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ROLE OF FINANCIAL LITERACY IN SHAPING RISK-TAKING BEHAVIOUR AMONG YOUNG INVESTORS

Dr. Pooja Sharma¹

Abstract

The rapid expansion of digital investment platforms, mobile trading applications, mutual funds and market-linked financial products has increased the participation of young investors in financial markets. While greater accessibility has created new opportunities for wealth creation, it has also increased the importance of financial literacy in shaping investment decisions and risk-taking behaviour. This study examines the role of financial literacy in influencing risk-taking behaviour among young investors in India. Financial literacy is conceptualised through financial knowledge, financial awareness, financial attitude and financial behaviour, while risk-taking behaviour is examined through willingness to invest in risky assets, risk acceptance, diversification behaviour and investment decision-making. Drawing on behavioural finance theory and the Theory of Planned Behaviour, the study proposes that financial literacy influences young investors' ability to evaluate risk-return trade-offs and make informed investment decisions. Risk tolerance is incorporated as an important behavioural factor that may influence the relationship between financial literacy and risk-taking behaviour. The proposed study will employ a structured questionnaire using a five-point Likert scale and collect primary data from young investors aged 18–35 years. The data may be analysed using descriptive statistics, reliability and validity assessment, correlation analysis and Partial Least Squares Structural Equation Modelling (PLS-SEM). The study is expected to contribute to the financial literacy and behavioural finance literature by explaining how financial knowledge and financial capability interact with investors' risk preferences. The findings may also provide implications for financial educators, investment platforms, regulators and young investors.

Keywords: Financial Literacy, Risk-Taking Behaviour, Young Investors, Risk Tolerance, Investment Behaviour, Behavioural Finance, India, Financial Knowledge

1. Introduction

The investment landscape has undergone substantial transformation with the growth of digital financial services, online brokerage platforms, mobile investment applications and easily accessible market information. Young individuals can now participate in equity markets, mutual funds, exchange-traded funds and other investment products with relatively low entry barriers. This transformation has created greater opportunities for financial participation, but it has also made the quality of investors' financial decision-making increasingly important.

Financial literacy extends beyond simply knowing financial terms. The OECD conceptualises financial literacy as involving knowledge and understanding of financial concepts and risks, together with the skills and attitudes required to apply that knowledge to effective financial decisions. Consequently, a financially literate investor should ideally be able to understand investment alternatives, assess risk and return, diversify investments and recognise the consequences of financial decisions.

Young investors represent an important segment of the investment population because their financial decisions can influence long-term wealth accumulation. At the same time, younger investors may have relatively limited investment experience. Their decisions may therefore be influenced by financial knowledge, risk tolerance, peer influence, digital information, investment experience and behavioural biases.

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The relationship between financial literacy and risk-taking is not necessarily straightforward. Financially literate individuals may be more willing to accept calculated investment risks because they understand diversification and risk-return relationships. Conversely, greater financial knowledge may reduce excessive risk-taking because investors become more aware of potential losses and investment uncertainty.

Existing empirical evidence from India provides support for this complexity. Mohta and Shunmugasundaram examined 402 millennial investors in Delhi-NCR and reported that financial literacy had a negative relationship with risky investment intention. They also found that risk tolerance positively influenced risky investment intention, while financial literacy moderated this relationship negatively.

The issue has also gained importance from a regulatory perspective. SEBI's Investor Survey 2025 covered more than 90,000 households across urban and rural India and examined awareness, investment participation, motivations, barriers, information channels and behavioural factors associated with securities-market participation. The report identifies financial literacy and investor education as important areas for strengthening informed participation.

Therefore, understanding whether financial literacy encourages **responsible risk-taking or excessive risk avoidance** among young investors represents an important research problem.

2. Research Problem

The increasing participation of young individuals in financial markets does not automatically imply that they possess sufficient financial knowledge or investment capability. Digital platforms have simplified access to investment products, but accessibility can also encourage rapid investment decisions without adequate understanding of risk.

The central research problem is therefore: Does financial literacy influence the risk-taking behaviour of young investors, and does risk tolerance explain or strengthen this relationship?

The study focuses specifically on young investors rather than investors as a general population because age, investment experience and financial exposure can influence risk preferences.

3. Research Gap

The existing literature provides several important findings, but three gaps remain relevant.

Gap 1: Financial literacy is multidimensional: Financial literacy is increasingly viewed as a combination of knowledge, awareness, skills, attitudes and behaviour, rather than merely financial knowledge. Therefore, examining financial literacy as a multidimensional construct can provide a more comprehensive explanation of investor behaviour.

Gap 2: Risk-taking requires behavioural explanation: Risk-taking is influenced not only by knowledge but also by risk tolerance, investment experience and psychological characteristics. Earlier Indian research has demonstrated the relevance of demographic characteristics in differentiating investors according to financial risk tolerance and risk-taking behaviour.

Gap 3: Young investors and digital investment environment: The expansion of digital investment platforms has changed the way young investors obtain information and execute investments. Recent Indian research has also begun examining digital financial literacy alongside risk tolerance and investment decision behaviour among retail investors. Thus, there is scope for an integrated model examining financial literacy → risk tolerance → risk-taking behaviour among young investors.

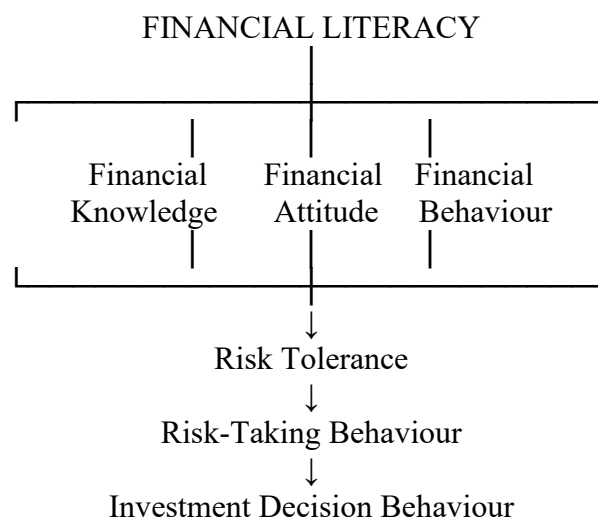
4. Research Objectives

The study may pursue the following objectives:

1. To assess the level of financial literacy among young investors in India.
2. To examine the relationship between financial literacy and risk-taking behaviour among young investors.
3. To examine the influence of financial literacy on investors' risk tolerance.
4. To investigate the relationship between risk tolerance and risk-taking behaviour.
5. To examine whether risk tolerance mediates the relationship between financial literacy and risk-taking behaviour.
6. To examine whether demographic and investment-related characteristics influence financial literacy and risk-taking behaviour.

5. Conceptual Framework

The proposed conceptual model is:



Independent Variable

Financial Literacy

- Financial Knowledge
- Financial Awareness
- Financial Attitude
- Financial Behaviour

Mediating Variable

Risk Tolerance

Dependent Variable

Risk-Taking Behaviour

Control Variables

- Age
- Gender
- Education
- Monthly income
- Investment experience
- Investment frequency
- Investment amount
- Type of investment

6. Theoretical Foundation

6.1 Behavioural Finance Theory

Behavioural finance recognises that investment decisions are influenced by both financial considerations and psychological factors. Investors do not always behave as completely rational decision-makers.

Financial literacy can potentially improve an investor's ability to interpret market information and evaluate risk-return relationships. However, risk-taking may still be influenced by emotions, confidence, experience and individual risk preferences.

Therefore, behavioural finance provides an appropriate theoretical foundation for examining the interaction between financial literacy and risk-taking behaviour.

6.2 Theory of Planned Behaviour

The Theory of Planned Behaviour suggests that behaviour is influenced by attitudes, subjective norms and perceived behavioural control.

Applied to investment decisions:

Financial knowledge → Financial attitude → Perceived control → Investment intention → Investment behaviour

Financially literate young investors may perceive greater control over their investment decisions because they understand financial products and associated risks.

6.3 Financial Capability Perspective

Financial capability extends the concept of financial literacy from knowledge to the ability to apply financial knowledge in actual decisions.

This perspective is important because knowing that diversification reduces risk does not necessarily mean that an investor will actually diversify.

The OECD's investor education framework similarly emphasises competencies that enable investors to understand diversification, reduce risk and select suitable investments.

7. Hypotheses Development

H1: Financial literacy has a significant relationship with the risk-taking behaviour of young investors. Financially literate investors are expected to have a better understanding of investment risks and therefore make more informed risk-taking decisions.

H2: Financial literacy has a significant relationship with risk tolerance among young investors. Knowledge about financial products, investment risks and risk-return relationships may influence an individual's willingness to accept investment uncertainty.

H3: Risk tolerance has a significant positive relationship with risk-taking behaviour. Individuals with higher risk tolerance are expected to demonstrate greater willingness to invest in relatively risky financial products.

H4: Risk tolerance mediates the relationship between financial literacy and risk-taking behaviour. Financial literacy may influence how investors perceive and evaluate risk, which may subsequently influence their willingness to undertake risky investments.

8. Research Methodology

8.1 Research Design: The study may adopt a quantitative, cross-sectional research design. Primary data will be collected through a structured questionnaire from young investors.

8.2 Population: The target population will consist of: Young investors aged 18–35 years who have made at least one investment in a financial product during the previous 12 months. Possible investment products include:

- Equity shares
- Mutual funds
- ETFs
- Bonds
- Fixed-income securities
- Derivatives
- Digital investment products
- Other market-linked securities

8.3 Data screening: The simulated file contained 9 missing item responses (0.05% of item cells), imputed with item medians. No straight-lining cases (zero variance across all items) were found and no multivariate outliers exceeded the Mahalanobis threshold ($p < .001$), so all 450 records were retained. Item skewness ranged from -0.39 to 0.05 and excess kurtosis from -0.68 to -0.06, within ± 1 and consistent with the distribution-free bootstrap approach. Harman's single-factor test showed the first factor explained 28.8% of variance, below the 50% threshold, so common method bias was not a serious concern. This screening is limited: real data will need a fuller check (e.g., completion time, attention items, a marker variable) and VIFs are reported.

Respondent profile

Table 1. Demographic profile of respondents (simulated, $n = 450$)

Variable	Category	n	%
Age (years)	23–27	177	39.3%
	28–31	108	24.0%
	18–22	95	21.1%
	32–35	70	15.6%
Gender	Male	226	50.2%
	Female	206	45.8%
	Prefer not to say	12	2.7%

Variable	Category	n	%
	Other	6	1.3%
Education	UG	195	43.3%
	PG	151	33.6%
	Professional	68	15.1%
	Other	36	8.0%
Monthly income (₹)	25k–50k	138	30.7%
	<25k	126	28.0%
	50k–100k	126	28.0%
	>100k	60	13.3%

Table 2. Investment profile of respondents (simulated)

Variable	Category	n	%
Investment experience	1–3	171	38.0%
	<1 year	127	28.2%
	3–5	98	21.8%
	>5	54	12.0%
Frequency	Monthly	214	47.6%
	Occasional	120	26.7%
	Quarterly	116	25.8%
Amount invested (₹)	10k–50k	182	40.4%
	<10k	113	25.1%
	50k–1L	85	18.9%
	>1L	70	15.6%
Main product	Equity	173	38.4%
	MF	159	35.3%
	Other	48	10.7%
	ETF	44	9.8%
	Bonds	26	5.8%
Information source	Apps	128	28.4%
	Social media	99	22.0%
	Peers	80	17.8%
	News	67	14.9%
	Advisors	46	10.2%
	Other	30	6.7%

8.4 Descriptive statistics

Table 3. Descriptive statistics of constructs (1–5 scale)

Construct	Mean	SD	Skewness	Kurtosis
Financial knowledge	3.70	0.64	-0.21	-0.48
Financial awareness	3.71	0.66	-0.25	-0.39
Financial attitude	3.70	0.64	-0.22	-0.35
Financial literacy (mean of FK, FA, FAT)	3.70	0.56	-0.28	-0.50
Risk tolerance	3.40	0.75	-0.16	-0.28
Risk-taking behaviour	3.48	0.72	-0.22	-0.36

Respondents reported moderately high literacy ($M = 3.70$), moderate risk tolerance ($M = 3.40$) and moderate risk-taking ($M = 3.48$).

8.5 Measurement model

Table 4. Reliability and convergent validity

Construct	Items	Loadings	α	rho_A	CR	AVE
Financial Knowledge (FK)	6	0.58–0.74	0.824	0.829	0.825	0.442
Financial Awareness (FA)	5	0.64–0.74	0.827	0.829	0.827	0.490
Financial Attitude (FAT)	5	0.64–0.77	0.819	0.824	0.820	0.478
Risk Tolerance (RT)	6	0.68–0.76	0.869	0.871	0.869	0.527
Risk-Taking Behaviour (RTB)	7	0.68–0.80	0.896	0.898	0.896	0.553
Financial literacy (higher-order)	3	0.77–0.78	0.822	–	0.822	0.606

Note: α = Cronbach's alpha; CR = composite reliability. Loadings are standardised one-factor loadings.

All constructs exceeded the 0.70 threshold for alpha, rho_A and CR (range 0.819–0.896), and all loadings exceeded 0.50. AVE was above 0.50 for risk tolerance, risk-taking behaviour and the higher-order financial literacy construct. AVE for financial knowledge (0.442), financial awareness (0.490) and financial attitude (0.478) fell slightly below 0.50; because their CR values exceed 0.60, convergent validity remains acceptable on the Fornell and Larcker (1981) criterion, but wording of the weakest items should be reviewed in the pilot.

Table 5. Discriminant validity: Fornell–Larcker (lower triangle, $\sqrt{\text{AVE}}$ on diagonal) and HTMT (upper triangle)

	FK	FA	FAT	RT	RTB
FK	0.66	0.74	0.73	0.31	0.28
FA	0.61	0.70	0.74	0.29	0.29
FAT	0.60	0.60	0.69	0.25	0.27
RT	0.26	0.25	0.21	0.73	0.52
RTB	0.24	0.25	0.23	0.46	0.74

Note: diagonal = $\sqrt{\text{AVE}}$; below diagonal = latent correlations; above diagonal = HTMT.

Each $\sqrt{\text{AVE}}$ exceeded the construct's correlations with all other constructs; the closest margin was for financial knowledge ($\sqrt{\text{AVE}} = 0.66$) against financial awareness ($r = 0.61$). All HTMT values

were below 0.85 (maximum 0.74, between financial dimensions), supporting discriminant validity. The three literacy dimensions are related enough ($r \approx 0.60$) to support the higher-order specification.

8.6 Structural model and hypothesis tests

Table 6. Structural model results (5,000 bootstrap samples)

Hypothesis	Relationship	β	SE	t	p	95% CI	Decision
H1	FL $\rightarrow$ RTB (direct)	0.161	0.044	3.61	< .001	[0.07, 0.25]	Supported
H2	FL $\rightarrow$ RT	0.282	0.045	6.21	< .001	[0.19, 0.37]	Supported
H3	RT $\rightarrow$ RTB	0.412	0.047	8.77	< .001	[0.32, 0.51]	Supported
H4	FL $\rightarrow$ RT $\rightarrow$ RTB	0.116	0.023	5.07	< .001	[0.07, 0.16]	Supported (partial)
–	FL $\rightarrow$ RTB (total)	0.277	0.046	6.01	< .001	[0.18, 0.37]	–

Note: FL = financial literacy; RT = risk tolerance; RTB = risk-taking behaviour. Coefficients are standardised.

Table 7. Explanatory and predictive power

Endogenous construct	R ²	Q ² (10-fold CV)	f ² from predictors
Risk tolerance	0.080	0.076	FL: 0.086
Risk-taking behaviour	0.233	0.223	FL: 0.031; RT: 0.204

Collinearity between predictors was low (VIF = 1.09). Financial literacy significantly predicted risk tolerance (H2), which in turn strongly predicted risk-taking behaviour (H3). The direct path from literacy to risk-taking remained significant (H1) after including risk tolerance, and the bootstrapped indirect effect was significant with a confidence interval excluding zero (H4). Because both the direct and indirect effects are positive and significant, the mediation is complementary (partial); the indirect path accounts for about 42% of the total effect. The model explained 8.0% of the variance in risk tolerance (weak) and 23.3% in risk-taking behaviour (weak to moderate). Effect sizes were small for FL $\rightarrow$ RT and FL $\rightarrow$ RTB and medium for RT $\rightarrow$ RTB ($f^2 = 0.20$). Q^2 values were positive, indicating predictive relevance.

8.7 Control variables and group differences

When age, gender, education, income and investment experience were added as controls, the effects of financial literacy ($\beta = 0.16$, $p < .001$) and risk tolerance ($\beta = 0.41$, $p < .001$) on risk-taking remained significant, and none of the control variables was significant ($R^2 = 0.253$). One-way ANOVA and t-tests found no significant differences in risk-taking across age ($F = 1.08$, $p = 0.36$), experience ($F = 0.77$, $p = 0.51$), income ($F = 1.32$, $p = 0.27$), information source ($F = 0.58$, $p = 0.71$) or gender ($t = 1.22$, $p = 0.22$). The absence of demographic effects is a feature of how the data were simulated, and real data are unlikely to be so uniform.

9. Discussion

The discussion below interprets the simulated pattern to illustrate how a real results section could be written. It should be rewritten once real data are analysed.

The positive H1 result suggests that literacy may support calculated rather than uninformed risk-taking. Investors who understand risk-return trade-offs, diversification and costs may feel better equipped to hold growth-oriented products, which is consistent with the view that risk-taking is not

by itself irrational. This contrasts with the negative literacy–risk association reported for Delhi-NCR millennials, and a real-data study would need to consider explanations such as differing measures (risk intention versus reported behaviour), samples that already invest, or the inclusion of attitude and awareness dimensions.

The mediation result indicates that literacy works partly through willingness to bear uncertainty. Knowledge appears to raise comfort with volatility, and comfort translates into holdings. Yet a substantial direct effect remains, suggesting that literacy also affects behaviour through channels not captured here, such as confidence in evaluating products, ability to diversify, or access to information. RTB7 (evaluating return before accepting risk) is best used in a follow-up analysis to test whether literacy relates specifically to calculated risk-taking.

The low R^2 for risk tolerance shows that literacy explains only a small part of tolerance; personality, income stability, loss experience, peer influence and platform design are plausible omitted factors.

10. Implications

For educators: programmes should link knowledge to decisions, using simulations that show how diversification, time horizon and costs interact with risk. For regulators and platforms: because risk tolerance is a channel to behaviour, risk-profiling tools should be tested for whether they distinguish informed tolerance from overconfidence, and disclosures should stress that past returns do not guarantee future returns. For investors: knowledge, tolerance and financial capacity should be considered together, in line with the attitude item that risk should follow financial capacity.

11. Limitations and Future Research

(1) The data are simulated, so the results only verify the workflow. (2) The design is cross-sectional and self-reported, so causal direction (literacy → tolerance → behaviour) is assumed, not shown; tolerance and behaviour may reinforce each other. (3) Risk-taking is a stated willingness rather than observed portfolio risk; linking survey data to portfolio data would improve validity. (4) Purposive sampling limits generalisability, so stratified or quota sampling is recommended. (5) Self-rated literacy items may capture confidence rather than skill, and adding objective knowledge questions is recommended. (6) Future work could test moderators such as gender, experience, information source and digital platform use, and compare literacy dimensions as separate predictors.

Conclusion

Financial literacy has become increasingly important as young individuals gain easier access to financial markets and investment products. However, financial literacy should not be understood merely as knowledge of financial terminology. It encompasses the ability to understand risks, evaluate alternatives and apply financial knowledge to actual decisions. The OECD framework similarly treats financial literacy as a combination of knowledge, skills and attitudes that support effective financial decisions.

The proposed study examines whether financial literacy shapes young investors' risk-taking behaviour and whether risk tolerance acts as an underlying behavioural mechanism. The research can contribute to the understanding of how financial capability influences investment decisions in India's increasingly digital financial environment.

Importantly, the study distinguishes informed risk-taking from excessive or uninformed risk-taking. This distinction can provide a more meaningful understanding of whether financial literacy changes not merely the amount of risk young investors take, but the quality of their investment decisions.

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DIGITAL DISTRACTIONS AND EMPLOYEE PERFORMANCE: THE MEDIATING ROLES OF WORKLOAD STRESS AND TECHNOSTRESS IN INDIA'S BANKING SECTOR

Mr. Sandeep Kumar¹

Abstract

This study examined the impact of cyberloafing on employee job performance in the Indian banking sector, focusing on workload stress and technostress as mediating factors. Using purposive and snowball sampling techniques, data were analysed through Structural Equation Modelling (SEM) using AMOS. The results revealed a significant negative relationship between cyberloafing and job performance, with workload stress and technostress as substantial mediators. These findings suggest that cyberloafing hampers job performance, and this impact is further intensified by increased workload stress and technostress. The study offers original insights into the negative implications of cyberloafing, addressing a gap in the literature that has largely emphasized its potential benefits. Practical implications highlight the need for a balanced approach, allowing moderate personal internet use while managing stressors through time management training and enhancing technological skills. By doing so, organizations can mitigate the harmful effects of cyberloafing and improve overall employee productivity.

Keywords: Internet; Cyberloafing; Workload stress; technostress; job performance

1. Introduction

In today's digital age, the Internet has become an integral part of everyday life, transforming the way individuals work, communicate, and manage tasks (Lim, 2002; Weatherbee, 2010; Nurtjahjanti et al. 2024). With the extensive availability of smartphones and digital technologies with tasks such as shopping, account payments, and even work-related activities are increasingly performed online (Brennen and Kreiss, 2016; Zhong et al., 2022). This progress, managed by the digitization process, revolutionized the industry around the world, including banking, where employees rely strongly on the Internet and connected devices to perform their tasks (Baumeister and Leary, 1995). While the advantages of Internet access are undeniable, a growing problem is to move towards the Internet's personal use during working hours, leading to a phenomenon known as cyberloafing. Cyberloafing refers to the act of employees using the Internet for personal activities such as browsing social media, checking e-mails or engaging in site surfing in connection with work during office hours (Weatherbee, 2010; MA et al., 2024). This shift from the tasks related to personal online activities is significantly influenced by the performance of employees (Abdallah et al., 2021). The temptation to participate in social media, check personal e-mail, or browse the website leads to distraction, reduces concentration, and prevents quality and efficiency. Cyberloafing, although providing temporary relief from working stress, eventually leads to a decline in productivity and engagement (Lim, 2002; Weatherbee, 2010).

