

ESG and Sustainability: Central to Governance,

sustainability is the most referenced theme (2,497 mentions), indicating its role as a core narrative. Corporate governance, transparency, climate action, and human capital disclosures strongly embed ESG (801 mentions). This reflects India's evolving regulatory landscape, investor pressure, and stakeholder scrutiny. The terminology used in human capital has undergone a strategic transformation. Conventional HRM language is considered outdated, prompting a contemporary recontextualization. The emphasis has shifted from administrative HR functions to concepts such as "talent," "workforce," and "human resources," indicating a strategic focus on capability development, agility, and workforce innovation. Talent and workforce development are national imperatives. The document highlights talent (506 mentions) and workforce development (248 mentions), reflecting a national agenda focused on the future of work, AI preparedness, and innovation-driven growth. The policy emphasizes employability, youth potential, entrepreneurship, and STEM competencies. Initiatives like Skill India, Digital India, and Startup India likely connect to the policy. Comprehensive Training and Large-Scale Capability Development Training, with 719 mentions, ranks as one of the most frequently discussed keywords, indicating a significant institutional focus on upskilling, reskilling, and vocational education. This indicates that educational policy aligns with the demands of the labor market. Integration with digital platforms, e-learning, and public-private partnerships holds promise for enhancing delivery. Leadership and Culture for Transformation: The term leadership (805 mentions) is integrated within both governance and enterprise frameworks, highlighting the importance of ethical leadership, as well as the roles of youth and women leaders, and the enhancement of institutional capacity. The emphasis on organizational culture (403 mentions) indicates endeavors to cultivate a values-driven, innovation-centric atmosphere. The organization prioritizes diversity, inclusion, and engagement. Factors influencing equity, diversity (477 references), and inclusion (378 references) are significant, particularly concerning gender representation, disability accessibility, rural outreach, and social equity. Engagement (649 mentions) enhances these aspects by emphasizing stakeholder inclusion, citizen participation, and community development. Employee welfare and social security are crucial components of well-being. The term 'well-being' is referenced 202 times, underscoring its significance. It includes elements such as employee mental health, workplace safety, and social welfare initiatives. This likely reflects the post-COVID human capital priorities and wellness standards that are linked to ESG criteria. Alignment with sustainable development goals and measurement of social impact. Although the references to SDGs (89) and social impact (42) are infrequent, they are still considered important. The proposal advocates for the implementation of a results-oriented policy framework linked to global benchmarks.

stakeholder trust. This in-depth story analysis points to a paradigm shift: from managing resources based on capabilities to empowering people based on their abilities, from following rules to aligning strategies, and from focusing on single interventions to building ecosystems as a whole. India's development trajectory, as reflected in the policy discourse, is now geared toward fostering a sustainable, inclusive, and innovation-driven society, where human capital serves as both a driver and beneficiary of transformation. In conclusion, the thematic evolution captured through this keyword mapping affirms a deliberate movement toward a new social contract—one that prioritizes people, planet, and purpose. This shift has critical implications not only for policymakers and institutions but also for educators, businesses, and communities aiming to co- create a more equitable and resilient future.

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Weather Derivatives in India: A Thematic and Bibliometric Analysis

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Abstract

Climate change poses serious risks to agricultural and financial stability in climate-sensitive economies like India. Climate-sensitive economies are increasingly using weather derivatives as financial tools to hedge against weather-related hazards. This study provides a comprehensive thematic and bibliometric analysis of scholarly works on weather derivatives conducted in India between 2000 and 2024. This paper identifies important publication trends, well-known authors and institutions, and new study fields by using Scopus, Web of Science, and Google Scholar. To identify subject clusters, author collaboration networks, and keyword co-occurrences, tools such as Bibliometrix and VOS viewer were used. According to the statistics, there has been a rise in interest in weather derivatives since 2010, with a particular emphasis on parametric insurance, pricing models, policy integration, and agricultural risk management. Additional visual aids that highlight the maturity and shortcomings of the study include a PRISMA flow diagram, conceptual structure map, and keyword trend analysis. The majority of the research focuses on certain Indian states and lacks community-level empirical validation. Our results point out the need for regulatory frameworks, interdisciplinary research, and wider public policy integration. This study contributes to the current discourse on climate finance in India and lays the groundwork for future empirical and policy-focused investigations.

Keywords: Weather Derivatives, Risk Management, Climate Finance, Agriculture, Parametric Insurance

WEATHER DERIVATIVES

Weather derivatives are financial instruments that are used to hedge against the risks that occur with changes in the weather, like temperature, rainfall, and snowfall. Traditional insurance products only pay for damage to property. Weather derivatives, on the other hand, pay out based on weather indices, giving people more flexible and quick financial options. Since they were first used in the energy sector in the late 1990s, they have been used in agriculture, transportation, and tourism, especially

in places like India that are sensitive to climate change. As climate change gets worse, weather swaps have become much more important in risk management and policy planning. The study of weather derivatives gives a numerical picture of the amount of research that has been done, how the themes have changed over time, and the intellectual structure of this multidisciplinary area. Bibliometric methods let us look at how much research has been done over time, the co-occurrence of keywords, citation networks, and thematic clusters. This helps us find new areas of study and knowledge gaps. Aria and Cuccurullo (2017) say that bibliometric

analysis helps researchers and policymakers make maps of scientific landscapes and figure out how new ideas are spreading across fields. This study uses these methods to try to figure out the overall growth pattern and main ideas behind weather derivatives research in India.

BACKGROUND OF THE STUDY

India is especially vulnerable to weather-related risks because its economy is based on farming and depends so much on seasonal rain. Changes in the climate, especially in temperature and rainfall, pose a major threat to economic stability and agricultural productivity. As climate change causes extreme weather events to occur more often and with more force, strong risk mitigation methods are becoming more and more important. Weather derivatives, first offered on foreign markets in the late 1990s, appear to be a good way to manage these risks. Despite their demonstrated usefulness in developed countries, the use and study of weather products remain challenging in India.

RATIONALE OF THE STUDY

Financial contracts known as weather derivatives are based on weather-related variables like humidity, rainfall, and temperature. These tools are necessary for protecting

against monetary losses brought on by unfavorable weather. Weather derivatives can be an effective tool for risk mitigation in India, where agriculture accounts for a sizable portion of GDP and is heavily reliant on weather patterns. This study uses bibliometric and thematic analyses to investigate the development of weather derivatives research in India. It looks for trends in publications, important authors, recurring themes, and areas in need of more research.

India's agricultural and economic sectors are being greatly affected by the changing weather patterns, so it is important to understand how research in this area has grown over time. This study discusses new trends and areas that need more empirical and theoretical growth. It also provides academics, decision-makers, and practitioners information about the current state of research.

OBJECTIVE OF THE STUDY

1. To identify gaps and contradictions in recent research and suggest new directions for further study in weather derivatives.

Research Methodology

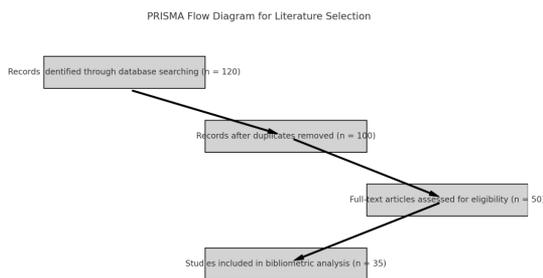
Data Collection

Databases: Scopus, Web of Science, and Google Scholar Search Terms: "weather derivatives" AND "India", "climate risk hedging", "weather insurance" Time Frame: 2000 to 2024 Tools: VOS viewer, Bibliometrix (R package), Microsoft Excel

Data Analysis

Bibliometric Analysis: Publication trends, citation metrics, prolific authors and institutions Thematic Analysis: Keyword co-occurrence, thematic clustering, and emerging trends.

Figure 1. PRISMA Flow Diagram for Literature Selection



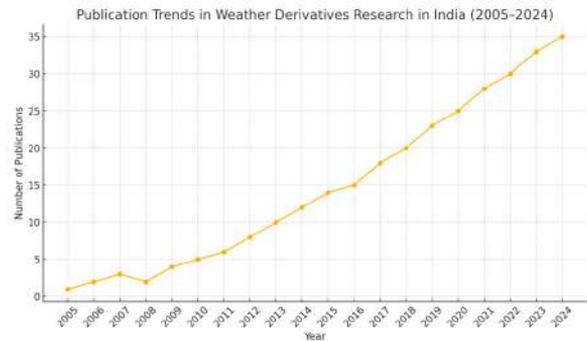
Source: Biblioshiny

This diagram illustrates the systematic selection of studies for inclusion in the bibliometric and thematic analysis.