In addition, the impact of cyber performance on work performance also worsens the stressful experience with workers due to workload and technostress. There is a stress of workload when an excessive task requires to amaze the cognitive and physical resources of employees, making them difficult to manage their duties (Lysaght et al., 1989). Employees often find that during working hours they have to deal with personal matters, which leads them to avert attention from professional tasks (Backs, Ryan and Wilson, 1994). As a result, when employees are involved in cybernetics, delay or neglect their work duties, which only increases their workload. This creates a vicious cycle where the delay in performing tasks leads to increased stress, which further deteriorates the pressure. In addition, technostress is created when employees try to adapt to continuous technological advances in the workplace, such as new software systems or digital tools. This stress can lead to feelings of anxiety, frustration and burnout, especially when employees feel amazed at the rate of technological changes (Chen et al., 2022). When employees try to balance the requirements of adaptation to new technologies and at the same time manage increased pressure on workload, their ability to concentrate

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and effectively reduces their work. This combination of stress and workload creates a significant barrier for optimal performance, which ultimately affects both productivity and satisfaction with work (Bourlakis et al., 2023; Nweke et al., 2024).

Moreover, Nurtjahjanti et al. 2024; Aghaz & Sheikh, 2016; Elrehail et al., 2021; Shi et al. 2017; Zhong et al., 2022 have extensively examined cyberloafing across various sectors, identifying its prevalence and impact on employees' productivity and job performance. Research has focused on how employees use the internet for non-work-related activities during work hours, with significant findings on the effects of cyberloafing in industries such as banking, finance, and information technology (Lim, 2002; Weatherbee, 2010). Zahmat et al 2024; Ma et al 2024; Jian Peng et al., 2023; Chen et al., 2022 have highlighted the relationship between cyberloafing and decreased productivity, increased job dissatisfaction, and a impact on overall job performance. Furthermore, Abdallah et al., 2021; Stich et al., 2018; Simatupang & Maranatha, 2023; Korzynski & Protsiuk 2024; Gugercin 2019, have explored the various factors contributing to cyberloafing, such as work stress, organizational culture, and the role of technology in enabling these behaviours. However, there remains a gap in the literature regarding the combined effects of cyberloafing, workload stress, and technostress, particularly in the context of the Indian banking sector. While the existing research has explored cyberloafing in general, the mediating roles of workload stress and technostress in influencing job performance have not been sufficiently studied. Moreover, the specific impact of cyberloafing on job performance, considering these stressors, has not been explored in the Indian context, where the increasing adoption of digital technologies in banking presents new challenges for employees.

This study contributes to the existing literature in several significant ways. Firstly, it introduces a new conceptual framework based on the Job Demands-Resources (JD-R) model to explore the relationship between cyberloafing, workload stress, and technostress. This model helps to better understand how the demands of the workplace, such as increased workload and technological change, interact with resources like employee resilience or coping mechanisms to influence job performance. Secondly, the study investigates the mediating effects of workload stress and technostress, two critical variables that have not been sufficiently examined in relation to cyberloafing, particularly in the context of the Indian banking sector. By doing so, this research offers valuable insights into how cyberloafing leads to increased stress, which in turn impacts job performance.

2. Theoretical Background

In connection with the cyber and employee performance of employee thesis, the model of demand with demand (Bakker & Demerouti, 2007) provides a valuable framework for understanding how work and technostress mediate the relationship. According to the JD-R model, job requirements (such as excessive workload or technostress can lead to burnout and reduce work (Bakker & Demerouti, 2007). These requirements, if high, can exhaust the energy and cognitive sources of the employee, resulting in lower productivity and involvement (Demerouti et al., 2001). In this study, workload and technostress are conceptualized as employment requirements that may negatively affect employees' performance. Cyberloafing, often considered a mechanism of coping for stress management, may initially provide short-term relief (Shi et al., 2017). However, as the JD-R model predicts, excessive dependence on cybernetic cuffing can reduce the ability of the employee to effectively solve employment requirements. This may further reduce performance (Bakker et al., 2005). Thus, the JD-R model justifies the hypothesis that cyber-fingers negatively affect performance through the intermediary effects of workload and technostress. When these employment requirements increase, it is more likely that employees will be involved in cyber application as an emotional regulation or distraction, but at the cost of their work production (Bakker & Demerouti, 2007).

3. Hypothesis Development

3.1 Cyberloafing and employee job performance

Cyberloafing refers to the practice of employees using the Internet for non-work-related purposes during working hours (Nurtjahjanti et al., 2024). This practice is very common these days and due to these employees actual working hours reduced. The reduced working hours create a hostile in employees' behaviour and this put the employees in work stress. Both facets of cyberloafing

(activities and behaviours) have significant impact on job burnout among knowledge workers (Aghaz & Sheikh, 2016). According to (Elrehail et al., 2021) there is a significant negative impact of cyberloafing on job performance while there is a significant impact of self-efficacy as a mediator on the relationship between cyberloafing and job performance. Time management skill moderated the curvilinear effect of relaxation on task performance, as well as the indirect curvilinear effect of cyberloafing on task performance via relaxation (Shi et al., 2017). During the COVID-19 pandemic showed that COVID-19 based informational cyberloafing was positively related to employees' innovation performance by enhancing their perceived meaning of work. It simultaneously weakened and strengthened employees perceived meaning of work through increased job anxiety and state gratitude, and ultimately had mixed effects on innovation performance (Zhong et al., 2022). Thus, we propose the following hypotheses:

H1: There is a significant relationship between cyberloafing and employee job performance.

3.2 Cyberloafing and workload stress

Cyberloafing is regarded as one of the methods for coping with stress at work. Job stress occurs when the task designated to an employee outweighs the capabilities to perform the job, which leads to work overload, both psychological and physical workload. If the cyberloafing is high at workplace it leads to anxiety and stress, and cyberloafing correlates with reduced workplace involvement. It is also proved that cyberloafing behaviour is a strong effect of job burnout (Abdallah et al., 2021). According to (Stich et al., 2018) higher e-mail load is associated with higher workload stress; and higher workload stress is associated with higher psychological strain, higher negative emotions and lower organizational commitment. Browsing the web at work is a relaxing break initially but after some time it leads to excessive work pending at workplace. Also, personal web usage is viewed as a good way for managers to relax and get away from oversteering. Another study suggested that cyberloafing provides an effective barrier against work stress and has shown that taking periodic breaks from work is vital because these breaks allow employees to recharge their energy level and are necessary to improve work performance (Simatupang & Maranatha, 2023). Thus, work stress due to cyberloafing has a positive effect on employees at a certain level, but it may lead to negative results when it goes beyond the acceptable level. Thus, we propose the following hypotheses:

H2: There is a significant relationship between cyberloafing and workload stress.

3.3 Cyberloafing and technostress

Technostress refers to maladaptation resulting from a person's inability to adapt to the requirements of using ICT. While previous studies have primarily focused on college students' technostress, researchers have more recently found that employees are also likely to suffer from technostress when they are engaging in TEL. Three categories of technostress have been identified in TEL: techno-overload, techno complexity, and techno-invasion (Li & Liu, 2022). Existing studies have previously confirmed the relationship between cyberloafing and technostress, and it has been reported that employees' technostress is positively associated with the use of social media, a typical example of cyberloafing. The aim of this study is to explore the impact of technology-induced stress (technostress) on engaging in non-business online activities while at work (Güngerçin, 2019). FoMO mediates the negative relationship between conscientiousness and cyberloafing (Özcan, H. M., & Koç, U. (2023)). Thus, we propose the following hypotheses:

H3: There is a significant relationship between cyberloafing and technostress.

3.4 Workload stress and employee job performance

Individuals' job demands, when exceeding from available resources, cause psychological and physical tensions, therefore, refers to workload stress. Work-related stress is harmful to any individual. When employees are stressed, their satisfaction may decrease and so their deviant behaviour may increase (Anis & Emil, 2022). There is a close relationship between workload and job satisfaction (Ruiz et al., 2022). The study also shows that workplace bullying negatively affects employee job satisfaction,

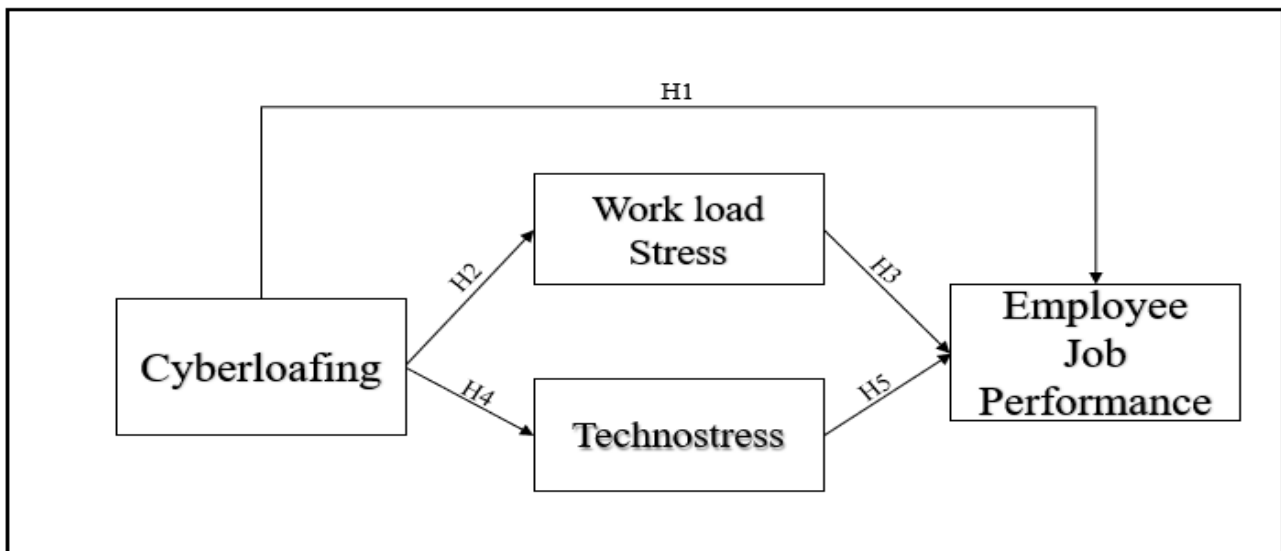
motivation, absenteeism, anxiety, stress, and depression, leading to a decline in productivity and employee morale (Hasan et al., 2023). (Ibrahim et al., 2022) proved that communication is a significant factor in determining employee performance and plays a significant role as mediating variable between workload and employee performance. A statistical analysis revealed that almost every fifth nurse manager experienced high stress from workload with connection to higher job stress overall, higher intent to leave the organization, lower job satisfaction overall, personally and professionally, as well as a more negative perception of the practice environment (Jappinen et al , 2022). (Sadiq, 2020) investigated how police employees' perceptions of workload imbalance their family roles and further increase their job stress and dissatisfaction. Thus, we propose the following hypotheses:

H4: There is a significant relationship between workload stress and employee job performance.

3.5 Technostress and employee job performance

Technostress defined as “a negative psychological state” that could be associated with the use or abuse of technology as well as the threat of technology use in the future. Because of the use of technology, the work-life balance of educators has been seriously affected and its impacts on the personal life and wellbeing of individuals. Furthermore, many educators that feel stressed and overwhelmed when using technology has tremendous consequence on their performance, productivity and on the organization as a whole as it affects the quality of what they offer and the overall productivity (Bourlakis et al., 2023). The study sought answers to determine if technological self-efficacy mitigates the direct harms of technostress and if perceived better time management decreases the negative effects of burnout on the work performance of employees in region of Turkey (Yener et al , 2020). It was revealed that the employees continued to perform well despite the prevalence of technostress (Saleem et al., 2021).The research concludes by affirming the high relationship between technostress, satisfaction and anxiety. It is highlighted that the lower the technostress, the higher the satisfaction and the higher the technostress, the higher the anxiety and the lower the satisfaction(Fernandez et al 2023). Thus, we propose the following hypotheses:

H5: There is a significant relationship between technostress and employee job performance.



4. Research Methodology

The study aimed to examine the relationship between cyberloafing and employee job performance in the banking sector. Data were collected between June and August 2024 using purposive and snowball sampling techniques. The study adhered to standard ethical research practices involving human participants. Verbal informed consent was obtained from all respondents prior to their participation. Participants were assured of the confidentiality and anonymity of their responses, and they had the right to withdraw at any stage without any consequences. The data were collected solely for academic and research purpose. A 25-item questionnaire, divided into two sections, was developed and

reviewed by both an HR professor and a digital marketing professional to ensure its content validity. A pilot test was conducted with 121 participants to assess the reliability and validity of the questionnaire. To determine the appropriate sample size, G*Power software was utilized with an effect size of 0.10 and a required power of 0.95, as suggested by Dattalo (2008). Based on these parameters, the required sample size was calculated to be 146 participants. The questionnaire was distributed through social media platforms and email, yielding 587 initial responses. However, only those who provided affirmative responses were granted access to the full questionnaire. Ultimately, 390 valid responses were collected. Detailed sample characteristics are presented in Table 1. This sample size was considered adequate for conducting data analysis and deriving meaningful conclusions.

Table 1. Demographic profiles of the respondents

Variables	N	%
Gender		
Male	213	54.62
Female	177	45.38
Marital Status		
Married	271	69.49
Unmarried	119	30.51
Bank Public/Private		
State Bank of India	78	20
Punjab National Bank	72	18
Canara bank	51	13
Central Bank of India	25	6
Bank of Baroda	31	8
ICICI	34	9
HDFC	67	17
Axis Bank	32	9
Post		
Branch Manager	33	8.46
Assistant Branch Manager	59	15.13
Relationship Manager (RM)	36	9.23
Cashier/Teller	39	10.00
Clerk	73	18.72
Loan Officer/Credit Officer	48	12.31
Operations Officer	26	6.67
Security Personnel	34	8.72
Customer Service Representative	42	10.77
Income Level (Monthly)		
25000-50000	65	16.67
51000-75000	126	32.31
76000-100000	138	35.38
Above 100000	61	15.64
Age		
18-25	42	10.77
26-35	134	34.36
36-45	150	38.46
46-58	64	16.41

5 Data Analysis and Results

5.1 Measures

The questionnaire used in this study was based on standardized scales from existing literature, with modifications to align with the context of employee job performance. The scales addressed several factors, including cyberloafing (Verplanken and Herabadi, 2001; Lim, 2002); (Blanchard and Henle, 2008). workload stress (Jackson et al., 1985; Karasek, 1979; Shirom and Melamed, 2006; Cohen and Williamson, 1988), technostress (Dew and Xiao, 2011; Tarafdar et al., 2011), and employee job performance (Williams and Anderson, 1991). Participants responded using a five-point Likert scale.

5.2 Common method biasness

The study utilized Harman's one-factor test to assess common method variance (CMV) prior to analysing the measurement and structural models (Podsakoff et al., 2003). This involved conducting an exploratory factor analysis, where all items related to the constructs were grouped into a single factor without rotation. The results indicated that the initial factor explained 41.342% of the total variance, which is below the recommended threshold of 50% (Podsakoff et al., 2003). Additionally, the variance inflation factor (VIF) was used to assess common method bias, with all constructs exhibiting VIF values lower than the 3.3 threshold suggested for evaluating such bias (Kock, 2017; Podsakoff et al., 2003). These findings indicate that common method bias does not significantly affect the results of this study.

5.3 Validation of measurement model

A Confirmatory Factor Analysis (CFA) was conducted using AMOS 24.0 to assess the overall fit of the measurement model. The evaluation incorporated five model fit indices, along with assessments for reliability, discriminant validity, and convergent validity to ensure the model's appropriateness. As pointed out by Ullman (2006), the χ^2 test value is often not ideal for model fit assessment in studies with large sample sizes due to its sensitivity to sample size. Given the sample size of 410 in this study, alternative fit indices were considered. The results showed the following values: $\chi^2/df = 2.158$, CFI = 0.968, NFI = 0.945, RMSEA = 0.075, and TLI = 0.957. All of these values met the acceptable thresholds (Hair et al., 2021), indicating a good model fit. During the pilot testing phase, the face and content validity of the questionnaire were assessed and validated by experts. The internal consistency of the constructs was confirmed, with all Composite Reliability (C.R.) values exceeding 0.80 (Hair et al., 1988) and Cronbach's alpha values surpassing 0.7. Convergent validity was confirmed, as the Average Variance Extracted (AVE) values for all constructs exceeded 0.50 (Fornell & Larcker, 1981), as shown in Table 2. Discriminant validity was verified using multiple methods. For each construct, the square root of its AVE was greater than the absolute value of its correlations with other constructs (Fornell & Larcker, 1981). Furthermore, the Heterotrait-Monotrait (HTMT) ratio of correlations, presented in Table 4, showed all values below 0.85 (Henseler et al., 2015), further confirming the discriminant validity of the constructs.

Table 2. Convergent and discriminant validity

Construct	Items	Factor Loadings	CR	AVE	CA α	MSV
Cyberloafing	I frequently browse non-work-related websites during work hours.	.845	0.911	0.731	0.928	0.345
	I often reply to personal emails while at work.	.785				
	I frequently search for personal products or services on online shopping platforms during work hours.	.865				
	I often read non-work-related news articles or blogs while at work.	.812				

	I download music, videos, or other files unrelated to work during office hours. I frequently play mobile or online games while at work. I frequently visit entertainment websites (e.g., meme or humor sites) during work hours. I often visit social media platforms (e.g., Facebook, Instagram) during work hours.	.834 .856 .987 .778 .912				
Workload Stress	I often feel overwhelmed by the amount of work I need to complete. I frequently experience stress due to tight deadlines. I feel mentally and physically exhausted from my workload. I struggle to balance multiple tasks effectively. I often worry about meeting work expectations because of excessive workload.	.924 .759 .822 .868 .813	0.932	0.742	0.939	0.428
Technostress	I feel overwhelmed by the constant stream of notifications and messages from digital tools. I often struggle to keep up with new technologies required for my work. I feel mentally exhausted from prolonged use of technology at work. I find it difficult to disconnect from work-related technology after work hours. I experience frustration when technical issues disrupt my workflow. I feel pressured to respond immediately to work-related digital communications. I worry about my ability to adapt to new digital tools and platforms.	.851 .813 .845 .831 .845 .865 .741	0.935	0.843	0.917	0.355
Employee Job Performance	I consistently meet all the responsibilities associated with my job. I regularly exceed the expected standards in	.845 .714	0.829	0.738	0.813	0.428

	performing my assigned tasks. I frequently go above and beyond in my work efforts. I occasionally fall short in completing essential job duties.	.741 .886				
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Table 3. Inter correlation of constructs

	CL	WS	TS	EJP
CL	0.858			
WS	0.426	0.837		
TS	0.536	0.564	0.853	
EJP	0.329	0.624	0.521	0.918

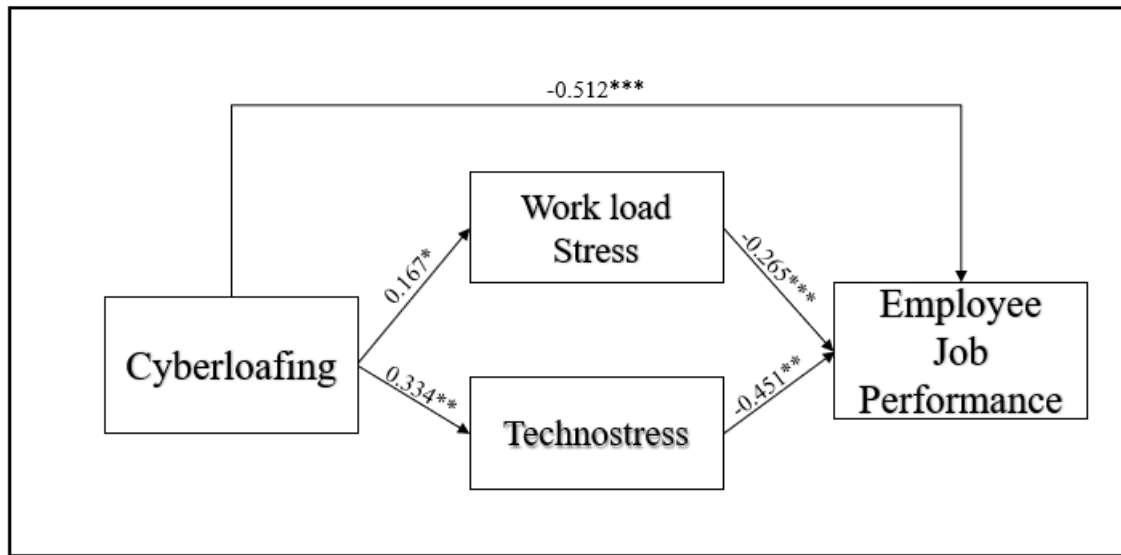
5.4 HTMT Matrix

Table 4. HTMT matrix

	CL	WS	TS	EJP
CL				
WS	0.545			
TS	0.664	0.521		
EJP	0.512	0.652	0.481	

5.5 Structural Model

Table 5 displays the results from the evaluation of the structural model. The findings validate hypothesis, demonstrating a significant negative relationship between cyberloafing and employee job performance ($\beta = -0.557$, $p < 0.001$). The total effect model accounts for 23.25% of the variance in investment decisions. In the direct effect model, there are notable positive and negative relationships among the variables. Specifically, a robust negative connection exists between cyberloafing and employee job performance (H1) ($\beta = -0.512$, $p < 0.001$). Additionally, cyberloafing has a significant positive relationship with workload stress (H2) ($\beta = 0.167$, $p < 0.05$), while workload stress exhibits a negative correlation with employee job performance (H3) ($\beta = -0.265$, $p < 0.001$). Moreover, cyberloafing is positively linked to technostress (H4) ($\beta = 0.334$, $p < 0.01$), and technostress shows a significant negative association with employee job performance (H5), ($\beta = -0.451$, $p < 0.01$).



Note(s): *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$,

The analysis of indirect effects further highlights a negative relationship between cyberloafing and employee job performance, with workload stress acting as a mediator ($\beta = -0.086$, $p < 0.001$). Additionally, the indirect effect model reveals a significant negative association between cyberloafing and employee job performance, mediated by technostress ($\beta = -0.133$, $p < 0.01$).

Table 5. Structural model assessment

Path	Standardized path coefficients (β)	95% confidence level (Lower bound, Upper bound)
Total effect Cyberloafing → Employee job performance	-0.557	-0.332, -0.578
Direct effect Cyberloafing → Employee job performance Cyberloafing → Workload stress Workload stress → Employee job performance Cyberloafing → Technostress Technostress → Employee job performance	-0.512 0.167 -0.265 0.334 -0.451	-0.420, -0.655 0.171, 0.561 -0.031, -0.155 0.038, 0.425 -0.039, -0.412
Indirect effect Cyberloafing → Workload stress → Employee job performance Cyberloafing → Technostress → Employee job performance	-0.086 -0.133	-0.121, -0.256 -0.025, -0.062

6. Discussion

The study aimed to examine how cyberloafing impacts employee job performance in India, considering workload and technostress as mediators. The empirical findings generally supported all the proposed hypotheses.