Results and Discussion

Publication Trends

Figure 2 Number of publications per year on weather derivatives research in India

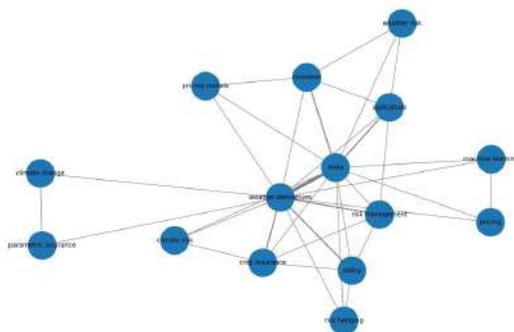


Source: Biblioshiny

Figure presents a bibliometric trend analysis of academic publications related to weather derivatives in India from 2005 to 2024. The long-term pattern shows three main stages in how this study area has changed over time. Price (1963) says that the first phase, from 2005 to 2009, is an emergence stage with few publications. This is typical of early stages of scientific progress. The development phase is shown by steady growth from 2010 to 2016, which shows rising scholarly interest, better methods, and increased institutional involvement. During the last phase (2017–2024), the number of publications rises at an exponential rate, reaching 35 per year. This shows that the study is mature and has more academic and policy relevance. Bibliometric methods, like those suggested by Aria and Cuccurullo (2017) and Donthu et al. (2021), use the number of publications as a measure of how science has changed over time. This trend fits with these methods. More people are becoming aware of climate risk, weather derivatives are becoming useful in agriculture, and new technologies like machine learning are being used in financial models. Bibliographic evidence shows that weather derivatives have grown into a field of study that is important to policy in India and crosses over into other fields of study.

Thematic Clustering

Figure 3 Keyword Co-occurrence Network



Source: Biblioshiny

Figure 3 shows the Network chart visualizing frequently co-occurring keywords and their thematic clusters, which shows how the ideas and themes in weather derivatives study in India are changing over time. The network analysis was created by making a map of how often and with what other words keywords were used in academic papers. This made it possible to find main themes, links, and new trends. The main theme of the network is the term "weather derivatives," which is in the middle of it all. This central placement shows how important it is to the books. The word "India" is strongly connected to most of the other nodes, which shows how geographically and contextually specific this study is. Some terms that are closely linked to the main idea are "agriculture," "risk management," "policy," "monsoon," and "weather risk." These words show the main areas of Indian research: how weather derivatives are used in agriculture, how important it is to be able to predict the monsoons, and how important it is to have legal and policy frameworks to help reduce financial risk. The fact that "risk management" and "risk hedging" come up a lot in these links shows how important weather derivatives are for dealing with climate uncertainty. Also, words like "pricing," "pricing models," and "machine learning" show how advanced the methods are becoming in this area. Their links show that pricing mechanisms, which are being backed by more and more advanced technologies like artificial intelligence, are getting a lot of attention in the academic world. These changes show that people are becoming more interested in using data to make forecasting and valuation of derivative products more accurate and useful. There is a different network cluster that links "climate change," "climate risk," "crop insurance," and "parametric insurance." This arrangement shows a main interest in weather derivatives as tools for adapting to changing climate conditions. The terms "parametric insurance" and "crop insurance" suggest that there has been some discussion in the past about how well weather derivatives work compared to more standard insurance methods in the agricultural sector. The network's structure—a dense core and a sparser periphery—shows that there is a mature and well-defined central discourse along with sub-themes that are changing or forming in the periphery. Terms like "parametric insurance" and "machine learning" are probably the beginnings of new areas of study that need to be explored in the future. The co-occurrence network shows a study domain that is multidisciplinary and changing. The focus on agriculture, climate adaptation, financial modeling, and policy support shows how important weather derivatives are to India's reaction to climate risks. The addition of technology-driven data shows that the field is moving forward in terms of innovation and usefulness.

Figure 4 Thematic Clustering of Weather Derivatives Research in India

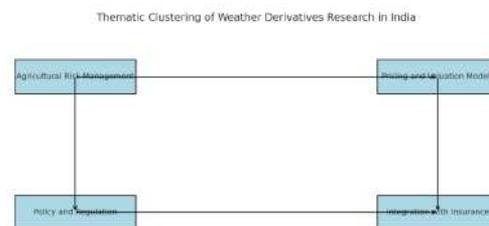


Figure 4 shows a thematic clustering map of research on weather derivatives in India. It is shown as a network of thematic domains that are all connected to each other. This diagram, which was made using keyword co-occurrence and co-word analysis, divides research themes into four groups that are all connected: Agricultural Risk

Management, Pricing and Valuation Models, Policy and Regulation, and Integration with Insurance. What these themes have in common shows how the field is structured and how its ideas are organized. This type of thematic clustering is the basis for bibliometric mapping, which groups keywords or articles based on how similar they are or how often they appear together (Callon et al., 1991). The aim is to find out how people think about a research area, what the main ideas are, and how scholarly interest has changed over time.

1. Agricultural Risk Management This cluster focuses on how weather derivatives can help farmers lower the economic risks that come with changing climates, especially in India, where farming depends on the monsoons. This theme comes up a lot when people talk about policies and insurance-based systems, which shows how financial instruments are used in rural economies.
2. Pricing and Valuation Models This theme is about making strong, data-driven models for pricing derivatives that use actuarial science, historical weather data, and more recently, machine learning. The fact that there is a strong connection to farming themes shows that valuation methods are usually designed to work with farming risk situations.
3. Policy and Regulation This cluster discusses the institutional frameworks that are needed to make weather derivatives work in India. It includes studies on legal infrastructure, regulatory gaps, and government interventions, with a focus on how important it is to create environments that make adoption easy for many people.
4. Integration with insurance Weather derivatives are often looked at along with or in addition to crop and parametric insurance. Comparative studies or hybrid financial models that aim to make risk coverage and affordability better for smallholder farmers are included in this thematic cluster. The thematic map shows that all four domains are linked, indicating a research landscape that is multidisciplinary and integrative. There is a mix of practical, technical, and institutional scholarship in the course "Agricultural Risk Management," for example, which is linked directly to

both "Policy and Regulation" and "Pricing and Valuation Models." The fact that "insurance" is used in both pricing and policy areas shows how financial instruments are mixed together in Indian strategies for managing climate risk. This structure is in line with bibliometric theory, which says that research fronts are either central or peripheral depending on how connected and dense they are (Aria & Cuccurullo, 2017). The strong and even connections between these clusters suggest a balanced and synergistic field where different sub-disciplines are making progress at the same time.

POLICY IMPLICATIONS AND RESEARCH GAPS

Research Gaps

- Limited empirical validation in the Indian context
- Low penetration of weather derivatives among Indian farmers
- Inadequate integration with traditional insurance models Policy Recommendations
- Incorporating weather derivatives into government schemes like PMFBY
- Developing a regulatory framework for derivative markets
- Enhancing awareness and training among stakeholders

CONCLUSION

This bibliometric and thematic study provides a comprehensive understanding of the evolution, scope, and structure of weather derivatives research in India. Over the past 20 years, there have been more and more academic papers about weather derivatives. This shows that these tools are becoming more useful for both academic and practical purposes, helping to reduce financial risk and adapt to climate change. The co-occurrence and thematic cluster analyses show that this domain is multidisciplinary, encompassing policy, insurance, and financial modeling. Citation analysis shows the important early contributions and new research areas that are shaping this ever-changing field. These results show that Indian research into weather derivatives is mature and rich. They also point to new areas like machine learning applications and hybrid insurance models. This study not only makes a map of the field's intellectual landscape, but it also gives advice on how to do more research, make policies, and get institutions to invest in climate-resilient financial instruments.

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A Study on Reliance Trends Omnichannel Strategy for Enhanced Customer Experience and Satisfaction

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ABSTRACT

This paper explores the omnichannel strategy implemented by Reliance Trends, one of India's leading fashion retailers. The study evaluates how effectively the integration of digital and physical retail platforms enhances customer experience, satisfaction, and loyalty. Data was collected through surveys and analysed to identify trends, pain points, and customer expectations. Findings reveal that while customers appreciate the convenience of multiple touchpoints, challenges such as inconsistencies in service and technological limitations remain. The paper suggests ways to improve digital integration and maintain consistent customer engagement.