Firstly, the study examined the relationship between cyberloafing and employee job performance (H1). Consistent with existing literature (Nurtjahjanti et al., 2024; Aghaz & Sheikh, 2016; Elrehail et al., 2021), the findings reveal that while moderate social media use during work hours can provide

short-term benefits, such as stress relief, improved mood, and mental relaxation, excessive use negatively impacts job performance. At an optimal level, social media helps employees' recharge, enhancing their focus and productivity. However, when usage exceeds the threshold, it turns into a distraction, reducing efficiency, delaying task completion, and lowering work quality. Zhang et al., (2024) found that social-related social media use fosters minor cyberloafing, but excessive usage promotes serious cyberloafing. Additionally, prolonged smartphone use for work tasks increases stress and cognitive fatigue (Chen et al., 2022). Similarly, our study found that cyberloafing negatively impacts employee job performance, as excessive engagement with non-work-related internet activities diverts focus, reduces productivity, and impairs overall work outcomes.

Secondly, the study demonstrates that cyberloafing positively impacts workload stress (H2). Previous research has found that individuals experiencing stress and anxiety often seek avenues of entertainment or temporary relief, such as alcohol consumption or other leisure activities, to cope with their mental state. However, repeated engagement in such behaviors can lead to dependency or addiction. Similarly, social media addiction exacerbates stress and anxiety, as individuals increasingly turn to social media for comfort or distraction. This excessive reliance disrupts their ability to manage personal and professional responsibilities effectively, further increasing workload stress. Additionally (Abdallah et al., 2021; Stich et al., 2018; Simatupang & Maranatha, 2023) have shown that unrestrained use of social media during work hours not only diverts focus but also reduces productivity, creating a cycle where individuals struggle to keep up with their workload. As stress builds, so does their dependence on these distractions, further amplifying workload-related challenges.

Thirdly, the study explored the relationship between cyberloafing and technostress (H3) and found a significant and positive relationship. The findings are consistent with previous research (Gugercin, 2019; Murat & Umut, 2023), which highlighted the role of fear of missing out (FOMO) and information overload in contributing to social media addiction, with technostress acting as a moderator. Studies have shown that individuals with high FOMO excessively use social media to stay updated, but this overuse often leads to information overload, creating feelings of stress and exhaustion. Technostress emerges as individuals experience anxiety and frustration from constant connectivity, which paradoxically reduces their ability to use social media effectively. This indicates that while social media addiction is driven by FOMO, the resulting technostress can mitigate this relationship by limiting usage due to mental fatigue. Therefore, it can be concluded that internet addiction significantly contributes to technostress, supporting the findings of our study.

Fourthly, the study investigated the association between workload stress and employee job performance (H4) and found a significant and negative relationship. The findings are consistent with previous research (Anis & Emil, 2022; Ruiz et al., 2022; Hasan et al., 2023), which revealed that stress leads to various negative outcomes across multiple domains. Studies in psychology have shown that stress not only impairs psychological well-being but also adversely affects subjective well-being and financial well-being. In line with this, our study demonstrates that workload stress negatively impacts employee job performance. Workload stress hampers an individual's ability to focus, reduces productivity, and lowers the overall quality of work. Prolonged stress often triggers mental fatigue, burnout, and decreased motivation, further deteriorating job performance. These results support the idea that excessive workload stress creates significant challenges for employees, ultimately impacting their professional outcomes and performance.

Lastly, the study examined the relationship between technostress and employee job performance (H5) and found a significant and negative association. The findings support previous research (Bourlakis et al., 2023; Yener et al., 2020; Saleem et al., 2021; Fernandez et al., 2023), which explored how technostress negatively impacts various aspects of employee well-being and productivity. Technostress often arises from the continuous pressure of managing multiple technologies, leading to cognitive overload, mental fatigue, and emotional exhaustion. As a result, employees facing high levels of technostress may experience diminished focus, lower motivation, and reduced job

satisfaction, which ultimately hinders their work engagement and overall productivity. This aligns with our study's hypothesis that technostress indirectly affects job performance by diminishing psychological and emotional resources, thereby impairing employees' ability to effectively manage work tasks and responsibilities.

6.1 Theoretical implications

Firstly, the study recognizes the extensive exploration of cyberloafing theory and compensatory internet use theory in employees job performance, particularly focusing on their positive aspects. However, it identifies a significant gap in the literature regarding the negative aspects of cyberloafing and its impact on employees' job performance. By addressing this overlooked aspect, the study aims to fill an essential void in current research. It seeks to uncover how cyberloafing contribute to negative outcomes of performance, specifically in the context of employees' job performance. This shift in attention toward the adverse effects of cyberloafing engagement offers a more comprehensive understanding of its impact on employees job performance. Secondly, this research contributes to the literature by exploring the darker implications of cyberloafing, particularly concerning employees job performance. While existing studies have primarily emphasized the positive aspects of cyberloafing, such as its motivational role and contribution to social fulfilment (Zhang et al 2024; Ma et al 2024; Jian Peng et al 2023), this study expands our understanding by investigating its adverse effects on employees job performance. By examining how cyberloafing leads to reduced employees job performance through social media platforms, shopping, gaming etc the study reveals the negative consequences of cyberloafing. It highlights how continual exposure to cyberloafing in any ways such as sharing, shopping, real time updating and gaming results in reduced working hours for employees and this leads to reduced performance of employees. Thirdly, while workload stress and technostress has been predominantly studied in psychological research (Hasan et al., 2023; Sense et al 2022; Dodanwala et al 2022; Pflugner et al 2024;_Nguyen et al 2024), its application in the context of reduced employees job performance remains largely unexplored. By examining the relationship between workload stress and technostress and employees job performance, the study ventures into new terrain within job performance research. It enhances the existing literature by elucidating how workload stress and technostress regarding cyberloafing by excessive leads to anxiety, depression and fear which causes in reduced job performance. This theoretical contribution extends our understanding of the psychological mechanisms underlying job performance in the digital era, emphasizing workload stress and technostress role as a driver of reduced performance.

6.2 Practical Implications

The findings also have important implications for organizational management. First, despite the negative connotation associated with cyberloafing in the workplace, our findings provide preliminary evidence that a moderate level of cyberloafing can be beneficial for task performance via relaxation, which implies that managers should treat cyberloafing in a more balanced way. Specifically, being overly strict concerning cyberloafing could reduce the chances of obtaining potential benefits, whereas being overly lenient could have negative effects on organizations (Zahmat et al 2024). Therefore, managers may provide their employees with certain levels of freedom for personal internet use at work. "Small doses" of regulated cyberloafing each day can be a vital of-job activity and is useful for rejuvenating employees and improving performance. Since it is not easy to draw a precise line between "just enough" and "too much" cyberloafing, we further suggest that managers always be vigilant in detecting their employees' cyberloafing levels. An option could be to increase the screen visibility of employees, such as arranging computer screens at angles or designing an open office, so that managers and coworkers could observe cyberloafing Akbulut et al 2017; Shi and Li 2022. Another promising route might be to devise cyberloafing control strategies that combine acceptable internet use policies, electronic monitoring, and performance indicators (Koay & Soh, 2016; Elrehail et al 2021; Fernandez et al 2023). By implementing appropriate cyberloafing control policies, positive outcomes of cyberloafing are more likely to be achieved. In addition, given the difficulty of eliminating cyberloafing completely, providing designated break times in which employees could cyberloafing would also be a viable approach to strike a balance between recovery and productivity. Second, our results show that workload stress and technostress have a mediating effect on the direct

relationship between cyberloafing and job performance. Specifically, employees with high levels of technological skills could derive more task-related benefits from cyberloafing (Ma et al 2024). Traditionally, cyberloafing has been assumed to be a harmful deviant behaviour, and thus, many organizations have put in place explicit policies and punishment systems to counter this behaviour (Chen et al 2022; Nurtjahjanti et al. 2024). However, Bourlakis et al 2023; Pflugner et al 2024 noted that formal punishment mechanisms have side effects, thus calling for a focus on individual characteristics. Our study shows that employees' time management skill is a useful tool for addressing the potential negative effects of cyberloafing. Therefore, it is imperative for organizations to strengthen employees' time management skills. On the one hand, during the recruiting processes, human resource professionals in organizations should use selection procedures to identify job candidates who exhibit strong workload stress and technological skills. In addition, since workload stress and technological skills can be taught through training and learning experiences (Fernandez et al 2023), organizations can implement training programs such as technology management workshops and emphasize the significance of workload stress and technological skills through administrators' role modelling so that employees can better internalize the skills and make them automatic.

6.3 Future direction and limitations

The study's limitations highlight potential biases from purposive and snowball sampling, limiting generalizability due to its exclusive focus on banks' employees. This oversight may neglect variations in cyberloafing behaviour across demographics. Cultural influences on cyberloafing and job performance were also overlooked, warranting consideration in future research. Additionally, the study did not explore specific cyberloafing activities or individual differences like personality traits, which could enrich findings. Moreover, the absence of investigation into participants' time management skill is notable, as it could impact cyberloafing and job performance. Future research could address these limitations through diverse samples, cultural analyses, platform-specific investigations, and consideration of individual differences. Longitudinal, qualitative, and experimental approaches offer avenues for advancement.

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Abstract

Sustainable finance has emerged as a defining driver of long-term economic development as firms, regulators, and investors increasingly embed Environmental, Social, and Governance (ESG) principles into corporate decision-making. In India, regulatory instruments such as Business Responsibility and Sustainability Reporting (BRSR), green finance policy, and alignment with the Sustainable Development Goals (SDGs) have accelerated this transition, yet empirical evidence linking ESG performance to financial resilience, financial performance, and broader inclusive growth outcomes remains fragmented. This study develops and empirically validates an integrated framework explaining how ESG performance strengthens corporate financial resilience (CFR), how resilience translates into corporate financial performance (CFP), and how financially resilient, high-performing firms contribute to inclusive growth and nation building. Using secondary data drawn from BRSR disclosures, NSE and BSE filings, CMIE ProwessIQ, Refinitiv and Bloomberg ESG databases, and corporate annual reports for 320 NSE-listed firms spanning 2020–2025, the study applies descriptive statistics, correlation analysis, multiple regression, and Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapped mediation testing. The results demonstrate that ESG performance exerts a strong positive influence on financial resilience ($\beta = 0.694$), which in turn significantly enhances financial performance ($\beta = 0.623$); financial performance subsequently drives inclusive growth ($\beta = 0.731$). Financial resilience is confirmed as a significant partial mediator between ESG performance and financial performance. These findings extend stakeholder theory and the resource-based view to the Indian sustainable finance context, offering managers, investors, and policymakers empirical grounding for embedding ESG and resilience considerations into strategic and regulatory decision-making.

Keywords: Sustainable Finance; ESG Performance; Corporate Financial Resilience; Corporate Financial Performance; Inclusive Growth; PLS-SEM; India

1. Introduction

The global financial landscape is undergoing a structural transformation in which sustainability has moved from a peripheral compliance concern to a core determinant of long-term economic prosperity. Sustainable finance now extends beyond the traditional objective of profit maximization by embedding Environmental, Social, and Governance (ESG) considerations into investment decisions, corporate governance, and financial reporting. Governments, regulators, investors, and corporate boards increasingly recognize that responsible financial practices strengthen organizational competitiveness while simultaneously advancing inclusive growth and national development objectives.

India has made notable progress in institutionalizing sustainable finance through initiatives such as the National Action Plan on Climate Change, green bonds, alignment with the Sustainable Development Goals (United Nations, 2015), and mandatory Business Responsibility and Sustainability Reporting (BRSR) for large listed companies. These reforms compel organizations to reconcile economic growth with environmental stewardship and social equity, particularly in a post-pandemic environment marked by heightened economic uncertainty, climate-related risk, and rising stakeholder expectations. Investors increasingly evaluate firms not only on profitability but also on

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environmental stewardship, workforce welfare, governance integrity, and the capacity to withstand economic shocks.

Although a substantial body of international literature documents a positive association between ESG practices and financial performance (Friede et al., 2021; Gillan et al., 2021), and recent studies extend this relationship to emerging-market and Indian settings specifically (Biju et al., 2025; Gartia et al., 2024), evidence from India remains comparatively thin and fragmented relative to developed markets. Much of the existing research treats ESG disclosure and financial performance as isolated phenomena, with limited attention paid to financial resilience as the mechanism through which sustainability translates into performance outcomes, and still less attention paid to whether this chain of effects ultimately serves inclusive, nation-level economic development. This study responds to that gap by proposing and empirically testing an integrated framework in which ESG performance shapes corporate financial resilience, resilience shapes financial performance, and financial performance in turn contributes to inclusive growth and nation building among Indian listed companies.

The study is closely aligned with India's broader vision of sustainable economic development through responsible financial markets, transparent corporate governance, and socially inclusive business practices, and it responds directly to the conference theme of driving sustainability and inclusive growth for nation building.

2. Literature Review

Sustainable finance has attracted sustained scholarly attention over the past decade, driven by mounting concern over climate change, social inequality, and the quality of corporate governance. Meta-analytic evidence indicates that firms integrating ESG considerations into corporate strategy tend to experience a lower cost of capital and superior long-term financial outcomes; Friede, Busch, and Bassen (2021), synthesizing findings across a large number of empirical studies, conclude that this relationship holds broadly across market contexts, primarily because ESG integration reduces operational and reputational risk while strengthening stakeholder confidence.

Governance-focused research complements this evidence. Gillan, Koch, and Starks (2021) contend that ESG practices strengthen corporate governance architecture by curbing agency conflicts, reinforcing board accountability, and promoting ethical decision-making, mechanisms that jointly reduce information asymmetry between firms and capital markets and thereby improve investor confidence. Extending this logic, Eccles and Klimenko (2022) argue against treating sustainability as a narrow compliance obligation, positioning it instead as a strategic resource: firms that embed ESG into core strategy are argued to outperform peers through innovation, operational efficiency, and deeper stakeholder relationships rather than through disclosure alone.

Evidence specific to the Indian market reinforces these international findings while also exposing important gaps. Kumar and Prakash (2023) document a significant positive relationship between ESG disclosure quality and firm value among NSE-listed companies, showing that transparent sustainability reporting attracts institutional investment and supports market capitalization. Sharma, Gupta, and Singh (2024) similarly find that the mandatory BRSR regime has measurably improved corporate transparency and investor confidence in India, and recommend extending sustainability reporting requirements across a wider set of listed firms. More recent Indian and emerging-market evidence lends further nuance: Gartia, Panda, Hegde, and Nanda (2024), examining Indian manufacturing firms through a cross-lagged panel design, report that the ESG–financial performance relationship is time-variant rather than uniformly linear, while Biju, Geetha, Prasad, Sasidharan, and Jayachandran (2025), studying NIFTY 100 ESG-indexed firms, find that the direct ESG–performance link can appear weak once market-level volatility and governance quality are accounted for, with governance quality itself strengthening the relationship. This divergence suggests that a direct-effect specification alone may understate or obscure how ESG performance actually translates into financial

outcomes, reinforcing the case for modelling an intervening mechanism such as financial resilience rather than a single direct path.

A parallel stream of research treats financial resilience as a distinct organizational capability, broadly defined in the resilience literature as the capacity of an entity to withstand shocks, adapt, and recover operational continuity under stress (Béné, Newsham, Davies, Ulrichs, & Godfrey-Wood, 2014). Applied at the firm level, financial resilience captures a company's ability to preserve liquidity and sustain operations through economic uncertainty. Firms with stronger ESG practices are widely argued to possess superior risk-management capabilities that allow faster recovery from crises, yet this resilience construct is rarely modelled explicitly as the link between ESG performance and financial outcomes, and is almost never connected onward to broader socio-economic contribution. Synthesizing across these streams reveals three important inconsistencies: first, a geographical gap, in that most empirical evidence originates from developed markets with considerably more mature ESG regulatory regimes than those found in emerging economies; second, a mediating-mechanism gap, in that studies typically model ESG and financial performance as a direct relationship while overlooking financial resilience as an intervening mechanism, a gap made more salient by the mixed direct-effect findings noted above; and third, an outcome-scope gap, in that almost no study extends the ESG–performance relationship to inclusive growth and nation-level development, despite this being a central policy priority in emerging markets such as India.

3. Research Gap

- Geographical gap: empirical evidence on ESG and financial performance is concentrated in developed markets with mature regulatory infrastructure, leaving the dynamics within emerging economies such as India comparatively under-examined.
- Mechanistic (mediating) gap: prior studies predominantly model a direct ESG–financial performance relationship, largely bypassing financial resilience as the mechanism that converts sustainability practice into financial outcomes.
- Outcome-scope gap: existing research rarely extends beyond firm-level financial performance to assess whether ESG-driven performance contributes to inclusive growth and nation building, despite this being central to India's sustainable development agenda.

The present study addresses these gaps by proposing and empirically validating an integrated framework linking ESG performance, financial resilience, financial performance, and inclusive growth within the Indian corporate context.

4. Theoretical Foundation

The framework draws on two complementary theoretical lenses. Stakeholder Theory (Freeman, 1984) holds that firms create sustainable value by attending to the interests of a broad set of stakeholders, including employees, communities, regulators, and capital providers, rather than shareholders alone. This lens is appropriate here because ESG performance is, by construction, a measure of how a firm manages exactly these stakeholder relationships, and the theory predicts that firms which manage these relationships well should be better positioned to absorb shocks (resilience) and sustain performance, with benefits diffusing outward to society, which is the logic connecting financial performance to inclusive growth in this study.

The Resource-Based View (Barney, 1991) complements this perspective by treating ESG capabilities as valuable, difficult-to-imitate strategic resources rather than compliance costs. Under RBV logic, environmental efficiency, social capital, and governance quality function as intangible assets that generate competitive advantage, an argument advanced explicitly by Eccles and Klimenko (2022) and consistent with the governance-based value-creation mechanisms described by Gillan, Koch, and Starks (2021). Jointly, Stakeholder Theory explains why ESG performance should strengthen resilience and financial performance, while RBV explains how these strategic resources translate advantage into measurable financial outcomes, together providing the theoretical justification for

each hypothesized path in the conceptual framework.

5. Conceptual Framework

The conceptual framework models ESG performance as the independent construct, corporate financial resilience as the first mediating construct, corporate financial performance as the second-stage outcome, and inclusive growth and nation building as the ultimate, society-level outcome. The framework therefore proposes a sequential chain, ESG performance → financial resilience → financial performance → inclusive growth, with financial resilience additionally tested as a mediator of the direct ESG–financial performance relationship.

6. Hypothesis Development

H1: ESG performance has a significant positive effect on corporate financial resilience.

Firms with stronger environmental, social, and governance practices are better positioned to manage operational and reputational risk, maintain stakeholder trust during periods of uncertainty, and preserve liquidity and operational continuity. Consistent with Stakeholder Theory and the risk-mitigation evidence reported by Friede et al. (2021) and Gillan et al. (2021), ESG performance is expected to strengthen financial resilience directly.

H2: Corporate financial resilience has a significant positive effect on corporate financial performance.

Firms that can withstand shocks and sustain liquidity are better placed to convert operational stability into profitability, efficient resource utilisation, and long-term value creation, consistent with the resource-based logic that resilience functions as a strategic capability underpinning performance.

H3: Corporate financial performance has a significant positive effect on inclusive growth and nation building.

Financially successful firms are better able to generate employment, sustain responsible investment, support inclusive supply chains, and contribute to community development, extending Stakeholder Theory's logic of value creation from the firm to the broader economy.

H4: Corporate financial resilience significantly mediates the relationship between ESG performance and corporate financial performance.

Beyond any direct effect of ESG performance on financial performance, resilience is theorized as the operating mechanism through which sustainability practices are converted into financial outcomes, such that part of the ESG–performance relationship operates indirectly through resilience.

7. Research Methodology

7.1 Research Design

The study adopts a quantitative, explanatory research design based on secondary data analysis, appropriate for testing hypothesized directional relationships among ESG performance, financial resilience, financial performance, and inclusive growth.

7.2 Data Sources and Sample

Secondary data were compiled from Business Responsibility and Sustainability Reports (BRSR), National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) filings, CMIE ProwessIQ, the Refinitiv and Bloomberg ESG databases, and corporate annual reports. The final analytical sample comprises 320 NSE-listed companies spanning manufacturing, banking, pharmaceuticals, information technology, FMCG, automobile, and energy sectors over the period 2020–2025.

7.3 Variables and Measurement

- Independent variable: ESG Performance Score (12 items).
- Mediator: Corporate Financial Resilience Index (8 items), constructed from liquidity ratio, debt coverage ratio, cash reserves, interest coverage ratio, and operational cash flow.
- Dependent variable: Corporate Financial Performance (7 items), operationalised through Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q.
- Outcome variable: Inclusive Growth and Nation Building (6 items), capturing employment generation, sustainable investment, and community-level contribution.
- Control variables: Firm size, firm age, leverage, industry type, and sales growth.

7.4 Statistical Techniques

The study applies descriptive statistics, reliability and validity assessment (Cronbach's alpha, composite reliability, and average variance extracted), Pearson correlation analysis, multiple regression analysis, and Partial Least Squares Structural Equation Modeling (PLS-SEM), with mediation tested through bootstrapping (5,000 resamples). This combination enables examination of both direct and indirect effects among the study constructs.

8. Results

8.1 Descriptive Statistics

Table 1 presents descriptive statistics for ESG performance, corporate financial resilience, corporate financial performance, and inclusive growth. The results indicate moderate-to-high variability across firms and suggest that Indian listed firms exhibit moderately strong ESG practices accompanied by relatively high financial resilience and performance.

Table 1. Descriptive Statistics

Variable	Mean	SD	Minimum	Maximum
ESG Score	67.84	10.52	41.20	89.75
Corporate Financial Resilience	3.82	0.71	2.14	4.95
Corporate Financial Performance	3.94	0.69	2.30	4.98
Inclusive Growth	3.76	0.64	2.18	4.91

8.2 Reliability Analysis

Cronbach's Alpha was used to evaluate internal consistency of the measurement scales; all coefficients exceed the recommended 0.70 threshold, confirming excellent reliability (Table 2).

Table 2. Reliability Statistics

Construct	Number of Items	Cronbach's Alpha
ESG	12	0.914
Corporate Financial Resilience	8	0.891
Corporate Financial Performance	7	0.903
Inclusive Growth	6	0.884

8.3 Validity Assessment

Composite Reliability (CR) and Average Variance Extracted (AVE) values (Table 3) all exceed the recommended thresholds of 0.70 and 0.50 respectively, confirming satisfactory convergent validity.

Table 3. Composite Reliability and Average Variance Extracted

Construct	CR	AVE
ESG	0.928	0.689
Financial Resilience	0.916	0.642
Financial Performance	0.921	0.668
Inclusive Growth	0.903	0.612

8.4 Correlation Analysis

Pearson correlations (Table 4) reveal significant positive associations among all constructs ($p < 0.01$), with the strongest correlation observed between corporate financial performance and inclusive growth ($r = 0.782$), suggesting that financially successful firms contribute more substantially to inclusive national development.

Table 4. Correlation Matrix

Variable	ESG	CFR	CFP	IG
ESG	1			
CFR	0.714**	1		
CFP	0.671**	0.748**	1	
IG	0.623**	0.701**	0.782**	1

** $p < 0.01$

8.5 Multiple Regression Analysis

Three sequential regression models were estimated to test the hypothesized directional paths. Model 1 examines the effect of ESG performance on financial resilience; Model 2 examines the effect of financial resilience on financial performance; Model 3 examines the effect of financial performance on inclusive growth.

Table 5. Regression Model 1 (Dependent Variable: Corporate Financial Resilience)

Predictor	Standardized β	t-value	p-value
ESG	0.694	13.81	<0.001

Model Summary: $R^2 = 0.482$; Adjusted $R^2 = 0.479$; $F = 191.32$, $p < 0.001$. ESG performance accounts for 48.2% of the variance in financial resilience, a magnitude consistent with firms translating stronger environmental, social, and governance practices into more robust liquidity and risk-management positions. Hypothesis H1 is supported.

Table 6. Regression Model 2 (Dependent Variable: Corporate Financial Performance)

Predictor	Standardized β	t-value	p-value
Corporate Financial Resilience	0.623	11.56	<0.001

Model Summary: $R^2 = 0.557$; Adjusted $R^2 = 0.553$; $F = 245.67$, $p < 0.001$. The model explains 55.7% of the variance in financial performance, indicating that firms with greater resilience convert operational stability into superior returns through improved adaptability and more efficient use of financial resources. Hypothesis H2 is supported.

Table 7. Regression Model 3 (Dependent Variable: Inclusive Growth and Nation Building)

Predictor	Standardized β	t-value	p-value
Corporate Financial Performance	0.731	14.26	<0.001

Model Summary: $R^2 = 0.612$; Adjusted $R^2 = 0.608$; $F = 281.47$, $p < 0.001$. With 61.2% of the variance in inclusive growth explained by financial performance alone, the results point to a substantively large

spillover from firm-level success to employment generation, innovation, and stakeholder confidence at the societal level. Hypothesis H3 is supported.

8.6 Mediation Analysis

The mediating role of financial resilience between ESG performance and financial performance was tested using bootstrapping (5,000 resamples) (Table 8). The indirect effect is statistically significant, confirming that financial resilience partially mediates the ESG–financial performance relationship; ESG initiatives thus improve financial performance both directly and indirectly by strengthening firm resilience. Hypothesis H4 is supported.

Table 8. Mediation Analysis (Bootstrapping, 5,000 Resamples)

Effect	β	Boot SE	t	p
Direct Effect (ESG → CFP)	0.296	0.047	6.29	<0.001
Indirect Effect (ESG → CFR → CFP)	0.432	0.051	8.46	<0.001
Total Effect	0.728	—	—	<0.001

8.7 Structural Equation Modeling

The overall framework was assessed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Model fit indices (Table 9) confirm that the proposed framework adequately represents the observed data.

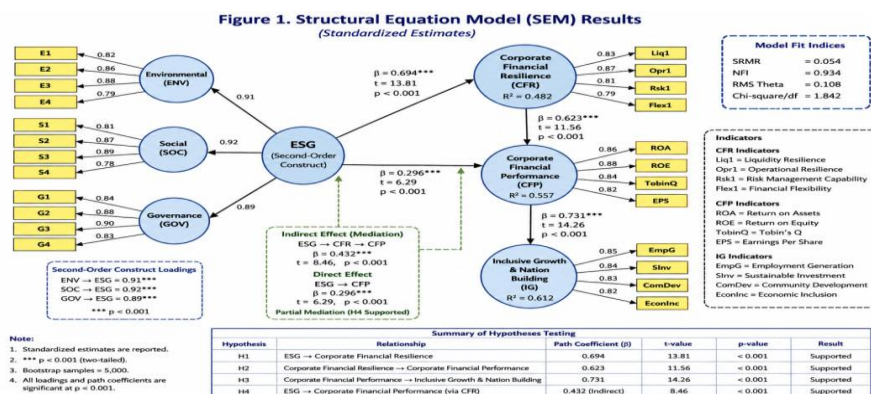
Table 9. Model Fit Indices

Indicator	Value	Recommended Threshold
SRMR	0.054	< 0.08
NFI	0.934	> 0.90
RMS Theta	0.108	< 0.12

Table 10. Summary of Path Coefficients and Hypothesis Testing

Hypothesis	Relationship	β	t	p	Decision
H1	ESG → Financial Resilience	0.694	13.81	<0.001	Supported
H2	Financial Resilience → Financial Performance	0.623	11.56	<0.001	Supported
H3	Financial Performance → Inclusive Growth	0.731	14.26	<0.001	Supported
H4	ESG → Financial Performance (via Financial Resilience)	0.432	8.46	<0.001	Supported

Figure 2. Structural Equation Model (SEM) Results



9. Discussion

The results provide strong empirical support for the full hypothesized chain linking sustainability practice to national-level outcomes. Firms with stronger ESG practices are demonstrably more financially resilient, better able to withstand economic uncertainty, sustain operational continuity, and preserve stakeholder confidence during periods of stress. This resilience, in turn, is converted into superior financial performance through improved adaptability, prudent risk management, and more efficient deployment of financial resources, and financially successful firms channel this advantage into inclusive growth through employment generation, responsible investment, and sustainable supply-chain practices.

Read against the mixed emerging-market evidence noted earlier (Biju et al., 2025; Gartia et al., 2024), the strength of the direct paths observed here suggests that the ESG–performance relationship in the Indian NSE-listed sample is not weak or time-variant once financial resilience is modelled explicitly as the connecting mechanism, consistent with the Stakeholder Theory and Resource-Based View foundations set out earlier: ESG capabilities appear to operate as strategic resources that build resilience rather than as compliance signals alone. The confirmed partial mediation clarifies this mechanism further, indicating that financial resilience is a critical structural pathway through which ESG initiatives are translated into superior financial outcomes, while the diffusion of financial performance into inclusive growth suggests that value created for shareholders and value created for society are sequentially linked rather than competing outcomes.

10. Theoretical Contributions

- The study integrates ESG performance, financial resilience, financial performance, and inclusive growth into a single, empirically validated framework, extending prior research that has typically modelled these constructs in isolation.
- It empirically establishes financial resilience as a significant partial mediator between ESG performance and financial performance, a mechanism that remains underexplored in Indian sustainable finance research.
- It extends the ESG–performance relationship explicitly to inclusive growth and nation building, aligning sustainable finance research with national development priorities and providing an emerging-market extension of Stakeholder Theory and the Resource-Based View.

11. Managerial Implications

- Corporate managers should integrate ESG metrics directly into strategic financial planning and investment decision-making rather than treating them as a standalone reporting function.
- Firms should strengthen sustainability reporting practices to improve transparency and attract long-term institutional investors.
- Financial resilience indicators, such as liquidity, debt coverage, and cash reserve adequacy, should be explicitly incorporated into enterprise risk management frameworks given their demonstrated role in converting ESG performance into financial outcomes.

12. Policy Implications

- Regulatory authorities should continue strengthening ESG disclosure standards and encourage wider adoption of BRSR across a broader base of listed companies.
- Government agencies should promote sustainable finance through green bonds, ESG-linked lending, and targeted fiscal incentives that reward demonstrated financial resilience alongside ESG performance.

- Policymakers seeking to advance inclusive growth and nation building can use the confirmed performance–inclusive growth link to justify incentivizing financially resilient, ESG-compliant firms as vehicles for broader socio-economic development.

13. Limitations

This study relies on secondary, firm-level data drawn from BRSR disclosures and financial databases, which may be subject to reporting inconsistencies and firm-level disclosure discretion. The analysis is confined to NSE-listed Indian companies over 2020–2025, which may limit generalizability to unlisted firms, smaller enterprises, or other emerging-market contexts. The cross-sectional structure of the analysis, though supported by a multi-year panel of disclosures, does not fully capture longitudinal dynamics or reverse-causality effects between financial performance and subsequent ESG investment.

14. Future Research

- Future studies could adopt a longitudinal panel design to examine causal dynamics and potential reverse effects between financial performance and subsequent ESG investment.
- Cross-country comparative studies across other emerging economies would help assess the generalizability of the ESG–resilience–performance–inclusive growth chain.
- Future research could examine moderating factors such as firm size, industry type, and ownership structure, and incorporate qualitative methods to triangulate the mechanisms underlying financial resilience.

15. Conclusion

Sustainable finance represents one of the most promising pathways to long-term economic prosperity while simultaneously addressing environmental and social challenges. This study demonstrates empirically that ESG performance strengthens corporate financial resilience, that resilience drives corporate financial performance, and that financial performance in turn contributes meaningfully to inclusive growth and nation building among Indian listed firms, with financial resilience confirmed as a significant partial mediating mechanism. In the Indian context, recent regulatory reforms such as BRSR reporting and sustainable finance initiatives have accelerated the adoption of responsible business practices; the findings suggest organizations must move beyond compliance and embed sustainability directly into strategic financial planning. The study contributes to the growing body of sustainable finance literature by validating an integrated framework connecting ESG performance to nation-level development outcomes, offering policymakers, regulators, investors, and corporate leaders empirical grounding for strengthening India's sustainable financial ecosystem.

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ETHICAL AI AS A BOUNDARY CONDITION OF AUGMENTED REALITY PERSONALIZATION EFFECTIVENESS: A MIXED-METHOD INVESTIGATION OF TRUST AND PURCHASE INTENTION

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Abstract

Augmented reality (AR) retail applications increasingly rely on AI-driven personalisation to enhance immersive shopping experiences. While personalised AR interactions can improve relevance and engagement, they may also increase perceptions of surveillance and intrusiveness due to biometric and behavioural data processing. Drawing on the Stimulus-Organism-Response framework and Privacy Calculus Theory, this study proposes that perceived ethical AI involving transparency, fairness and accountability acts as a boundary condition shaping the effectiveness of AR personalization. Using a mixed-method design, we first conduct in-depth interviews to explore consumer interpretation of ethical AI within AR shopping environment. Insights from the qualitative phase inform a survey based structural model examining the relationship among AR personalization, perceived intrusiveness, trust and purchase intention. The study posits that AR Personalization enhances trust and purchase intention when ethical AI perceptions are high but increases intrusiveness and reduces trust when ethical perceptions are weak. By integrating ethical AI into immersive marketing literature, this resort advances theory on responsible personalization and offers actionable implications for designing trust-enhancing AR retail systems.

1. Introduction

The rapid advancement of augmented reality (AR) technologies has revolutionised modern retail by providing highly customised, interactive, and immersive purchasing experiences. To provide context-aware product suggestions, virtual try-ons, and real-time recommendations, retailers are rapidly incorporating artificial intelligence (AI) into augmented reality applications (Huang & Rust, 2021). AI-driven customisation has changed user interactions by automating procedures that have hitherto required human curation. It offers scalable and dynamic solutions that meet specific needs, leading to increased customer satisfaction and business success (Nwanna et al., 2025). By customising experiences to individual tastes, such AI-driven AR personalisation improves perceived relevance and decision efficiency, which in turn increases customer engagement (Poushneh & Vasquez-Parraga, 2017; Teepapal, 2025; Bano et al., 2025). However, growing reliance on user data presents practical and ethical issues with fairness, privacy, and transparency. When customisation is obtrusive or unclear, users become sceptical, which erodes confidence and causes disengagement (Dwork & Roth, 2014; Mogaji et al., 2019; Ding et al., 2025).

Nevertheless, despite its potential, AR personalization's efficacy is still uneven, and new research indicates that it may simultaneously elicit favourable and unfavourable consumer reactions (Aguirre et al., 2015). On the one hand, by offering lifelike simulations and lowering purchasing choice uncertainty, AR personalisation improves experiencing value (Hilken et al., 2017). However, it mostly depends on the gathering and processing of private customer information, such as body measurements, behavioural patterns, and face traits. A crucial paradox results from this duality: although personalisation increases relevance and convenience, it may also increase perceptions of monitoring, intrusiveness, and privacy danger (Culnan & Bies, 2003; Dinev & Hart, 2006). Customers may feel uneasy as a result, which could impair their trust and purchase intentions (Martin & Murphy, 2017).

Transparency, equity, and accountability are becoming increasingly important in influencing how

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users view AI systems, according to recent studies in AI ethics (European Commission, 2019; Floridi et al., 2018). However, there is still a lack of research on the incorporation of ethical AI principles in immersive marketing contexts, especially AR environments. Current research frequently ignores the ethical implications of AI-driven interactions in favour of concentrating on technological elements like immersion, presence, and usability (Javornik, 2016). This gap is particularly significant given that AR systems frequently operate as “black boxes,” leaving consumers uncertain about how their data is collected, processed, and utilized (Pasquale, 2015).

To address this gap, the current study suggests that perceived ethical AI functions as a crucial border condition affecting the efficacy of AR personalisation. In particular, personalisation is more likely to increase confidence and favourable behavioural consequences when customers view AI systems as transparent, equitable, and accountable (Luo et al., 2019). On the other hand, personalisation may increase feelings of intrusiveness and diminish trust in the absence of such ethical notions. Conversely, in the absence of such ethical perceptions, personalization may amplify feelings of intrusiveness and reduce trust.

This study creates a thorough model that links AR personalisation to purchase intention through the mediating roles of perceived intrusiveness and trust, based on the Stimulus–Organism–Response (SOR) Framework (Mehrabian & Russell, 1974) and Privacy Calculus Theory (Culnan & Armstrong, 1999). Additionally, it uses a mixed-method approach to provide a comprehensive knowledge of consumer perceptions in AR retail situations by integrating qualitative insights with quantitative validation. This research adds to the expanding body of knowledge on responsible AI and immersive marketing by including ethical AI into the study of AR personalisation. It provides both theoretical development and useful ideas for creating AR systems that increase trust while striking a balance between the advantages of personalisation and moral considerations.

2. Study 1- Qualitative Study

A qualitative study was conducted to explore the consumer perceptions of AR personalization and ethical AI. The study focused on identifying the factors influencing trust intrusiveness, and behavioural responses in immersive retail environments.

2.1 Methodology

Semi-structured interview was conducted with 20 participants (Table 1). The participants had prior experience of using AR- based retail applications such as virtual try-ons and interactive shopping platforms like Nykka, Amazon, Lenskart etc. Purposive sampling technique was employed to ensure that the selected participants had experience of AR- based retail shopping. The interviews with each participant lasted for approximately 25-30 minutes. The interviews were transcribed after obtaining informed consent and the participants were assured that the information would be used strictly for research purposes.

TABLE 1
Demographic Profile of Respondents

	Qualitative (N=20)		Quantitative (N=)	
Variables	N	%age	N	%age
Gender				
Male	9	45	208	46.22
Female	11	55	242	53.78
Occupation				
Employed	9	45	190	42.22

Business	4	20	128	28.44
Student	3	15	103	22.88
Others	4	20	29	6.46
Age				
21-25	4	20	42	9.33
25-30	8	40	113	25.11
30-35	2	10	169	37.56
35-40	3	15	87	19.33
40 Above	3	15	39	8.67

2.2 Data Collection

The transcribed interviews were thematically analysed using the approach employed by Braun and Clarke (2006). The first author manually coded the responses after conducting thorough reading. Second author coded all responses using NVIVO 11. The recurring themes were then identified. To ensure that the themes identified are credible, the results were then peer reviewed by an expert.

2.3 Data Analysis

The qualitative findings revealed a complex interplay between perceived benefits and concerns associated with AR personalization. Many participants described AR as “*helpful*”, “*convenient*” and “*engaging*”. One of participants expressed that “*When I try glasses virtually, it actually helps me decide faster because it feels like it’s made for me.*” Another participant sharing his experience stated, “*The recommendations feel more relevant.*” These responses indicate that personalization enhances perceived value and convenience.

During the interview, when the participants were questioned about any concerns if they had while using the AR- based application for the first time, or any discomfort they experienced which made reluctant in trying virtual try-on, respondents responded saying “*I am OK with personalization, but when it starts tracking too much, I feel uncomfortable.*” Another respondent mentioned “*The policies of data sharing are not easily tracked on app interface, and I really don’t know what data is stored and where it is stored.*” These statements clearly indicate that users can feel intrusive while using AR applications.

Transparency was another recurrent theme identified during the interactions. One participant mentioned that, “*Most of these apps don’t explain anything..... that makes me question whether I should trust them or not.*” Thus, an increased skepticism and hesitation along with decreased trust was noticed in responses where transparency was missing.

Importantly, it was observed positive outcomes due to personalization are contingent upon the perceived ethicality of the systems. When participant perceives an application to be ethical and transparent, the trust and engagement is enhanced. Whereas if the personalization is felt to be invasive, the negative reactions are intensified. Overall, the qualitative findings observed the dual nature of AR personalization and highlighted the role of ethical AI perceptions in shaping consumer responses.

Based on these insights the constructs were finalized, and the conceptual model was developed.

3. Theoretical Background and Literature Review

This study integrates insights from consumer behaviour and technology adoption literature to examine AR personalization outcomes.

3.1 S-O-R Theory

The Stimulus–Organism–Response (SOR) Framework provides a robust theoretical lens to understand consumer behaviour in technology-mediated environments (Mehrabian & Russell, 1974). The relationships between inputs (stimulus), processes (organism), and outputs (reaction) have been extensively studied using the SOR theory. In the context of AR retail, personalization acts as a stimulus that shapes consumers' internal evaluations, such as trust and perceived intrusiveness. Purchase intention is one of the behavioural consequences that are determined by these internal states. Previous research has examined online and immersive encounters using the SOR paradigm, emphasising the function of affective and cognitive mediators (Eroglu et al., 2001; Chen, 2023). This theory is extended in the current study, which views AR personalisation as a stimulus that affects consumer responses by impacting both positive (trust) and negative (intrusiveness) organismic states. Building on recent developments in immersive technology, new research indicates that AR-based settings increase cognitive processing and sensory engagement, which amplifies both positive and negative psychological reactions (Hilken et al., 2017; Javornik, 2016). Additionally, it has been demonstrated that personalisation in digital settings causes a "privacy–personalization paradox," in which heightened privacy concerns coexist with increasing relevance (Aguirre et al., 2015). Accordingly, integrating both trust-enhancing and intrusiveness-inducing mechanisms within the SOR framework allows for a more nuanced understanding of consumer decision-making in AR retail contexts, particularly under conditions of data-driven personalization.

3.2 Privacy Calculus Theory

According to the Privacy Calculus Theory, customers weigh perceived risks and advantages when determining whether to provide personal information (Culnan & Armstrong, 1999; Dinev & Hart, 2006). Personalisation increases perceived benefits in augmented reality environments by improving relevance, convenience, and decision efficiency, but it also increases perceived hazards because it requires a lot of data collecting and processing. In order to ascertain whether the expected advantages surpass any potential privacy costs, users engage in a cognitive evaluation process. By lowering perceived uncertainty and boosting system trust, ethical AI beliefs may have an impact on this assessment. According to earlier studies, fairness and transparency in data practices can reduce privacy concerns and change the balance in favour of technology adoption (Martin & Murphy, 2017; Xu et al., 2011).

Additionally, recent research indicates that customers' willingness to divulge personal information depends on contextual cues like perceived control and institutional confidence in addition to logical cost-benefit analysis (Pavlou, 2011). The significance of ethical AI in influencing perceptions of control and accountability becomes especially prominent in immersive AR situations, where data collection is frequently ongoing and less obvious. Users are more likely to view personalisation as helpful rather than invasive when they believe AI systems are accountable and transparent. On the other hand, uncertainty about how data is used could increase perceived dangers, upsetting the privacy calculation and causing resistance to adopting new technologies. The current work expands Privacy Calculus Theory to better explain consumer decision-making in data-intensive, immersive retail environments by integrating ethical AI as a contextual moderator.

3.3 AR Personalization and Perceived Intrusiveness

Existing research indicates that personalization can enhance user experience but may also lead to perceptions of intrusiveness, particularly when it involves sensitive data. In digital retail, augmented reality (AR) personalisation has become a game-changing tool that allows businesses to provide highly customised and context-specific experiences (Alhelaly et al., 2025). AR apps can offer personalised product recommendations and virtual try-on features that improve decision-making effectiveness and experiential value by utilising user data like preferences, location, and physical characteristics (Javornik, 2016; Hilken et al., 2017; Dai et al., 2024). But the same mechanisms that make personalisation possible also give rise to worries about perceived intrusiveness, especially when customers feel that their personal boundaries are being crossed.

According to Li et al. (2002), perceived intrusiveness is defined as the degree to which marketing strategies are viewed as excessive, intrusive, or interruptive when obtaining personal data. When users believe that the system gathers and uses sensitive data—like facial recognition inputs or behavioural tracking—without enough transparency or control, intrusiveness occurs in the context of AR personalisation (Awad & Krishnan, 2006; Huang & Zhou, 2019). In immersive settings, where interactions are ongoing and intricately woven into users' sensory experiences, this sense is further enhanced. In AR contexts, personalization often requires access to biometric and behavioural data, increasing perceived invasiveness. Furthermore, according to White et al. (2008), the personalization-privacy conundrum implies that the advantages of customised experiences coexist with worries about excessive data consumption, causing discomfort and reluctance. Customers' negative emotive reactions are likely to increase perceived intrusiveness when they believe that personalisation goes beyond acceptable bounds (Feng & Xie, 2019; Sambyal, 2025). Therefore:

H1: AR personalization positively influences perceived intrusiveness.

3.4 AR Personalization and Trust

Technology adoption and online shopping behaviour are significantly influenced by trust, which is defined as a consumer's propensity to rely on a system or company in unknown circumstances (Gefen et al., 2003). In digital environments, trust is often shaped by perceptions of reliability, competence, and integrity of the system. By increasing the accuracy and relevance of the information provided to users, augmented reality personalisation can boost trust and lessen uncertainty when making purchases (Komiak & Benbasat, 2006). Customers are more likely to see the system as trustworthy and reliable when they believe that recommendations closely match their needs (Bleier & Eisenbeiss, 2015; Enyejo et al., 2024). Online marketing research shows that customised content improves perceived value, which in turn builds customer connections and trust (Tam & Ho, 2006). This effect is further enhanced in AR situations by the technology's immersive and interactive features, which offer realistic product visualisation and experience assurance (Javornik, 2016; Sambyal, 2025). The personalization-privacy paradox suggests that consumers simultaneously value personalization and fear potential misuse of their personal data (Aguirre et al., 2015; Edrees, 2026). Therefore, transparency, control, and ethical handling of data become critical in ensuring that personalization leads to trust rather than scepticism. In AR environments, personalized interactions can reduce uncertainty and improve perceived usefulness, thereby fostering trust (Razzaq et al., 2025; Dwivedi et al., 2025). However, this relationship is contingent upon consumer perceptions of data usage. When personalization is perceived as beneficial and non-invasive, it enhances trust. Thus:

H2: AR personalization positively influences trust.