INTRODUCTION

The Indian retail industry is undergoing rapid transformation driven by technological advancements, changing consumer expectations, and increasing internet penetration. In this evolving landscape, fashion retailers are turning to omnichannel retailing to stay competitive. Unlike traditional multichannel models, omnichannel retailing offers a seamless, integrated experience across physical stores, websites, mobile apps, and social media platforms.

Reliance Trends, a key player in India's fashion sector, has adopted this approach to enhance customer engagement by combining its extensive store network with a growing digital presence. Through tools like real-time inventory systems and personalized marketing, the brand aims to deliver a consistent and convenient shopping experience.

OBJECTIVES OF THE STUDY

- To analyse the effectiveness of Reliance Trends omnichannel strategy.
- To study customer response to key omnichannel features.
- To identify challenges and suggest improvements in the omnichannel experience.

RESEARCH METHODOLOGY

The research methodology provides a structured framework for the systematic collection, analysis, and interpretation of data to address the objectives of this study. Given the nature of the topic evaluating the effectiveness of Reliance Trends' omnichannel strategy in enhancing customer experience and satisfaction a descriptive research design was deemed appropriate. This design allows for the detailed exploration of customer perceptions, behaviours, and satisfaction levels across various touchpoints in the omnichannel retail environment.

Research Design:

This study adopts a descriptive and analytical approach. Descriptive research was selected to portray an accurate profile of customer behaviours, preferences, and opinions toward the omnichannel services offered by Reliance Trends. Analytical elements were included to examine relationships between variables such as mode of shopping, frequency of online-offline interactions, satisfaction levels, and perceived service quality.

Sampling Technique:

A non-probability convenience sampling method was employed to collect responses from customers of Reliance Trends, primarily in the Thrissur region. The sample was selected based on the ease of access and willingness of respondents to participate in the survey, ensuring timely and cost-effective data collection.

Sample Size:

A total of 105 valid responses were collected from customers who had engaged with either the online or offline services of Reliance Trends. The sample size was chosen to provide a balanced representation of customer experiences across various demographic segments.

Data Collection Methods:

- **Primary Data:** Primary data was collected through a structured questionnaire disseminated via Google Forms. The questionnaire was designed to gather information on customer awareness, usage patterns, satisfaction levels, and feedback on specific omnichannel features such as order tracking, in-store pickup, digital payments, and customer service integration.
- **Secondary Data:** To support the primary findings, secondary data was sourced from company websites, articles, and online publications relevant to omnichannel retailing and customer experience in India.

Statistical Tools and Techniques:

Two major analytical tools were employed to interpret the collected data:

- a) **Percentage Analysis:** This method was used to convert raw survey data into understandable proportions, allowing for a clear depiction of trends and general preferences among respondents.
- b) **Chi-Square Test:** The chi-square test of independence was used to determine the statistical significance of relationships between categorical variables such as customer satisfaction and specific omnichannel features. This helped in testing hypotheses related to the impact of omnichannel integration on customer experience.

Scope and Limitations:

This study focuses exclusively on customers of Reliance Trends, primarily from the Thrissur region. While the findings offer valuable insights into customer experiences with omnichannel retailing, they may not be generalizable to all regions or retail formats. Further, since the data was self-reported, it may be subject to individual biases or inaccurate recollections.

Ethical Considerations:

All participants were informed about the purpose of the study and assured of the confidentiality of their responses. Participation was voluntary, and no personal

identifiers were collected, ensuring ethical compliance throughout the data collection process.

HYPOTHESIS

H01: There is no significant association between use of online and offline channels and customer satisfaction.

H11: There is a significant association between use of online and offline channels and customer satisfaction.

H02: There is no significant association between real time product availability and customer satisfaction.

H12: There is a significant association between real time product availability and customer satisfaction.

H03: There is no significant association between facing issues while switching platforms and customer satisfaction.

H13: There is a significant association between facing issues while switching platforms and customer satisfaction.

KEY FINDINGS

- Customers value the flexibility and options offered by multiple channels.
- Platform switching and real-time inventory visibility are still big issues.
- Personalized promotions and better coordination improve satisfaction.
- High customer awareness of omnichannel features.
- Enhanced satisfaction from integrated online and offline experiences.
- Inconsistencies in service quality across channels.
- Mobile app preferred for convenience and ease of use.
- Demand for real-time inventory visibility across platforms.
- Personalized offers and loyalty programs improve engagement.