3.5 Perceived Intrusiveness and Purchase Intention (200 words)

Consumer reactions in digital and technology-mediated contexts are known to be significantly influenced by perceived intrusiveness. It describes the degree to which marketing strategies are perceived as intrusive, disrupting, or infringing upon personal space (Li et al., 2002; Edwards et al., 2002). The ongoing and frequently implicit collection of user data, including behavioural patterns and biometric inputs, makes intrusiveness especially noticeable in interactive situations like augmented reality (AR). Online advertising research shows that invasive marketing strategies disrupt customers' mental processes and cause annoyance, which results in avoidance behaviours and decreased purchase intention (Edwards et al., 2002; Baek & Morimoto, 2012; Anisah & Miswanto, 2021). In a similar vein, it has been demonstrated that over-personalization causes psychological reactance, in which customers reject attempts at persuasion that they believe to be manipulative or unduly dominating (White et al., 2008; Cheoux-Damas & Le Floch, 2014). People are more likely to feel uneasy and sceptical of the service provider when they believe their privacy has been violated, which ultimately reduces their desire to make a purchase (Aguirre et al., 2015; Martin & Murphy, 2017; Feng & Xie, 2019). Because interactions in AR environments are more intimate and immersive, users may be more sensitive to perceived privacy violations. Furthermore, according to the privacy calculus approach, customers are less inclined to engage in positive behaviours like making purchases

when perceived risks exceed perceived rewards (Dinev & Hart, 2006; Xu et al., 2011). Perceived intrusiveness and purchase intention are regularly found to be negatively correlated in e-commerce and mobile marketing scenarios (Baek & Morimoto, 2012; Li et al., 2002; Xu & Ling, 2025). The literature generally agrees that perceived intrusiveness reduces trust and elicits negative emotional reactions, which hinders customer involvement. Managing intrusiveness becomes crucial to maintaining customer acceptance and purchasing behaviour in the setting of augmented reality retail, where personalisation and data collecting are crucial. Therefore:

H3: Perceived intrusiveness negatively influences purchase intention.

3.6 Trust and Purchase Intention

Based on expectations of dependability, honesty, and skill, trust represents a customer's readiness to depend on a company, platform, or technology (Gefen et al., 2003; McKnight et al., 2002; Ganguly et al., 2009). Because there is no in-person connection and a greater reliance on information supplied by the system, trust becomes even more important in online and immersive retail situations like augmented reality (AR). Customers are more likely to perceive lesser risk and greater confidence in transaction outcomes when they trust a platform or merchant, which favourably affects their desire to buy (Pavlou, 2003; Kim et al., 2008). Trust promotes positive behavioural responses by lowering perceived ambiguity about data privacy, payment security, and product quality. By improving product visualisation and experiential assurance, augmented reality technologies have the ability to increase both types of trust through immersive and interactive encounters (Van der Heijden et al., 2003; Javornik, 2016). Customers are far more ready to deal online and are less resistant to adopting new technologies when they have higher levels of trust (Gefen et al., 2003; Kim et al., 2008; Diwanji, 2026). Lack of trust, on the other hand, causes doubt, scepticism, and eventually decreased purchase intention. Furthermore, trust acts as a mediator between system attributes and behavioural consequences in data-driven environments where AI and personalisation are common. Customers are more likely to build trust when they believe a system manages their data ethically and openly, which increases their propensity to make a purchase (Din et al., 2018; Wang et al., 2022). Hence:

H4: Trust positively influences purchase intention.

3.7 Mediating Effects

The level of customisation in augmented reality settings heightens concerns about the privacy dilemma. Unlike traditional online platforms, augmented reality applications often require real-time data inputs, like location mapping and biometric data, which could make users feel more exposed. Thus, perceived intrusiveness becomes a key mediator influencing user attitudes and behavioural intentions. Higher levels of perceived intrusiveness appear to have a negative impact on trust, contentment, and purchase intention in digital environments, according to empirical data (Baek & Morimoto, 2012; Jeličić et al., 2024).

Additionally, previous research suggests that intrusive personalisation techniques may cause psychological reactance, which could cause users to reject or steer clear of technology-mediated interactions (White et al., 2008; Edwards et al., 2002). Additionally, studies indicate that increased perceptions of surveillance and a lack of control over personal data exacerbate discomfort and lower user engagement (Malhotra et al., 2004; Xu et al., 2011; Aguirre et al., 2015). As a result, when users feel that augmented reality personalisation is excessively intrusive, it not only erodes their trust but also affects their overall assessment of the experience, which ultimately lowers their intention to stick with the technology or make purchases.

Previous studies indicate that psychological mechanisms like perceived risk and trust impact consumer reactions to personalisation. Personalisation affects internal assessments in AR contexts, which in turn affect behavioural results. While trust is a good road, perceived intrusiveness is a negative pathway through which personalisation may lower purchase intention (Pal et al., 2022). Consequently:

H5: *Perceived intrusiveness mediates the relationship between AR personalization and purchase intention.*

H6: *Trust mediates the relationship between AR personalization and purchase intention.*

4. Quantitative Study- Research Methodology

4.1 Research Design

A quantitative survey was conducted using purposive sampling targeting urban digitally active consumers with prior experience using AR-based retail applications. A sample size of 450 respondents was obtained (Table 1). The number ensures statistical power and is considered adequate for applying SEM. The structured questionnaire based on standardized likert scales was used.

4.2 Measures

Based on the qualitative study, constructs were finalized and standardized scales were adapted as per the need of the study. AR personalization scale was adapted from (Hu & Lee, 2026), scale for perceived intrusiveness from (Smink et al., 2020), trust from (Hu & Lee, 2026) and purchase intention from (Smink et al., 2020).

TABLE 2
Convergent and Discriminant Validity

Construct	CR	AVE	CA (α)	MSV
AR Personalization	0.91	0.68	0.89	0.45
Perceived Intrusiveness	0.90	0.66	0.88	0.42
Trust	0.92	0.70	0.90	0.48
Purchase Intention	0.93	0.72	0.91	0.50

Item-wise Factor Loadings ranged between 0.72 to 0.89 which were all acceptable.

4.3 Common Method Biasness

Harman Single Factor was run on SPSS 23 to determine the common method biasness. The variance calculated was 40.65% which is less than 50% assuring that the data was free from bias. The VIF values of all constructs were less than 5 (Kock 2015).

4.4 Validation of Measurement Model

Using AMOS 24.0 model fit was ensured by examining reliability, convergent and discriminant validity. Data for quantitative study was collected from 450 respondents. χ^2/DF at 2.87 was found to be acceptable as per Byrne (2016). Additionally, the goodness-of-fit indices demonstrated satisfactory model fit meeting all the requirements (CFI= 0.951, NFI= 0.932, RMSEA= 0.048, and TLI= 0.944). Face and Content validity were established through a pilot study. The values of composite reliability (CR) and Cronbach Alpha (CA) for all constructs exceeded recommended thresholds of 0.70 and 0.80 respectively (Table 2) (Fornell and Larcker 1981; Nunnally 1978). Thus, internal consistency was ensured. All AVE values exceeded the threshold of 0.50, thus confirming the convergent validity. Square root of AVE of each construct was greater than inter-construct correlations, thus, ensuring discriminant validity (Table 3).

TABLE 3
Intercorrelation of Constructs

	AR-P	PRI	TR	PI
AR-P	0.82			

PRI	0.42	0.81		
TR	0.55	-0.48	0.84	
PI	0.50	-0.46	0.60	0.85

AR-P denotes Augmented Reality- Personalization, PRI for Perceived Intrusiveness, TR for Trust, PI for Purchase Intention

In addition to this, HTMT matrix values were also ascertained, which were found to be within 0.80 benchmark ensuring discriminant validity (Ab Hamid et al., 2017).

TABLE 4
HTMT Matrix

	AR-P	PRI	TR	PI
AR-P	--			
PRI	0.58	--		
TR	0.64	0.61	--	
PI	0.66	0.59	0.72	--

AR-P denotes Augmented Reality- Personalization, PRI for Perceived Intrusiveness, TR for Trust, PI for Purchase Intention

4.5 Structural Model

AMOS 24 was used to evaluate the structural model. The findings indicate that all hypothesized relationships are statistically significant thereby supporting the conceptual model (Table 5). AR Personalization exhibited a positive and significant effect on perceived intrusiveness ($\beta = 0.42$, $p < 0.001$), supporting H1. This suggests that higher levels of personalization in AR environments tend to increase consumers' perceptions on intrusiveness. At the same time, AR personalization demonstrates strong positive influence on trust ($\beta = 0.51$, $p < 0.001$), thereby supporting H2. This indicates that personalized AR experiences can enhance trust when perceived positively. Further perceived intrusiveness shows a negative impact on purchase intention ($\beta = -0.38$, $p < 0.001$), supporting H3. This finding implies that feeling of intrusion reduce consumers' likelihood of engaging in purchase behaviour. In contrast, trust exerts a strong positive effect on purchase intention ($\beta = 0.56$, $p < 0.001$), thereby supporting H4, indicating that trust plays a critical role in driving favourable behavioural outcomes.

Overall, the structural model demonstrates that AR personalization simultaneously triggers both positive (trust) and negative (intrusiveness) psychological responses, which in turn influence purchase intention. All direct paths are statistically significant, confirming robustness of the proposed relationships.

TABLE 5
Assessment of Structural Model

Path	Standardized Path Coefficients (β)	95% confidence level	
		Upper Control Limit	Lower Control Limit
Total Effects	0.28*	0.36	0.20
AR-P $\rightarrow$ PI			
Direct Effects	0.42*	0.49	0.35

AR-P → PRI			
AR-P → TR	0.51*	0.58	0.44
PRI → PI	-0.38*	-0.30	-0.45
TR→PI	0.56*	0.63	0.49
<i>Indirect Effects</i>			
AR-P→PRI→PI	-0.16*	-0.10	-0.22
AR-P→TR→PI	0.29*	0.36	0.22

*denotes p -value<0.001. AR-P denotes Augmented Reality- Personalization, PRI for Perceived Intrusiveness, TR for Trust, PI for Purchase Intention

4.6 Mediation Analysis

The mediation analysis was conducted as per the recommendations of (Hayes, 2018), bootstrapping the sample at 95% confidence level so as to eliminate the potential bias. The mediation analysis revealed that both perceived intrusiveness and trust significantly mediate the relationship between AR personalization and purchase intention. The indirect effect through trust is positive and stronger, while the indirect effect through perceived intrusiveness is negative. This indicates a dual path mechanism, confirming partial mediation and supporting the hypothesized model.

5. Discussion

The present study advances understanding of consumer responses to AI driven personalization within augmented reality (AR) environments by uncovering the dual psychological mechanisms through which personalization shapes behavioural outcomes. The findings demonstrate that AR personalization simultaneously produces beneficial and adverse effects, reinforcing the notion of a “personalization paradox” in immersive digital contexts. Specifically, personalization enhances trust while also increasing perceptions of intrusiveness, both of which significantly influence purchase intention.

The positive association between AR personalization and trust aligns with prior research suggesting that personalized experiences reduce uncertainty and improve decision-making efficiency (Bleier & Eisenbeiss, 2015). In immersive AR settings, this effect appears to be amplified due to the heightened sense of realism and interactivity, which strengthens consumers’ confidence in the system. This finding extends existing marketing literature by demonstrating that personalization remains critical driver of trust even in technologically advanced, immersive environments.

At the same time, the results reveal that AR personalization significantly increases perceived intrusiveness. This is consistent with earlier studies indicating that personalization can trigger privacy concerns when it relies on sensitive or excessive data collection (White et al., 2008; Edwards et al., 2002). In AR contexts, the use of biometric and spatial data (e.g. facial recognition, body mapping) appears to intensify such concerns, making consumers more aware of surveillance. This supports the argument that immersive technologies may magnify the perceived risks associated with data driven personalization.

Importantly, the study confirms that perceived intrusiveness negatively affects purchase intention, whereas trust exerts a strong positive influence. These findings are consistent with prior research highlighting trust as a key enabler of technology adoption and consumer engagement (Gefen et al., 2003), while intrusiveness acts as a deterrent to favourable behavioural outcomes (Li et al., 2002). The coexistent of these opposing pathways underscores the complexity of consumer decision-making in AI-enabled environments.

Furthermore, the mediation analysis reveals that both trust and perceived intrusiveness serve as

significant intervening mechanisms linking personalization to purchase intention. While trust emerges as the stronger pathway, the negative indirect effect through intrusiveness cannot be overlooked. This dual mediation provides empirical support for Privacy Calculus Theory, which posits that consumers evaluate the trade-off between perceived benefits and risks when engaging with digital technologies (Dinev & Hart, 2006). The findings suggest that AR personalization enhances perceived benefits while simultaneously elevating perceived risks, thereby influencing consumer behaviour through competing psychological processes.

Overall, the study highlights that the effectiveness of AR personalization is not unconditional. Instead, it depends on how consumers interpret and evaluate the underlying data practices. By demonstrating both positive and negative pathways, the findings contribute to a more balanced understanding of AI-driven personalization and emphasize the need for responsible and consumer-centric design in AR retail environments.

6. Theoretical and Managerial Implications

There are significant theoretical and managerial ramifications to the study's results. Theoretically, by simultaneously considering both enabling and inhibiting psychological mechanisms, the integration of Privacy Calculus Theory with the Stimulus–Organism–Response (SOR) framework offers a more thorough explanation of consumer behaviour in AR-enabled retail environments. By emphasising the paradoxical nature of personalisation, the identification of trust and perceived intrusiveness as dual mediators enhances the body of current work. Further, by highlighting that consumer reactions to personalisation are influenced by both functional advantages and hazards as well as ethical assessments of AI systems, the inclusion of perceived ethical AI as a border condition expands on previous studies. The study also adds to the emerging discourse on ethical and responsible AI by indirectly emphasizing the importance of consumer perceptions of data practices in shaping technology acceptance. Although ethical AI is not modelled as a direct construct in quantitative analysis, but the qualitative findings and overall framework highlight its implicit role in influencing trust and intrusiveness. This opens avenues for integrating ethical AI dimensions such as transparency, fairness and accountability in consumer behaviour models.

From a management standpoint, the study emphasises the need for technology developers and retailers to prioritise openness, fairness, and data responsibility over merely performance-oriented augmented reality designs. The degree of AR personalisation should be carefully calibrated by managers to prevent perceived intrusiveness from resulting from increased relevance. Transparent data practices and explainable AI features should be prioritised to boost customer confidence and lessen privacy worries. Giving users more control over personalisation and data sharing options might help reduce discomfort and perceptions of surveillance. To cultivate long-term client connections, businesses should also incorporate ethical AI principles—such as justice, accountability, and consent—into the design of AR systems. Organisations can improve purchase intention outcomes and user experience by striking a balance between ethical data governance and technological innovation. To prevent impressions of intrusiveness, businesses must carefully balance the degree of personalisation. At the same time, they must build trust through user control mechanisms, ethical AI practices, and transparent data usage policies. A strategy like this can boost customer confidence, encourage sustained involvement, and eventually improve purchase results.

7. Limitations and Future Research

The study is limited by its cross-sectional design and reliance on self-reported data. Future research can adopt longitudinal or experimental approaches and explore cross-cultural differences. Despite limitations, the study provides valuable insights into ethical AI and AR personalization. The current work can be expanded upon by future research by investigating a number of interesting avenues. First, since AR applications are becoming more and more popular in a variety of industrial contexts, including healthcare, tourism, and education, the findings' generalisability might be examined. Second, long-term research could shed more light on how consumers' opinions of intrusiveness and trust change when they are repeatedly exposed to augmented reality systems. Third, cross-cultural

studies would be helpful in comprehending how variations in technical readiness, regulatory settings, and privacy sensitivity affect the suggested linkages. In order to capture variation in customer responses, future research may also include additional moderating variables, such as individual characteristics (e.g., technology preparedness, privacy concerns, or innovativeness). Causal inferences could be further strengthened by experimental study designs that manipulate ethical transparency and personalisation levels.

8. Conclusion

By combining the Stimulus–Organism–Response (SOR) framework with Privacy Calculus Theory, the current study extends our knowledge of customer behaviour in augmented reality (AR)-enabled retail environments. It demonstrates AR personalisation as a crucial stimulus that simultaneously elicits psychological reactions that are both good (trust) and negative (perceived intrusiveness). Customers' buying intents are greatly influenced by these organismic states, which validates the dual-edged character of personalisation in immersive technology.

Importantly, the study emphasises how customer assessments are influenced by perceived ethical AI. The detrimental impacts of intrusiveness are lessened, and confidence is increased when AI systems are seen as transparent, equitable, and accountable. On the other hand, a lack of ethical guarantees diminishes behavioural outcomes and increases privacy issues. Therefore, the results highlight the need for ethical issues in addition to technological sophistication to determine the efficacy of AR personalisation.

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SOCIAL COMMERCE AND CONSUMER BEHAVIOUR IN INDIA: A SYSTEMATIC REVIEW AND THEORETICAL FRAMEWORK LINKING TRUST, IMPULSE BUYING AND PURCHASE DECISIONS

Dr. Jatin Kumar Lamba¹

Abstract

Social commerce, the use of social media and social interaction to support buying and selling, has grown quickly in India, driven by cheap mobile data, vernacular content, influencer culture and reseller networks. Yet the scholarly evidence on how trust, impulse buying and purchase decisions relate to one another in the Indian setting is scattered across disciplines. This paper reviews the secondary literature using a transparent, PRISMA-informed protocol and integrates the findings into a theoretical framework. Drawing on the Stimulus–Organism–Response (S-O-R) model, trust theory and the theory of planned behaviour, the framework proposes that social cues (influencer endorsement, peer reviews, live interaction, group recommendations) operate as stimuli; that cognitive trust and affective trust, together with urge to buy, operate as the organism; and that purchase decisions operate as the response. Trust is positioned as a dual-role construct that can both enable and restrain impulsive purchasing, with context-specific moderators such as price sensitivity, cash-on-delivery availability, digital literacy and city tier. Seven testable propositions and a research agenda are offered.

Keywords: *social commerce, consumer behaviour, trust, impulse buying, purchase decision, India, S-O-R model*

1. Introduction

Online retail in India has moved beyond search-based shopping on marketplaces. A growing share of discovery and purchase now happens inside social environments: WhatsApp catalogues and groups, Instagram and Facebook shops, short-video and live-stream selling, and reseller apps that turn individuals into micro-entrepreneurs. Industry reports from consultancies and platform companies consistently describe social commerce as one of the fastest growing segments of Indian e-commerce, particularly among first-time online shoppers in smaller cities.

Academic work has followed, but it is fragmented. Studies on social commerce often examine trust or intention in isolation, while impulse-buying research frequently comes from retail or marketing journals that rarely engage with social commerce theory. Few papers connect trust, impulse buying and the final purchase decision in one model, and fewer still address India's distinctive conditions: low-trust offline-to-online transitions, cash-on-delivery habits, linguistic diversity, and strong community-based influence.

Research questions

1. How has the literature defined and examined social commerce and consumer behaviour, globally and in India?
2. What does the evidence say about trust, impulse buying and purchase decisions in social commerce?
3. How can these constructs be integrated into a coherent theoretical framework suited to the Indian market?

Contribution. The paper (a) synthesises dispersed secondary evidence, (b) identifies the dual role of trust in impulsive social purchasing, and (c) proposes a context-sensitive framework with propositions that future empirical work can test.

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2. Methodology

2.1 Design

The study is a systematic, secondary-data review. It follows the reporting logic of the PRISMA guidelines (Moher et al., 2009) and uses a qualitative thematic synthesis. No primary data were collected.

2.2 Inclusion and exclusion criteria

Included: studies addressing at least one of trust, impulsive buying or purchase decision in a social or social-media shopping setting; conceptual and empirical papers; Indian and comparable emerging-market samples. **Excluded:** studies on social media use without any buying outcome, opinion pieces without a method, and duplicates.

2.3 Limitations of the method

Restricting to English-language sources may omit regional research. Industry reports are used only for context because they are not peer reviewed and may reflect commercial interests.

3. Literature Review

3.1 Defining social commerce

Early definitions framed social commerce as e-commerce enriched by Web 2.0 features that let users interact, share and contribute (Kaplan & Haenlein, 2010; Liang & Turban, 2011). Stephen and Toubia (2010) showed that social networks among sellers can create economic value, while Hajli (2015) argued that social support, ratings, reviews and recommendations shape trust and buying intention. Later reviews organised the field into themes of user behaviour, business models, and platform design (Zhang & Benyoucef, 2016; Lin, Li & Wang, 2017).

For this paper, social commerce is defined as *commercial activity in which discovery, evaluation, persuasion or transaction is mediated by social interaction, user-generated content or social relationships on digital platforms*.

3.2 The Indian context

Four features distinguish India:

- **Mobile-first, price-sensitive users.** Many new shoppers come online through low-cost smartphones and data plans, and respond strongly to value deals.
- **Relationship-based buying.** Recommendations from family, neighbours and community groups carry weight. Reseller models convert these ties into sales channels.
- **Trust deficits and payment habits.** Concerns about fraud, counterfeit goods and returns keep cash-on-delivery and easy-return policies important.
- **Vernacular and video content.** Regional-language video, influencer content and live selling lower the literacy and language barriers of text-heavy sites.

3.3 Core constructs

Trust. Trust is commonly defined as willingness to be vulnerable based on expectations about another party's ability, benevolence and integrity (Mayer, Davis & Schoorman, 1995). In online shopping, trust reduces perceived risk and supports intention (Gefen, Karahanna & Straub, 2003). Social commerce adds trust in the seller, in the platform, and in peers or influencers. It is useful to separate *cognitive trust* (rational belief in competence and reliability) from *affective trust* (emotional comfort and rapport).

Impulse buying. Rook (1987) described impulse buying as a sudden, powerful and persistent urge to buy immediately, often with reduced regard for consequences. Beatty and Ferrell (1998) modelled its antecedents, including the urge to buy, browsing, mood and individual traits. Online, the trigger can be a limited-time deal, a live-stream countdown or a friend's post (Verhagen & van Dolen, 2011;

Parboteeah, Valacich & Wells, 2009).

Purchase decision. Classic models describe a sequence from need recognition to information search, evaluation, purchase and post-purchase assessment. Social commerce compresses and blends these stages: discovery, evaluation and checkout can occur in one feed.

3.4 Evolution of social commerce research

Research can be read in three broad phases. The first (about 2008 to 2012) was definitional, asking what distinguishes social commerce from conventional e-commerce and treating it as a product of Web 2.0 (Kaplan & Haenlein, 2010; Liang & Turban, 2011). The second (about 2012 to 2018) was behavioural, testing how social support, reviews and recommendations shape trust and intention (Hajli, 2015; Zhang & Benyoucef, 2016). The third (from about 2018) has turned to influencer, live-stream and short-video selling, where entertainment and parasocial attachment are as important as information (Xiang et al., 2016). Review articles by Zhang and Benyoucef (2016) and Lin, Li and Wang (2017) show that early work concentrated on adoption and intention, with comparatively little on impulsive or post-purchase behaviour. Figure 2 summarises this progression.

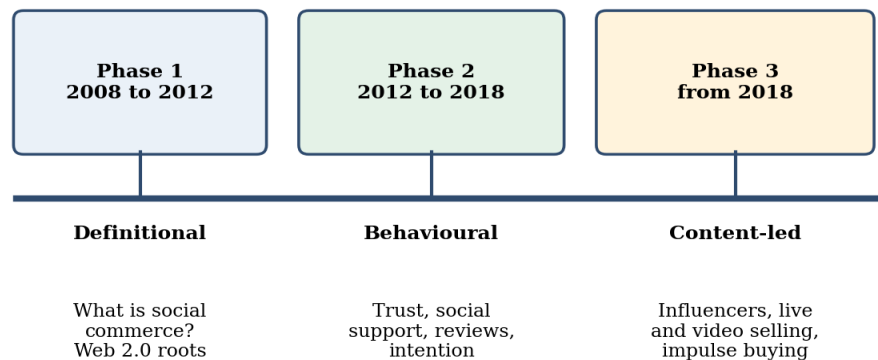


Figure 1. *Evolution of social commerce research*

3.5 Trust and purchase decisions in social commerce

The e-commerce trust literature established that trust lowers perceived risk and works alongside usefulness in predicting intention (Gefen, Karahanna & Straub, 2003). Social commerce research extends this by showing that trust can be transferred from peers and communities to sellers. Hajli (2015) reported that ratings, reviews, recommendations and social support strengthen trust and, through it, intention to buy. Stephen and Toubia (2010) demonstrated that connections among sellers on a social commerce platform generated measurable economic value, suggesting that network ties act as an implicit assurance mechanism. Taken together, these studies indicate that in settings with weak formal safeguards, relational signals substitute for institutional ones, a point that is especially relevant to India.

3.6 Impulse buying in online and social settings

Foundational work defined impulse buying by its spontaneity, emotional pull and reduced deliberation (Rook, 1987) and identified its drivers, including urge, mood, browsing and personality traits (Beatty & Ferrell, 1998). Online studies show that website cues can trigger an urge to buy: Parboteeah, Valacich and Wells (2009) distinguished task-relevant cues (such as clear information) from mood-relevant cues (such as visual appeal), and found that both influence the urge. Verhagen and van Dolen (2011) found that beliefs about an online store, such as the attractiveness of its merchandise, affected impulse buying through positive affect and urge. In social commerce specifically, Xiang et al. (2016) showed that parasocial interaction with a streamer or influencer, together with other platform features, encourages impulsive buying. These findings support treating urge to buy as the central mechanism linking social cues to unplanned purchase.

3.7 Research on social commerce in India

Indian scholarship on this topic has grown mainly through survey-based studies of social media marketing, influencer credibility, online trust and purchase intention, and through industry reports describing the rise of reseller and vernacular platforms. Common themes are that trust in the seller and peer recommendations strongly influence buying among first-time online shoppers, that payment and return safeguards matter, and that promotional events raise unplanned purchases. However, many studies rely on convenience samples from urban areas or university students, use cross-sectional designs and examine one construct at a time.

3.8 Summary of key studies

Table 1. Selected foundational and review studies informing the framework

Study	Context	Focus	Main contribution
Rook (1987)	Consumer research	Impulse buying	Defined the buying impulse as sudden, emotional and persistent
Beatty & Ferrell (1998)	Retail	Impulse buying precursors	Modelled urge, mood, browsing and traits as antecedents
Gefen et al. (2003)	Online shopping	Trust and TAM	Showed trust works with usefulness to shape intention
Parboteeah et al. (2009)	Online shopping	Website cues and urge	Task-relevant and mood-relevant cues raise the urge to buy
Stephen & Toubia (2010)	Social commerce platform	Seller networks	Social links among sellers created economic value
Verhagen & van Dolen (2011)	Online shopping	Store beliefs	Beliefs act on impulse buying through affect and urge
Hajli (2015)	Social commerce	Trust and intention	Social support, reviews and recommendations build trust
Xiang et al. (2016)	Social commerce	Parasocial interaction	Parasocial bonds encourage impulsive buying
Zhang & Benyoucef (2016)	Literature review	Consumer behaviour	Organised the field and identified research gaps
Lin et al. (2017)	Literature review	Definitions and themes	Mapped research themes and trends in social commerce

4. Thematic Synthesis and Research Gaps

4.1 Theory use

Four theoretical lenses dominate. The **Stimulus–Organism–Response model** (Mehrabian & Russell, 1974) treats environmental cues as stimuli, internal states as the organism and behaviour as the response; it is the most common basis for impulse-buying studies in online settings. The **Technology Acceptance Model** (Davis, 1989) and its extensions explain adoption of shopping platforms. The **Theory of Planned Behaviour** (Ajzen, 1991) links attitudes, subjective norms and perceived control to intention, and fits the strong role of peer norms. **Social influence and social proof** principles (Cialdini, 2001) explain why reviews, counts of buyers and endorsements change behaviour.

4.2 Trust in social commerce

Across settings, studies find that trust is built through peer reviews and ratings, social support, seller

responsiveness, platform assurances and the perceived authenticity of endorsers (Hajli, 2015; Zhang & Benyoucef, 2016). In Indian discussions, trust is more fragile for new, unbranded sellers on messaging apps, where there is no formal dispute process. This is why visible social proof, video demonstration, cash-on-delivery and return policies repeatedly emerge as substitutes for institutional assurance.

4.3 Impulse buying in social settings

Research on social platforms points to several stimulus categories: price promotions and scarcity, entertaining or highly visual content, real-time interaction in live streams, and parasocial attachment to influencers (Xiang et al., 2016). Hedonic motivation and positive affect heighten the urge to buy, while self-control and financial constraints dampen it (Beatty & Ferrell, 1998). In India, festival seasons and flash sales are likely to amplify these effects, and low-priced items lower the perceived cost of a mistake.

4.4 Trust and impulse buying: a contested relationship

The literature offers two partly opposing views:

- **Trust as enabler.** When consumers trust the seller or influencer, perceived risk falls and an urge converts to action quickly. Without trust the urge may be felt but suppressed.
- **Trust as restraint.** Higher trust may increase deliberate, comparison-based buying and reduce the emotional intensity associated with impulsiveness.

This tension suggests that trust is better treated as a conditional and multi-dimensional variable than as a single positive driver, which motivates the framework below. Figure 2 illustrates the two competing views.

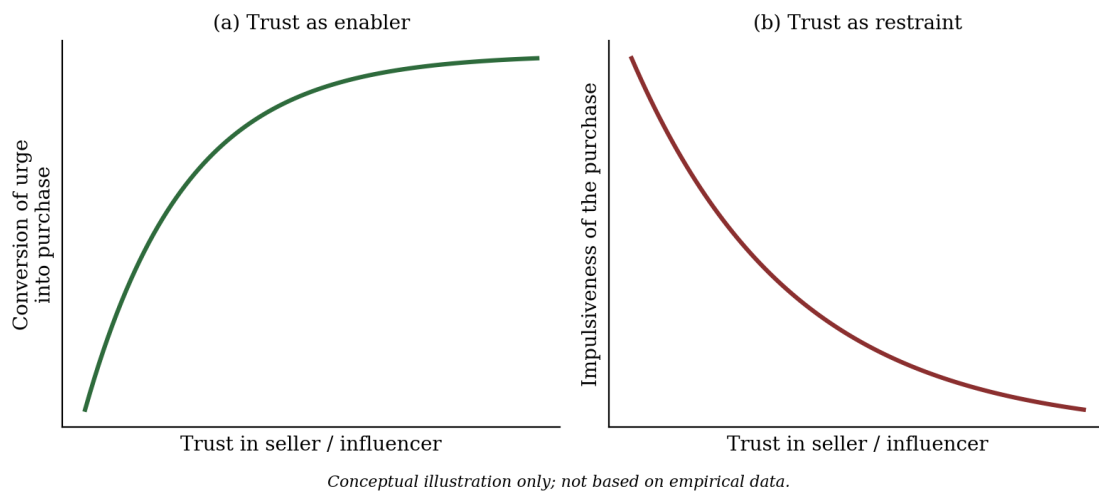


Figure 2. *Competing views of trust in impulsive social purchasing (conceptual)*

4.5 From urge to purchase decision

Most studies treat purchase intention or behaviour as the outcome. The evidence suggests that intention is shaped by trust and perceived usefulness, while unplanned purchase is shaped by urge, affect and situational triggers. Post-purchase outcomes such as regret, returns and repeat purchase are under-studied and are especially relevant where cash-on-delivery returns are common.

4.6 Gaps identified

- 1) Few integrated models connect trust, impulse buying and decisions together.
- 2) Indian evidence is dominated by cross-sectional surveys of students and urban users; tier-2/3 and rural consumers are under-represented.
- 3) Messaging-app commerce and reseller models receive little academic attention compared with Western-style social network sites.
- 4) Post-purchase consequences, including regret and returns, are rarely examined.

- 5) Ethical issues such as undisclosed sponsorship and dark patterns are discussed more in policy than in behavioural research.

5. Theoretical Framework and Propositions

5.1 Framework overview

The framework extends the S-O-R model and is shown in Figure 3.

Stimulus (social commerce cues): influencer endorsement, peer reviews and ratings, live interaction, group or community recommendations, time-limited offers.

Organism (internal states): cognitive trust, affective trust, perceived risk, and urge to buy (emotional arousal).

Response: impulsive purchase, planned purchase, and post-purchase outcomes (satisfaction, regret, repeat intention).

Moderators: price sensitivity, trait impulsiveness and self-control, digital literacy, availability of cash-on-delivery and returns, and city tier.

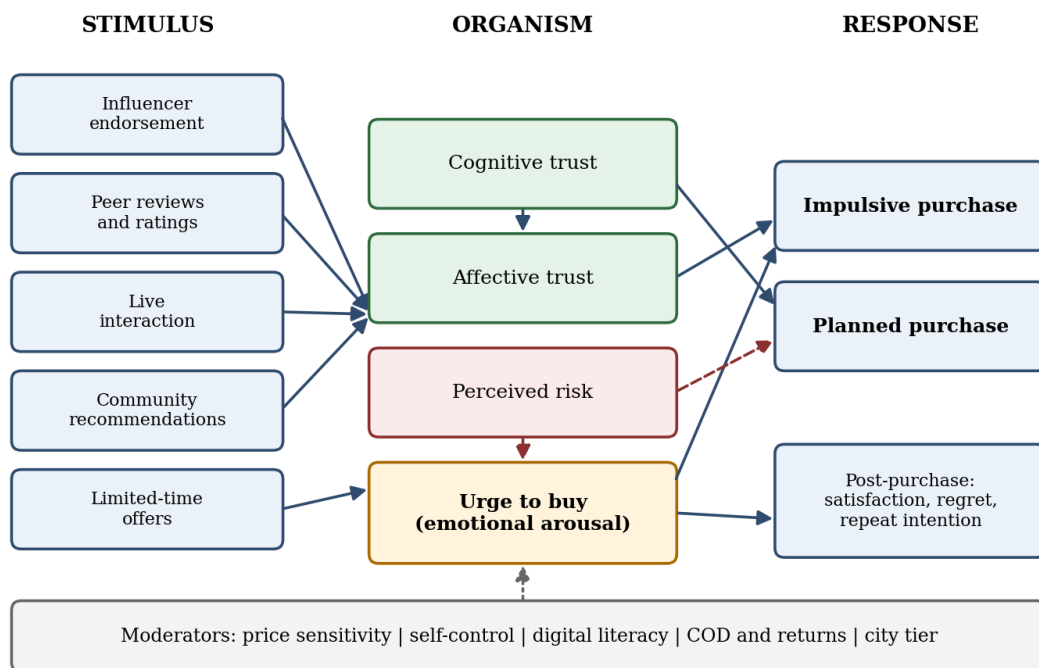


Figure 3. Proposed S-O-R framework linking social cues, trust, urge to buy and purchase decisions

5.2 Propositions

- **P1.** Social cues (reviews, endorsements, live interaction) increase both cognitive and affective trust.
- **P2.** Affective trust has a stronger positive effect on urge to buy than cognitive trust.
- **P3.** Cognitive trust reduces perceived risk and strengthens the link between urge and actual purchase; without it, urge is more likely to be suppressed.
- **P4.** Limited-time offers and live interaction directly increase urge to buy, independent of trust.
- **P5.** Trait impulsiveness strengthens, and self-control weakens, the effect of urge on impulsive purchase.
- **P6.** Availability of cash-on-delivery and easy returns strengthens the effect of urge on impulsive purchase, but also raises the likelihood of returns and post-purchase regret.
- **P7.** The trust–impulse relationship differs by city tier and digital literacy: where institutional assurance is weak, peer-based trust has a larger effect on purchase decisions.

5.3 Theoretical contribution

The framework (i) distinguishes two forms of trust and assigns them different roles, (ii) places urge

to buy as the pivotal organismic state between social cues and behaviour, and (iii) adds India-relevant moderators that standard Western models omit.

6. Discussion

6.1 Implications for practitioners

- **Sellers and platforms** should invest in verifiable trust signals such as authentic reviews, clear return policies and transparent seller identity, since these support both planned and impulsive buying sustainably.
- **Influencer-led selling** should be disclosed clearly. Short-term conversions from undisclosed promotion risk longer-term loss of affective trust.
- **Regional-language and video content** should be used to reach first-time users, with support for grievance handling on messaging platforms.
- **Responsible design** should avoid manipulative urgency that raises returns and regret.

6.2 Implications for policy

Consumer-protection norms for e-commerce, influencer advertising disclosure and data protection are evolving in India. Evidence on impulsive purchasing and regret can inform guidelines on misleading urgency cues, return handling and seller accountability on social platforms.

6.3 Implications for research

The propositions can be tested through survey-based structural equation modelling, experiments manipulating social cues and urgency, and analysis of platform behavioural data. Mixed-method designs and samples from smaller cities would address the main gaps identified.

7. Limitations and Future Research

As a secondary-data review, the study depends on the quality and coverage of published work. The framework is conceptual and has not been empirically validated. Future research should (a) validate the model with Indian samples across tiers and age groups, (b) compare platform types (messaging apps, video platforms, reseller apps), (c) study longitudinal outcomes such as regret and loyalty, and (d) examine ethical and regulatory aspects of influencer and live commerce.

8. Conclusion

Social commerce in India blends relationship-based buying with digital reach, creating conditions in which trust and impulse can both rise at once. Rather than treating trust as a uniformly positive driver, the proposed framework shows that it operates through cognitive and affective routes, interacts with urge to buy, and is conditioned by price sensitivity, self-control and the availability of payment and return safeguards. By integrating these elements, the paper offers a basis for empirical testing and for more responsible practice in India's rapidly growing social commerce ecosystem.

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METaverse MARKETING AND BRAND ENGAGEMENT: EXPLORING CONSUMER INTERACTIONS IN VIRTUAL ENVIRONMENTS

Dr. Manisha Kaushal Arora¹

Abstract

The rapid development of immersive digital environments has created new possibilities for firms to design brand experiences that extend beyond conventional websites and social media. This paper develops an integrated framework explaining how Virtual Brand Experience, Interactivity, Immersion, and Social Presence may stimulate Brand Engagement and subsequently influence Brand Loyalty and Purchase Intention in metaverse environments. The framework combines the Technology Acceptance Model (TAM), Uses and Gratifications Theory (UGT), and Social Presence Theory to explain technology-related perceptions, motivational benefits, and interpersonal experience. A structured literature review identifies an emerging body of research showing that interactivity, immersive experience, social presence, and engagement can shape consumer responses in virtual and metaverse settings. The paper proposes eight hypotheses and a quantitative research design suitable for structural equation modeling. A questionnaire is developed using multiple Likert-scale items for each construct. To avoid fabrication, the statistical results presented in this manuscript are explicitly hypothetical and illustrative rather than empirical findings from a real sample. The illustrative analysis demonstrates how reliability, convergent validity, discriminant validity, correlation, regression/SEM, and hypothesis-testing results could be reported after actual data collection. The paper contributes an integrated conceptual pathway from virtual experience characteristics to engagement, loyalty, and purchase intention and offers managerial guidance for brands seeking to develop credible, interactive, socially meaningful, and commercially effective metaverse experiences.

Keywords: Metaverse Marketing; Virtual Brand Experience; Interactivity; Immersion; Social Presence; Brand Engagement; Brand Loyalty; Purchase Intention

1. Introduction

Digital marketing has progressively moved from static communication toward interactive, participatory, and experience-oriented environments. The emergence of the metaverse represents another step in this transition because it brings together virtual environments, avatars, social interaction, immersive interfaces, digital assets, real-time communication, and commercial activities. Rather than treating consumers merely as recipients of marketing messages, metaverse environments can position them as participants who explore spaces, interact with products, communicate with other users, customize avatars, attend events, and co-create experiences with brands. Recent conceptual work characterizes the metaverse as a set of interconnected and evolving virtual experiences rather than a single technological platform (Barrera & Shah, 2023; Dwivedi et al., 2023).

The marketing significance of this development lies in the quality of the consumer experience. In conventional digital advertising, consumers may encounter a brand through images, text, video, reviews, and clickable interfaces. In immersive environments, however, the consumer may experience the brand through spatial exploration, embodied interaction, social encounters, virtual product trials, games, events, and personalized digital objects. This shift makes constructs such as immersion, interactivity, virtual experience, and social presence particularly important. Research on virtual reality marketing shows that immersive and interactive encounters can support customer engagement and advocacy, while branded VR environments can evoke emotional responses that influence brand-related outcomes (de Regt et al., 2021; van Berlo et al., 2021).

The commercial relevance of metaverse experiences is also reflected in recent empirical studies. Payal et al. (2024), for example, examined Nikeland in Roblox and reported that interactivity contributed to brand trust, knowledge, and attachment, which were linked with active brand engagement and purchase intention. Jang and Kim (2026) further examined social interaction and brand engagement

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in metaverse brand stores and found that social interaction and engagement can influence satisfaction and purchase intention, with enjoyment playing a mediating role. These studies indicate that metaverse marketing is not simply an extension of digital advertising; it can operate through experience, participation, sociality, and affective mechanisms.

At the same time, the academic literature remains fragmented. Some studies emphasize technological characteristics such as interactivity and telepresence; others focus on social presence, attachment, enjoyment, brand engagement, NFTs, or purchase intention. Reviews also indicate that metaverse consumer research is still developing and that researchers need clearer integration of theories, constructs, contexts, and methods. The present paper responds to this need by integrating four experience-related antecedents—Virtual Brand Experience, Interactivity, Immersion, and Social Presence—with three consumer outcomes—Brand Engagement, Brand Loyalty, and Purchase Intention.

The study is designed as a conceptual and methodological paper rather than a report of completed primary research. This distinction is important. No real survey dataset is claimed, and no empirical findings are presented as observed facts. Instead, the paper provides a proposed questionnaire and a clearly labeled hypothetical statistical demonstration. Such a design allows researchers and postgraduate students to understand how the proposed model could be tested using covariance-based SEM or PLS-SEM after collecting valid data.

The paper makes three principal contributions. First, it synthesizes contemporary metaverse and immersive marketing literature around a coherent consumer-response pathway. Second, it combines TAM, UGT, and Social Presence Theory to explain why consumers may engage with brands in virtual environments. Third, it provides a complete empirical research blueprint—including constructs, questionnaire items, reliability and validity procedures, correlation and SEM reporting formats, and hypothesis testing—that can be used for a future field study.

2. Literature Review

Metaverse marketing and consumer experience

Metaverse marketing can be understood as the strategic use of persistent or immersive virtual environments to create brand encounters, facilitate social interaction, communicate value, and influence consumer attitudes and behaviors. Barrera and Shah (2023) reviewed a large body of metaverse literature and emphasized that the metaverse changes the interaction possibilities between consumers and firms. Dwivedi et al. (2023) similarly argued that metaverse marketing creates opportunities for novel forms of consumer interaction while also introducing important societal, ethical, and managerial challenges. Recent reviews suggest that metaverse consumer research encompasses identity, social interaction, virtual consumption, technology adoption, well-being, engagement, and purchase behavior (Yang & Chattopadhyay, 2025; ShabbirHusain & Kamath, 2026).

Virtual Brand Experience

Virtual Brand Experience refers to the consumer's holistic perception of interacting with a brand through a virtual environment. It encompasses sensory, cognitive, affective, and behavioral aspects of the encounter. In immersive marketing, consumers do not only receive information; they may explore, manipulate, personalize, communicate, and participate. de Regt et al. (2021) demonstrated the importance of narrative and social interaction in VR branded experiences. van Berlo et al. (2021) found that branded VR games can generate emotional responses and influence brand-related outcomes. These findings support the view that the quality of the experience is an important antecedent of brand engagement.

Interactivity

Interactivity concerns the extent to which a virtual environment permits reciprocal communication,

active control, responsiveness, and meaningful participation. Metaverse environments can offer richer forms of interactivity than traditional webpages because consumers may manipulate virtual objects, navigate three-dimensional spaces, communicate synchronously, and interact with avatars. Payal et al. (2024) specifically identified interactivity as a relevant mechanism connecting metaverse experiences with brand-related responses. Recent work also continues to show that interactivity is central to immersive retail engagement (Purohit & Arya, 2026).

Immersion

Immersion represents the degree to which users feel surrounded by and absorbed in a mediated environment. It is closely related to attention, presence, flow, and experiential intensity. VR and AR research suggests that immersive experiences can reduce psychological distance between consumers and products and may strengthen engagement and purchase-related responses. Gonçalves et al. (2023) examined immersive tendencies in VR e-commerce, while Pathak and Prakash (2023) linked immersive experience and flow with purchase-related processes in augmented reality shopping. More recent metaverse retail research continues to identify immersion as an important pathway toward engagement (Purohit & Arya, 2026).