INDUSTRY OVERVIEW

India's retail industry is rapidly transforming due to rising incomes, urbanization, and widespread digital access. While unorganized retail still exists, organized formats especially in fashion are growing, with brands like Reliance Trends adapting to evolving urban consumer tastes.

The shift toward digital-first shopping has accelerated omnichannel adoption, blending in-store and online experiences. Government support, FDI, and the COVID-19 pandemic have further fuelled this shift. Despite challenges like regulatory hurdles and infrastructure gaps, tech-driven, customer-focused strategies are reshaping the sector, with Reliance Trends leading innovation in this dynamic market.

CUSTOMER BEHAVIOUR AND SHOPPING TRENDS

Indian consumer behaviour has shifted significantly with greater digital access. Shoppers now research products online, compare options, and expect a smooth experience across both online and offline channels. Personalization is key, with AI-driven recommendations and targeted offers enhancing engagement.

Social media heavily influences buying decisions, while speed, convenience, and mobile-friendly shopping are top priorities. Features like fast delivery, “click and collect,” and seamless returns are now expected. Retailers like Reliance Trends are adapting by integrating services and support across platforms to meet these evolving demands.

TECHNOLOGICAL INTEGRATION

Technology is key to enabling a seamless omnichannel experience for retailers like Reliance Trends. Integrated systems ensure consistency in inventory, pricing, and promotions across physical and digital channels, reducing errors and delays.

CRM tools, AI, and data analytics personalize shopping and improve customer engagement. In-store tech like mPOS, digital kiosks, and virtual try-ons enhance service and convenience. Mobile apps link online and offline experiences with features like order tracking and rewards, while real-time inventory supports faster delivery. With growing concerns around data privacy, secure digital infrastructure is essential. Overall, technology is vital for driving and sustaining omnichannel success.

CHALLENGES

- Gaps in technology infrastructure and inventory synchronization
- Limited use of data analytics for personalization
- Friction in switching between online and offline platforms
- Low customer awareness and adoption of omnichannel features
- Inadequate staff training on omnichannel processes

FUTURE PROSPECTS

- Enhanced use of AI and data analytics for personalized experiences
- Expansion into tier-II and tier-III markets
- Development of unified, cross-platform loyalty programs
- Integration of sustainable and ethical fashion initiatives
- Adoption of AR/VR and real-time inventory visibility
- Strategic collaborations to strengthen the omnichannel ecosystem

Fig: 1.1 Have you used both online and offline channel * overall satisfaction Crosstabulation

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.219a	4	.000

Likelihood Ratio	38.046	4	.000
Linear-by-Linear Association	16.091	1	.000
N of Valid Cases	105		

INTERPRETATION

- The p-value is less than 0.05, indicating a statistically significant association between using both online and offline channels and overall customer satisfaction.
- Respondents who used both channels showed higher satisfaction, particularly with many selecting "Strongly Agree."
- Therefore, the use of both channels is associated with greater satisfaction.

Fig: 1.2 Features Improved shopping experience * overall satisfaction Crosstabulation

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	101.444a	16	.000
Likelihood Ratio	108.961	16	.000
Linear-by-Linear Association	48.154	1	.000
N of Valid Cases	105		

INTERPRETATION

- This test also shows a significant association (p < 0.05).
- The feature of “improved shopping experience” has a strong positive impact on satisfaction.
- Those who “Strongly Agreed” that features improved their experience were also more likely to be “Strongly Satisfied.”

Fig: 1.3 Issues While Switching Platform * overall satisfaction Crosstabulation

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.289a	4	.121
Likelihood Ratio	8.330	4	.080
Linear-by-Linear Association	.542	1	.462
N of Valid Cases	105		

INTERPRETATION

- The p-value is greater than 0.05, indicating that there is no significant association between issues during platform switching and overall satisfaction.
- In other words, whether or not users faced switching issues did not significantly affect their satisfaction levels.

CONCLUSION

Reliance Trends has successfully leveraged an omnichannel strategy to enhance customer convenience and engagement by blending physical and digital shopping experiences. Customers value features like personalization, flexible purchase options, and cross-platform accessibility. However, challenges such as inconsistent service, limited inventory visibility, and infrastructure gaps persist.

To maintain its competitive edge, the company must improve service consistency, invest in staff training,

upgrade digital infrastructure, and enhance data-driven decision-making. Long-term success will rely on balancing innovation with customer-focused service to meet evolving retail expectations.

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