Social Presence

Social Presence refers to the perceived sense that other people are psychologically present and socially accessible in a mediated environment. It is especially relevant to metaverse marketing because avatars, virtual communities, shared events, and synchronous interaction can create a perception of co-presence. Ghali et al. (2024) found that social presence and attachment were important in explaining revisit intentions in metaverse tourism. Mansoor et al. (2024) also identified social presence as an important element in customer experience and purchase spillovers from metaverse environments to real-world consumption. Automotive metaverse research has similarly reported a positive role of perceived social presence in purchase intention pathways (2025).

Brand Engagement

Brand engagement describes a consumer's cognitive, emotional, and behavioral investment in interactions with a brand. In virtual environments, engagement may include attention to the brand, enthusiasm, participation, exploration, communication, sharing, and co-creation. Payal et al. (2024) provide direct evidence that metaverse brand engagement can be connected with real-world purchase intentions. Jang and Kim (2026) show that brand engagement in metaverse stores can contribute to consumer outcomes through enjoyment. Lee et al. (2023) further demonstrate that branded NFTs can be used to build brand engagement and customer relationships.

Brand Loyalty

Brand loyalty is reflected in preference, commitment, repeat purchase tendencies, resistance to switching, and willingness to maintain a relationship with a brand. The metaverse may influence loyalty by creating repeated and personalized interactions rather than isolated transactions. When consumers invest time, identity, emotion, and social relationships in a branded virtual environment, the resulting relationship may extend beyond a single purchase. However, the strength and persistence of such loyalty require empirical testing because novelty may produce short-term engagement without producing enduring commitment.

Purchase Intention

Purchase intention refers to the consumer's stated likelihood or willingness to purchase a product or service. In metaverse settings, purchase intention can concern virtual goods, physical products, or products encountered in virtual environments that are later purchased through traditional channels. Payal et al. (2024) demonstrate the possibility of real-world purchase spillovers, while Mansoor et al. (2024) explicitly examine purchase spillovers from metaverse experiences. This makes purchase intention an important downstream outcome in metaverse marketing research.

3. Detailed Literature Review Table

Author(s)	Year	Study Context	Methodology	Key Findings	Research Gap
Barrera & Shah	2023	Metaverse marketing	Systematic review + expert content analysis	Organizing framework for metaverse marketing and research agenda	Limited integrated empirical model linking experience, engagement, loyalty and purchase
Dwivedi et al.	2023	Consumer/marketing implications of metaverse	Expert/conceptual synthesis	Identified transformative marketing opportunities and societal challenges	Need for stronger empirical testing of consumer mechanisms
de Regt, Plangger & Barnes	2021	VR branded experiences	5 focus groups + experiment	Narrative and social interaction can support customer engagement and advocacy	VR findings need extension to broader metaverse environments
van Berlo et al.	2021	Brands in VR games	Experimental study	VR branding can evoke emotion and influence brand responses	Need to connect experience variables to longer-term loyalty
Lee, Ho & Xie	2023	Branded NFTs in metaverse commerce	Text mining + SEM	BNFT attributes can promote brand attitude, commitment and engagement	Focus on NFTs leaves broader experiential drivers underexplored
Jafar, Ahmad & Sun	2023	Metaverse stores	Online survey + PLS-SEM	Metaverse aspects influence telepresence, product knowledge and purchase intentions	Brand engagement and loyalty not central
Gonçalves et al.	2023	VR e-commerce	Correlational study	Immersive tendencies relate to purchase intention and memory	Need for social and brand-specific variables
Pathak & Prakash	2023	AR shopping	Quantitative empirical study	Flow and immersive experience support purchase processes	AR context differs from persistent metaverse environments

Ghali, Rather & Khan	2024	Metaverse tourism	Two-study empirical design	Social presence and attachment support revisit intentions; engagement has moderating effects	Need to connect social presence directly to brand engagement and loyalty
Mansoor et al.	2024	Metaverse retail/customer experience	Empirical survey	Social presence and trialability contribute to experience and purchase spillovers	Need to integrate brand engagement as a central mechanism
Payal, Sharma & Dwivedi	2024	Nikeland/Roblox	Quantitative empirical study	Interactivity supports trust, knowledge, attachment, engagement and real-world purchase intention	Need broader multi-construct framework including loyalty
Kaur et al.	2024	Gen Z metaverse consumer behavior	63 semi-structured interviews	Identified awareness, information search, engagement and post-engagement evaluation	Qualitative findings require quantitative validation
Jang & Kim	2026	Metaverse brand stores	Two experimental studies	Social interaction and engagement affect satisfaction/purchase pathways, partly through enjoyment	Need to integrate immersion and social presence with loyalty
Purohit & Arya	2026	Metaverse retail	Two experiments	Innovativeness influences immersion/interactivity; engagement predicts purchase intention	Need integrated model covering experience antecedents and loyalty
Cho	2025	Digital luxury/NFTs	Survey of 519 metaverse users	NFT-related values and attitudes influence purchase-related responses	Luxury/NFT focus limits generalizability
Yang & Chattopadhyay	2025	Metaverse consumer behavior	Conceptual/research agenda	Highlights broad consumer behavior mechanisms and research opportunities	Need empirical models integrating multiple consumer outcomes
ShabbirHusain & Kamath	2026	Metaverse consumer behavior	Bibliometric and structured review	Maps major research clusters	Need focused empirical frameworks

				and identifies emerging themes	connecting marketing stimuli to behavioral outcomes
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4. Theoretical Foundation

4.1 Technology Acceptance Model (TAM)

TAM proposes that perceived usefulness and perceived ease of use shape attitudes and behavioral intentions toward technology (Davis, 1989). Although developed before the metaverse, its logic remains useful because consumers must perceive virtual environments as usable, valuable, and worthwhile. In the present model, TAM provides a foundation for understanding why technologically sophisticated experiences may not produce engagement unless consumers perceive them as accessible and useful. Interactivity can reduce uncertainty by giving consumers greater control, while an effective virtual brand experience can communicate functional and experiential value. TAM therefore supports the expectation that positive technology-mediated experiences will facilitate behavioral responses.

4.2 Uses and Gratifications Theory

Uses and Gratifications Theory views media users as active participants who select media to satisfy needs such as entertainment, information, social interaction, identity, escapism, and self-expression. This perspective is highly relevant to metaverse environments because consumers may enter virtual spaces for different purposes. A branded environment that satisfies hedonic, social, informational, and self-expressive needs is more likely to generate sustained participation. Recent metaverse brand-store research explicitly draws on UGT to explain social interaction, enjoyment, and purchase intentions (Jang & Kim, 2026). UGT therefore supports the relationship between the quality of the virtual brand experience and engagement.

4.3 Social Presence Theory

Social Presence Theory explains how communication media create perceptions of another person's presence and interpersonal connection. In metaverse settings, social presence can be intensified by avatars, spatial audio, shared environments, real-time interaction, and virtual communities. When consumers feel that other people are genuinely present, the environment may become more socially meaningful and engaging. Research on metaverse tourism and retailing provides evidence that social presence is related to attachment, experience, revisit intention, identification, and purchase behavior (Ghali et al., 2024; Mansoor et al., 2024). Social Presence Theory therefore supports H4 and provides a theoretical explanation for the central role of social interaction in brand engagement.

5. Research Gap

The literature reveals five important gaps. First, metaverse marketing research is dispersed across tourism, gaming, retail, luxury, NFTs, VR, AR, and technology adoption. Second, many studies emphasize one or two antecedents rather than comparing virtual experience, interactivity, immersion, and social presence within one framework. Third, engagement is frequently examined as an outcome or moderator, while its role as a central bridge between experience characteristics and longer-term consumer outcomes requires additional testing. Fourth, relatively fewer frameworks explicitly connect metaverse brand engagement with both brand loyalty and purchase intention. Fifth, the field remains methodologically young, creating a need for transparent measurement instruments and replicable quantitative models. The proposed study addresses these gaps by treating Brand Engagement as the central mechanism through which experience characteristics are expected to influence loyalty and purchase intention.

6. Research Objectives

RO1: To examine the influence of Virtual Brand Experience on Brand Engagement.

RO2: To examine the influence of Interactivity on Brand Engagement.

RO3: To assess the influence of Immersion on Brand Engagement.
 RO4: To determine the effect of Social Presence on Brand Engagement.
 RO5: To examine the effect of Brand Engagement on Brand Loyalty.
 RO6: To examine the effect of Brand Engagement on Purchase Intention.
 RO7: To assess the effect of Brand Loyalty on Purchase Intention.
 RO8: To provide an integrated conceptual and methodological framework for future empirical research in metaverse marketing.

7. Research Questions

RQ1: Does Virtual Brand Experience significantly influence Brand Engagement?
 RQ2: Do Interactivity, Immersion, and Social Presence significantly influence Brand Engagement?
 RQ3: Does Brand Engagement influence Brand Loyalty and Purchase Intention?
 RQ4: Does Brand Loyalty influence Purchase Intention?
 RQ5: Does Brand Engagement provide an explanatory pathway between metaverse experience characteristics and downstream consumer responses?

8. Hypotheses Development

Hypothesis	Proposed Relationship	Rationale
H1	Virtual Brand Experience positively influences Brand Engagement.	A richer and more meaningful virtual encounter should encourage consumers to invest cognitive, emotional, and behavioral resources in the brand.
H2	Interactivity positively influences Brand Engagement.	Reciprocal communication, active control, responsiveness, and participation increase the consumer's role from observer to participant.
H3	Immersion positively influences Brand Engagement.	Higher experiential absorption should increase attention, involvement, and perceived experiential value.
H4	Social Presence positively influences Brand Engagement.	Perceived co-presence and interpersonal connection should make brand environments more socially meaningful.
H5	Brand Engagement positively influences Brand Loyalty.	Repeated cognitive, affective, and behavioral investment should strengthen the consumer-brand relationship.
H6	Brand Engagement positively influences Purchase Intention.	Engaged consumers are more likely to evaluate, discuss, explore, and consider purchasing from the brand.
H7	Brand Loyalty positively influences Purchase Intention.	Loyalty reflects preference and commitment that should increase willingness to purchase.
H8	Brand Engagement mediates the relationship between metaverse experience antecedents (Virtual Brand Experience, Interactivity, Immersion, and Social Presence) and downstream behavioral outcomes.	Experience characteristics are expected to affect behavioral outcomes partly by first creating an engaged consumer-brand relationship.

9. Conceptual Framework

The proposed framework is: Virtual Brand Experience + Interactivity + Immersion + Social Presence → Brand Engagement → Brand Loyalty → Purchase Intention, with an additional direct path from Brand Engagement to Purchase Intention.

Antecedents	Mediator	Relational Outcome	Behavioral Outcome
Virtual Brand Experience Interactivity Immersion Social Presence	Brand Engagement	Brand Loyalty	Purchase Intention

10. Research Methodology

Research design. The proposed study follows a quantitative, cross-sectional design. Data would be collected from adult consumers who have used at least one immersive or metaverse-like virtual environment and have encountered a brand in that environment. A screening question should verify relevant experience before the main questionnaire is administered.

Population and sampling. The target population comprises consumers with experience of virtual worlds, metaverse platforms, VR/AR shopping environments, branded virtual events, virtual games, or avatar-based brand experiences. Purposive sampling is appropriate because respondents need direct experience of the phenomenon. A minimum sample of approximately 300 respondents would be suitable for the proposed model, while 400–500 respondents would provide stronger statistical stability and allow subgroup analysis.

Data collection. A structured online questionnaire can be distributed through academic networks, professional communities, social media, and consumer panels. Participation should be voluntary, informed consent should be obtained, and respondents should be allowed to withdraw. Duplicate, incomplete, extremely rapid, and patterned responses should be removed using transparent screening rules.

Measurement. All constructs should be measured reflectively using a five-point Likert scale from 1 = Strongly Disagree to 5 = Strongly Agree. Items should be adapted from established technology, experience, engagement, and behavioral-intention literature and then contextualized for metaverse brand encounters. A pilot test with approximately 30–50 respondents should assess wording, completion time, and preliminary reliability.

Data analysis. The proposed analysis sequence is descriptive statistics, common-method checks, measurement-model assessment, reliability, convergent validity, discriminant validity, correlation analysis, and structural-model testing. PLS-SEM may be selected where prediction and model development are primary goals; covariance-based SEM may be used where theory confirmation and model fit are emphasized. Bootstrapping should be used for indirect effects.

11. Questionnaire Development

Instruction: Please think of a recent experience in which you interacted with a brand in a metaverse, virtual world, VR/AR environment, virtual game, or avatar-based digital environment. Indicate your level of agreement with each statement. Scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

Virtual Brand Experience (VBE)

VBE1: The virtual environment provided a memorable experience with the brand.

VBE2: The brand experience in the virtual environment felt meaningful to me.

VBE3: The virtual environment allowed me to experience the brand in a distinctive way.

VBE4: Overall, my interaction with the brand in the virtual environment was enjoyable.

Interactivity (INT)

INT1: I could actively interact with the brand in the virtual environment.

INT2: The virtual environment responded effectively to my actions.

INT3: I could communicate or exchange information with the brand or other participants.

INT4: I felt that I had control over my interaction with the brand.

Immersion (IMM)

IMM1: I felt deeply absorbed in the virtual environment.

IMM2: The virtual environment captured my attention strongly.

IMM3: I felt as though I was part of the virtual experience.

IMM4: I became less aware of my physical surroundings while interacting with the brand.

Social Presence (SOP)

SOP1: I felt that other people were genuinely present in the virtual environment.

SOP2: Interacting with other users felt socially meaningful.

SOP3: I felt a sense of connection with people in the virtual environment.

SOP4: The environment created a strong feeling of being together with others.

Brand Engagement (BE)

BE1: I paid considerable attention to the brand during the virtual experience.

BE2: I felt enthusiastic about interacting with the brand.

BE3: I actively participated in activities involving the brand.

BE4: The experience made me want to learn more about the brand.

BE5: I enjoyed spending time interacting with the brand.

Brand Loyalty (BL)

BL1: I would prefer this brand over competing brands.

BL2: I would consider using this brand again.

BL3: I would continue my relationship with this brand.

BL4: I would recommend this brand to others.

Purchase Intention (PI)

PI1: I am likely to purchase from this brand.

PI2: I would consider buying products from this brand in the future.

PI3: The virtual experience increased my willingness to purchase from the brand.

PI4: I would seriously consider choosing this brand when making a relevant purchase.

12. Hypothetical Dataset Summary

IMPORTANT: The following statistics are illustrative only. They are not results from an actual survey and must not be represented as empirical findings in a submitted journal article. They demonstrate the expected format and magnitude of results for a future dataset.

Indicator	Illustrative Value
Sample size (N)	450
Valid responses	432
Female / Male / Other	46% / 52% / 2%
Age 18–24	58%
Age 25–34	29%
Age 35+	13%
Previous metaverse/VR/AR experience	100% screening criterion
Mean construct scores	3.71–4.02
Analysis software (proposed)	SmartPLS/AMOS + SPSS

13. Reliability Analysis (Hypothetical/Illustrative)

Reliability assesses internal consistency. Cronbach's alpha and composite reliability (CR) values above approximately .70 are commonly interpreted as acceptable for established constructs, subject to context. The following table is a hypothetical illustration.

Construct	Items	Cronbach's α	CR	Interpretation
Virtual Brand Experience	4	.89	.92	Acceptable
Interactivity	4	.87	.91	Acceptable
Immersion	4	.90	.93	Acceptable
Social Presence	4	.88	.92	Acceptable
Brand Engagement	5	.91	.94	Acceptable
Brand Loyalty	4	.89	.92	Acceptable
Purchase Intention	4	.92	.94	Acceptable

14. Validity Analysis (Hypothetical/Illustrative)

Convergent validity can be evaluated through standardized loadings, CR, and AVE. Discriminant validity can be assessed through HTMT and/or the Fornell–Larcker criterion. The values below are hypothetical and are included solely as a reporting template.

Construct	CR	AVE	HTMT Range	Status
Virtual Brand Experience	.92	.74	.42–.71	Supported
Interactivity	.91	.72	.48–.76	Supported
Immersion	.93	.77	.51–.79	Supported
Social Presence	.92	.74	.47–.73	Supported
Brand Engagement	.94	.75	.58–.82	Supported
Brand Loyalty	.92	.74	.61–.84	Supported
Purchase Intention	.94	.80	.63–.86	Supported

Illustrative Fornell–Larcker interpretation: the square root of each construct's AVE is assumed to exceed its correlations with other constructs. This should be recalculated from actual data before submission.

15. Correlation Matrix (Hypothetical/Illustrative)

	VBE	INT	IMM	SOP	BE	BL	PI
VBE	1.00	.61	.65	.58	.72	.56	.54
INT	.61	1.00	.63	.60	.74	.58	.60
IMM	.65	.63	1.00	.62	.76	.60	.62
SOP	.58	.60	.62	1.00	.69	.55	.57
BE	.72	.74	.76	.69	1.00	.71	.70
BL	.56	.58	.60	.55	.71	1.00	.73
PI	.54	.60	.62	.57	.70	.73	1.00

16. SEM/Regression Results (Hypothetical/Illustrative)

The following standardized path coefficients are hypothetical. They are designed to demonstrate a plausible reporting format and must be replaced by coefficients generated from actual observations.

Path	β	SE	t	p	Decision
VBE → BE	.24	.06	4.00	<.001	Support H1
INT → BE	.21	.06	3.50	<.001	Support H2
IMM → BE	.29	.06	4.83	<.001	Support H3
SOP → BE	.18	.06	3.00	.003	Support H4
BE → BL	.71	.05	14.20	<.001	Support H5
BE → PI	.34	.07	4.86	<.001	Support H6
BL → PI	.49	.07	7.00	<.001	Support H7

Illustrative structural model indicators: R^2 for Brand Engagement = .69; R^2 for Brand Loyalty = .50; R^2 for Purchase Intention = .65. These values are hypothetical and do not constitute evidence about the population.

17. Hypothesis Testing Table (Hypothetical/Illustrative)

Hypothesis	Relationship	β	p-value	Result
H1	VBE $\rightarrow$ BE	.24	<.001	Supported
H2	INT $\rightarrow$ BE	.21	<.001	Supported
H3	IMM $\rightarrow$ BE	.29	<.001	Supported
H4	SOP $\rightarrow$ BE	.18	.003	Supported
H5	BE $\rightarrow$ BL	.71	<.001	Supported
H6	BE $\rightarrow$ PI	.34	<.001	Supported
H7	BL $\rightarrow$ PI	.49	<.001	Supported
H8	Antecedents $\rightarrow$ BE $\rightarrow$ outcomes	Illustrative indirect effects	<.05	To be tested by bootstrapping

18. Results and Discussion

Because the statistical results above are hypothetical, this section should be interpreted as an illustration of how the empirical findings could be discussed rather than as a claim about observed consumers. The illustrative model suggests that all four experience characteristics could contribute positively to Brand Engagement, with Immersion representing the strongest antecedent in the example. This pattern is theoretically plausible because immersive environments can intensify attention and involvement. However, actual relative strengths should be established only after empirical testing.

The proposed positive relationship between Virtual Brand Experience and Brand Engagement is consistent with the broader experience-marketing perspective. A virtual environment can become strategically valuable when the experience is distinctive, meaningful, and enjoyable rather than simply technologically novel. This aligns with VR marketing research showing that branded experiences can be structured around narrative and social interaction to generate favorable consumer responses (de Regt et al., 2021).

Interactivity is expected to influence engagement because participation increases the consumer's agency. The consumer becomes an active participant rather than a passive viewer. This expectation is particularly consistent with Payal et al. (2024), whose study of Nikeland linked interactivity with brand trust, knowledge, attachment, active engagement, and real-world purchase intention. The implication is that brands should not confuse visual sophistication with interaction quality; consumers need meaningful opportunities to act and receive responsive feedback.

Immersion is proposed as another important antecedent. Immersion can intensify the subjective experience of being inside the environment and can support flow-like states. Recent work on metaverse retail and immersive marketing continues to examine how immersion and interactivity shape engagement and purchase-related outcomes (Purohit & Arya, 2026). The model therefore treats immersion as an experiential mechanism rather than merely a hardware characteristic.

Social Presence is expected to contribute to engagement because brand experiences can become more meaningful when consumers feel that other people are present and accessible. This is supported conceptually and empirically by studies of metaverse tourism and retailing. Ghali et al. (2024) identified social presence and attachment as relevant to revisit intentions, while Mansoor et al. (2024) linked social presence to customer experience and purchase spillovers. Thus, brands may gain more from shared experiences than from isolated virtual displays.

The proposed pathway from Brand Engagement to Brand Loyalty reflects relationship marketing logic. Engagement is not synonymous with loyalty: a consumer may be highly engaged because an

experience is novel without intending to remain loyal. Nevertheless, repeated positive engagement can create familiarity, emotional attachment, preference, and willingness to recommend. Empirical research should therefore test whether engagement remains a significant predictor after controlling for perceived value, satisfaction, brand trust, and prior loyalty.

The relationship between Brand Engagement and Purchase Intention is also theoretically supported by emerging metaverse evidence. Payal et al. (2024) show that metaverse brand engagement can connect with real-world purchase intentions, while Jang and Kim (2026) demonstrate that social interaction and engagement can influence purchase-related outcomes in metaverse stores. The present model extends these insights by positioning loyalty alongside purchase intention.

Finally, the proposed mediation hypothesis is important because it shifts attention from simple stimulus-response relationships to the psychological process through which virtual experiences create consumer value. If future data support mediation, managers would need to invest not only in technological features but also in mechanisms that convert those features into meaningful brand engagement.

19. Managerial Implications

Design for participation rather than passive viewing. Virtual environments should give users meaningful control, responsive interfaces, and opportunities to explore products or brand stories.

Prioritize experience quality over technological novelty. Immersion should serve a clear brand purpose rather than become an expensive visual attraction with little consumer value.

Build social layers into branded environments. Shared events, collaborative activities, avatars, community features, and real-time interaction can strengthen perceived social presence.

Use engagement as a strategic KPI. Time spent alone is insufficient; managers should monitor interaction depth, participation, content creation, recommendations, repeat visits, and brand-related actions.

Connect virtual and physical commerce. Metaverse experiences should make it easy to move from exploration to product information, trial, reservation, purchase, or post-purchase relationship management.

Protect trust and transparency. Virtual environments create new questions around data, identity, advertising disclosure, digital ownership, and consumer vulnerability. Responsible design should accompany commercial innovation.

Segment consumers according to motivation and experience. UGT suggests that consumers enter virtual environments for different reasons; entertainment-oriented, social, informational, and self-expression-oriented users may respond differently to the same campaign.

Evaluate long-term loyalty rather than short-term excitement. A successful campaign should be assessed through repeat engagement and relationship quality rather than novelty metrics alone.

20. Theoretical Implications

The paper contributes theoretically by combining three complementary perspectives. TAM explains technology acceptance and perceived value; UGT explains consumer motivations for participating in virtual environments; and Social Presence Theory explains the interpersonal dimension of shared virtual experiences. Together, the theories provide a multi-level explanation of consumer response. The model also places Brand Engagement between environmental/experiential characteristics and relationship/behavioral outcomes, creating a bridge between technology-oriented and relationship-oriented research. The framework can be extended in future studies with flow, perceived value, brand trust, attachment, identification, psychological ownership, and consumer innovativeness.

21. Limitations

The paper is conceptual and methodological; it does not report a real primary dataset.

The statistical values in the illustrative tables are hypothetical and must not be represented as empirical findings.

The proposed model focuses on seven constructs and therefore excludes potentially relevant variables

such as flow, trust, privacy concern, perceived value, avatar identification, and psychological ownership.

A cross-sectional survey would limit causal inference even if the proposed hypotheses were statistically supported.

Purposive or convenience sampling may limit generalizability across countries, age groups, platforms, and product categories.

Metaverse technologies are evolving rapidly, so platform-specific findings may become less applicable as interfaces and consumer practices change.

22. Future Research Directions

Conduct longitudinal studies to determine whether engagement develops into durable loyalty.

Compare immersive VR environments with browser-based virtual worlds and augmented reality.

Examine differences between Gen Z, Millennials, and older consumer groups.

Test the moderating roles of personal innovativeness, technology readiness, and prior virtual-world experience.

Investigate virtual-to-physical purchase spillovers and whether metaverse experiences change offline brand choice.

Examine ethical issues including privacy, biometric data, algorithmic personalization, advertising disclosure, and child/young-user protection.

Study AI-powered avatars and conversational brand agents as emerging forms of social presence.

Compare product categories such as fashion, automobiles, tourism, education, entertainment, luxury, and FMCG.

Use experimental and longitudinal designs alongside SEM to strengthen causal explanations.

23. Conclusion

Metaverse marketing provides brands with an opportunity to move from conventional digital communication toward immersive, interactive, and socially meaningful consumer experiences. The present paper develops an integrated framework in which Virtual Brand Experience, Interactivity, Immersion, and Social Presence influence Brand Engagement, which subsequently contributes to Brand Loyalty and Purchase Intention. The framework is grounded in TAM, UGT, and Social Presence Theory and is supported by an emerging body of empirical and conceptual literature. The central proposition is that the commercial value of a metaverse environment does not arise from virtuality alone. It arises when technology enables consumers to experience, participate, connect, and build meaningful relationships with brands. For researchers, the framework offers testable relationships and a structured questionnaire. For managers, it emphasizes experience quality, interaction, social connection, and continuity between virtual and physical commerce. Most importantly, the statistical tables in this manuscript are explicitly hypothetical. A publishable empirical article using this framework must replace them with results obtained from a real, ethically collected dataset and must report the actual sample, measurement model, structural model, effect sizes, confidence intervals, and robustness checks.

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GREEN ECONOMY AND SUSTAINABLE DEVELOPMENT IN INDIA: A QUALITATIVE ANALYSIS OF OPPORTUNITIES, CHALLENGES AND POLICY IMPERATIVES

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Abstract

The transition towards a green economy has emerged as an important pathway for reconciling economic growth, environmental sustainability and social inclusion. For India, the transition is particularly significant because the country must simultaneously pursue economic expansion, employment generation, energy security and poverty reduction while addressing climate change, environmental degradation and resource constraints. This paper examines the relationship between the green economy and sustainable development in India using a qualitative and descriptive research design. The study draws upon peer-reviewed literature, government policy documents and reports published by international organisations. A thematic analysis is undertaken across seven dimensions: renewable energy and energy transition, green employment and skills, sustainable agriculture, circular economy, green finance, sustainable infrastructure, and green technology and innovation. The study develops an integrated conceptual framework linking green economic transformation with the three dimensions of sustainable development—economic prosperity, environmental sustainability and social inclusion. The analysis indicates that India's green transition has considerable potential to stimulate investment, technological innovation, employment generation and resource efficiency (UNEP, 2011; United Nations, 2015). However, financing constraints, skill mismatches, technological gaps, regional disparities, institutional fragmentation and unequal distribution of transition costs remain important barriers (International Labour Organization [ILO], 2018, 2025). India's Nationally Determined Contribution for 2031–2035 further strengthens the policy relevance of green economic transformation (Government of India, 2026). The paper argues that India's green economy should be understood not merely as an environmental policy agenda but as a structural socio-economic transformation. A successful transition therefore requires green investment to be accompanied by human-capital development, social protection, MSME support, community participation and effective institutional coordination. The study concludes that an inclusive green economy can contribute significantly to India's long-term sustainable development and the broader vision of Viksit Bharat @2047.

Keywords: Green Economy; Sustainable Development; Green Transition; Renewable Energy; Green Employment; Circular Economy; Green Finance; Inclusive Growth; India.

1. INTRODUCTION

Economic development has traditionally been associated with industrialisation, infrastructure expansion, increasing production and rising income levels. These processes have contributed significantly to improvements in living standards. However, conventional development pathways have also generated environmental externalities, including pollution, resource depletion, ecosystem degradation and greenhouse-gas emissions (United Nations Environment Programme [UNEP], 2011; World Bank, 2022).

The increasing intensity of climate change and environmental degradation has challenged the assumption that economic growth can be pursued independently of ecological considerations. This has encouraged the emergence of alternative development approaches that seek to integrate economic, environmental and social objectives (United Nations, 2015).

The concept of the green economy represents one such approach. UNEP (2011) describes a green economy as one that improves human well-being and social equity while significantly reducing environmental risks and ecological scarcities. The concept therefore extends beyond environmental conservation. It involves changes in investment, production, consumption, technology, employment and institutions.

The green economy is closely connected with sustainable development. The 2030 Agenda for Sustainable Development emphasises that economic prosperity, social inclusion and environmental

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protection are interconnected objectives (United Nations, 2015). Sustainable Development Goals relating to clean energy, decent work, sustainable infrastructure, responsible consumption and climate action provide an important policy framework for green economic transformation.

The relevance of this transition is particularly strong in India. As a major emerging economy, India faces the simultaneous requirements of expanding productive capacity, generating employment, improving living standards and maintaining energy security while reducing environmental pressures (World Bank, 2022).

India's policy framework has increasingly incorporated sustainability into economic planning. Renewable energy, energy efficiency, green hydrogen, electric mobility, sustainable infrastructure and circular economy initiatives have emerged as important components of the country's green transition (Government of India, Ministry of New and Renewable Energy, 2023).

India's Nationally Determined Contribution for 2031–2035 further strengthens this policy direction. The Government of India has established targets relating to emissions intensity, non-fossil electricity capacity and carbon sinks as part of its long-term climate and development strategy (Government of India, 2026).

These developments demonstrate that climate policy is increasingly being integrated with India's long-term economic-development strategy. The green economy is consequently becoming relevant not only to environmental policy but also to industrial development, employment, investment, technology and energy security.

However, the transition is not without challenges. Green technologies require investment, workers require new skills, businesses require financing, and communities may face adjustment costs. The distribution of the benefits and costs of the transition therefore becomes an important economic question (ILO, 2018, 2025).

The present study consequently examines India's green economy from an integrated economic and sustainable-development perspective. Rather than focusing exclusively on environmental indicators, the paper considers the interaction between economic opportunity, environmental sustainability and social inclusion.

2. CONCEPTUAL FOUNDATION

The green economy can be understood as an economic system in which economic activity is increasingly decoupled from environmental degradation while maintaining social welfare (UNEP, 2011).

Its major characteristics include efficient utilisation of natural resources; reduction of greenhouse-gas emissions; promotion of renewable energy; sustainable production and consumption; development of green technologies; creation of green employment; circular use of resources; and inclusive access to economic opportunities.

Pearce, Markandya and Barbier (1989) provided an early foundation for green economic thinking by highlighting the need to incorporate environmental values and ecological costs into economic decision-making.

UNEP (2011) subsequently developed the green economy as a broader development framework in which investment in environmentally sustainable sectors can contribute simultaneously to economic and social objectives.

2.1 Meaning of Green Economy

A green economy does not imply abandoning economic growth. Instead, it seeks to transform the nature and quality of economic growth. The objective is to create economic value while reducing resource intensity, environmental damage and ecological risks (UNEP, 2011).

The green economy therefore involves:

1. Efficient utilisation of natural resources.
2. Increased reliance on renewable energy.
3. Reduction of greenhouse-gas emissions.

4. Promotion of sustainable production and consumption.
5. Development of green technologies.
6. Creation of decent green employment.
7. Promotion of circular production systems.
8. Strengthening of environmental governance.
9. Greater integration of environmental considerations into financial decisions.
10. Ensuring social inclusion and a just transition.

For India, the concept has particular relevance because economic development must occur alongside poverty reduction, employment generation, energy security and climate resilience (World Bank, 2022).

3. GREEN ECONOMY AND SUSTAINABLE DEVELOPMENT: CONCEPTUAL FRAMEWORK

The relationship between green economy and sustainable development is multidimensional and extends beyond environmental protection. A green economy involves a structural transformation of production, consumption, investment, employment and resource-use patterns towards low-carbon, resource-efficient and socially inclusive development. In the Indian context, such transformation is particularly significant because the country must simultaneously pursue economic growth, employment generation, poverty reduction, energy security and environmental sustainability. Accordingly, this study conceptualises the green economy as a system of interconnected economic, environmental, technological and social processes that collectively contribute to sustainable development.

The conceptual framework proposed in this study integrates five interconnected components: (i) transition drivers, (ii) green economic transformation, (iii) enabling mechanisms, (iv) sustainable development outcomes, and (v) long-term developmental impact. The framework draws conceptually upon the green economy perspective of the United Nations Environment Programme (UNEP, 2011), the Sustainable Development Goals framework (United Nations, 2015), the green employment perspective of the International Labour Organization (ILO, 2018, 2025), and the emerging Indian policy discourse on energy transition, circular economy, green finance, green skills and climate-resilient development.

3.1 Transition Drivers

The transition towards a green economy is influenced by a combination of environmental, economic, technological and policy-related pressures. Climate change, environmental degradation, resource scarcity and increasing energy demand have created a need to reconsider conventional patterns of economic growth. At the same time, international commitments related to sustainable development and climate action have encouraged countries to adopt cleaner and more resource-efficient development pathways.

For India, the transition is also closely associated with energy security, technological competitiveness, employment generation and long-term economic resilience. Therefore, the drivers of green transformation cannot be viewed exclusively from an environmental perspective. They represent a broader set of economic and social imperatives that influence the direction and pace of India's development trajectory.

3.2 Green Economic Transformation

The second component of the framework represents the core areas through which green economic transformation takes place. These include renewable energy, circular economy, sustainable agriculture, green manufacturing, sustainable infrastructure and transportation, green technology and innovation, and nature-based solutions.

Renewable energy contributes to the reduction of dependence on fossil fuels and supports energy diversification. Circular economy practices promote resource efficiency, waste reduction, reuse, recycling and recovery. Sustainable agriculture seeks to improve productivity while reducing ecological pressure and protecting natural resources. Green manufacturing and sustainable infrastructure encourage cleaner production and more efficient use of energy and materials. Green technology and innovation facilitate technological transformation, while nature-based solutions contribute to ecosystem protection and climate resilience.

These dimensions are interconnected rather than independent. For example, renewable energy can support low-carbon manufacturing, while circular economy practices can reduce industrial resource requirements. Similarly, technological innovation can improve both energy efficiency and resource productivity. The green economy should therefore be understood as an integrated transformation of economic systems rather than as a collection of separate environmental initiatives.

3.3 Enabling Mechanisms

The effectiveness of green economic transformation depends upon a set of enabling mechanisms that determine whether environmental and technological interventions can generate wider developmental benefits. The present framework identifies green finance, green skills and employment, technological innovation, policy and regulatory support, institutional capacity, MSME support, social protection and community participation as major enabling mechanisms.

Green finance facilitates investment in renewable energy, sustainable infrastructure, cleaner technologies and environmentally responsible enterprises. Green skills are essential for developing a workforce capable of operating emerging technologies and adapting to changing occupational requirements. Technological innovation and research and development support productivity improvements and the development of indigenous solutions.

Policy and regulatory mechanisms provide incentives and standards for sustainable production and consumption, while institutional capacity determines the effectiveness of implementation and coordination. Support for micro, small and medium enterprises is particularly important because MSMEs constitute a significant component of India's productive and employment structure and may face greater constraints in accessing finance, technology and technical expertise. Social protection and community participation further ensure that the transition does not disproportionately burden vulnerable workers and communities.

Thus, the framework considers enabling mechanisms as an intermediate layer through which green economic initiatives are translated into broader economic, environmental and social outcomes.

3.4 Transformation Outcomes

The interaction between green economic sectors and enabling mechanisms generates a range of immediate and intermediate outcomes. These include improved resource efficiency, increased adoption of clean energy, reduction in emissions and pollution, growth in green investment, technological upgrading, employment generation, entrepreneurship development and sustainable production and consumption.

Green investment can create new markets and business opportunities, while technological innovation can improve productivity and competitiveness. Similarly, the expansion of renewable energy and

circular economy activities can generate new occupational categories and entrepreneurial opportunities. However, the quantity and quality of these outcomes depend upon the availability of appropriate skills, finance, institutions and supportive policies.

The framework therefore emphasises that green economic transformation should not be evaluated solely through environmental indicators. Its effectiveness must also be assessed through its contribution to economic productivity, employment, innovation, entrepreneurship, resource efficiency and resilience.

3.5 Sustainable Development Outcomes

The transformation outcomes ultimately influence the three interconnected dimensions of sustainable development: economic prosperity, environmental sustainability and social inclusion.

Economic prosperity is reflected through investment, productivity, innovation, competitiveness, entrepreneurship, employment generation and the emergence of new green markets. A successful green transition can create new economic opportunities while reducing the risks associated with resource scarcity and environmental degradation.

Environmental sustainability is reflected through lower greenhouse gas emissions, improved energy efficiency, conservation of natural resources, waste reduction, pollution control, ecosystem protection and enhanced climate resilience. These outcomes are central to maintaining the ecological foundations required for long-term development.

Social inclusion involves equitable access to the benefits of green development, employment opportunities, skill development, social protection and affordable sustainable goods and services. It also requires attention to workers and communities that may be adversely affected by the restructuring of carbon-intensive economic activities. Consequently, the social dimension of the green transition is closely associated with the concept of a just and inclusive transition (ILO, 2018, 2025).

The three dimensions are mutually reinforcing. Economic growth that produces significant environmental degradation cannot provide a sustainable development pathway, while environmental policies that generate substantial social costs may weaken the inclusiveness and acceptability of the transition. Sustainable development therefore requires an appropriate balance among economic efficiency, ecological sustainability and social equity.

3.6 Long-Term Developmental Impact

The final component of the framework represents the long-term developmental impact of green economic transformation. When green sectors are supported by appropriate financial, technological, institutional and human-capital systems, they can contribute to the emergence of an economy that is more resource-efficient, climate-resilient, innovative and socially inclusive.

In the Indian context, this long-term transformation can contribute to a development pathway characterised by cleaner economic growth, improved energy security, new employment opportunities, technological competitiveness and greater resilience to environmental and climate-related risks. The green economy can therefore become an important component of India's broader sustainable development trajectory and its long-term vision of Viksit Bharat @2047.

3.7 Conceptual Proposition

The framework suggests that the contribution of the green economy to sustainable development is not automatic. The positive developmental impact of green economic transformation depends upon the interaction between sectoral transformation and the enabling institutional, financial, technological and human-capital ecosystem.

Accordingly, the central conceptual proposition of the study is:

Green economic transformation is more likely to contribute to sustainable development when it is supported by adequate finance, appropriate technology, skilled human resources, effective institutions, supportive public policy and mechanisms for social inclusion.

This proposition highlights the importance of moving beyond an environment-centred understanding of the green economy. India's transition requires simultaneous attention to economic competitiveness, environmental sustainability and social justice. The framework consequently positions the green economy as a broader development strategy through which environmental objectives can be integrated with employment generation, innovation, resource efficiency, inclusive growth and long-term economic resilience.

The framework further indicates that institutional capacity and social inclusion function as cross-cutting conditions influencing the effectiveness of the entire transition. Weak institutional coordination, inadequate financing, skill shortages or unequal distribution of transition costs may reduce the developmental benefits of green transformation. Conversely, effective institutions, accessible finance, appropriate skills and inclusive policy mechanisms can strengthen the capacity of the green economy to generate mutually reinforcing economic, environmental and social outcomes. Overall, the proposed framework provides an integrated conceptual basis for examining India's green economy as a process of structural economic transformation rather than merely as an environmental policy response. It establishes the analytical foundation for the subsequent thematic examination of renewable energy, green employment, sustainable agriculture, circular economy, green finance, sustainable infrastructure and green technology within the Indian context.

4. REVIEW OF LITERATURE

The literature on green economy and sustainable development has expanded substantially over the past three decades as scholars, policymakers and international institutions have increasingly recognised the limitations of conventional growth models based on intensive resource consumption, fossil-fuel dependence and environmentally damaging production practices. The green economy has consequently emerged as an important framework for reconciling economic development with environmental protection, resource efficiency and social inclusion. Although the concept has evolved considerably, its central premise remains that economic prosperity and environmental sustainability need not necessarily represent competing objectives when investment, technology, institutions and human capabilities are appropriately aligned (Pearce et al., 1989; UNEP, 2011; United Nations, 2015).

The literature relevant to the Indian context is particularly diverse. India faces the dual challenge of sustaining high economic growth and employment generation while simultaneously addressing climate change, environmental degradation, resource scarcity and energy security. Consequently, the country's green transition encompasses multiple dimensions, including renewable energy, circular economy, sustainable agriculture, green employment, green finance, technological innovation, sustainable infrastructure and institutional transformation. These dimensions are increasingly recognised as interconnected components of a broader structural transformation rather than isolated environmental interventions (UNEP, 2011; ILO, 2018; United Nations, 2015).

The existing literature can be organised into the following major themes: (i) conceptual foundations of the green economy and sustainable development, (ii) renewable energy and energy transition, (iii) green employment and skills, (iv) circular economy and resource efficiency, (v) green finance and sustainable investment, (vi) green technology and innovation, (vii) sustainable agriculture and infrastructure, (viii) institutional capacity and policy coordination, and (ix) social inclusion and just transition. The synthesis of these themes provides the basis for identifying the research gap addressed by the present study.

4.1 Conceptual Foundations of the Green Economy

The intellectual foundations of the green economy can be traced to early attempts to integrate environmental considerations into economic decision-making. Pearce et al. (1989) argued that economic policy should account for environmental costs and the depletion of natural capital. Their work challenged the assumption that environmental degradation could be treated as an external issue separate from economic policy. The subsequent development of ecological economics further strengthened the argument that economic activity operates within ecological limits and that natural resources and ecosystem services constitute important foundations of economic welfare.

The concept received renewed international attention following the global financial crisis and the growing recognition of climate-related risks. UNEP (2011) defined a green economy as one that improves human well-being and social equity while significantly reducing environmental risks and ecological scarcities. This conceptualisation is important because it places social welfare and economic opportunity alongside environmental sustainability. In this perspective, green economic transformation is not simply about reducing carbon emissions; it involves redirecting investment towards sectors and technologies that generate long-term economic and social benefits while reducing environmental pressures.

The Sustainable Development Goals further broadened this perspective by establishing an integrated global framework linking economic prosperity, social inclusion and environmental sustainability (United Nations, 2015). Goals relating to affordable and clean energy, decent work, sustainable cities, responsible consumption and production, climate action and life on land demonstrate the interconnected nature of contemporary sustainability challenges.

The literature therefore suggests that green economy and sustainable development are conceptually complementary. While sustainable development represents a broader developmental objective, the green economy can be understood as an economic pathway through which that objective may be pursued (UNEP, 2011). However, the relationship is not automatic. Green investments may produce environmental benefits without necessarily reducing inequality, while environmental regulation may impose adjustment costs on workers and enterprises. The effectiveness of the green economy therefore depends on the institutional and social conditions within which the transition takes place.

For developing countries, this issue becomes particularly significant. Economic development remains essential for improving living standards and reducing poverty, but resource-intensive development can generate long-term environmental costs. The challenge is consequently to achieve a degree of economic decoupling in which improvements in productivity and welfare increasingly occur without proportional increases in resource consumption and environmental degradation.

4.2 Green Economy and Sustainable Development in the Indian Context

India presents a distinctive case for analysing the green economy because of its large population, rapidly growing economy, substantial development requirements and considerable dependence on natural resources and fossil fuels. The country's transition therefore involves a fundamental policy balancing exercise between growth, energy access, affordability, environmental sustainability and employment.

The literature increasingly portrays India's green transition as both an environmental necessity and an economic opportunity. The development of renewable energy, green hydrogen, electric mobility, sustainable infrastructure, circular production and green industries has the potential to generate new investment and employment while reducing environmental pressures. At the same time, India's large informal economy, regional disparities and dependence on carbon-intensive sectors create significant challenges for ensuring an equitable transition.

The emerging literature on India's green economy increasingly adopts a multidimensional perspective. Recent work on building a green economy for *Viksit Bharat* identifies opportunities

across jobs, investment, circular economy, energy transition and sustainable livelihoods, suggesting that green transformation can become an important component of India's long-term development strategy rather than remaining confined to environmental policy (Jain et al., 2025). Similarly, state-level research highlights the potential of green economic transformation to combine employment, economic growth and sustainability when supported by appropriate policy and institutional arrangements.

This perspective reinforces the argument that India's green economy should be examined as a structural transformation involving economic, technological, environmental and social systems simultaneously.

4.3 Renewable Energy and Energy Transition

Renewable energy represents one of the most extensively researched components of India's green transition. The expansion of solar, wind, hydro and other renewable sources is widely regarded as essential for reducing dependence on fossil fuels, improving energy security and supporting climate objectives. Renewable energy also has implications for investment, technological development, industrial competitiveness and employment.

The energy transition literature traditionally focuses on the relationship between energy consumption, economic growth and environmental quality. More recent studies have broadened this perspective by incorporating energy security, affordability and sustainability into a common framework. Behera et al. (2024), for example, examine India's energy trilemma and demonstrate that renewable energy has a positive influence on balancing energy security, affordability and sustainability in both the short and long run. Their findings also indicate that green technology innovation has a positive but statistically insignificant effect, highlighting the need for stronger technological development and supportive policy conditions.

The findings of Behera et al. (2024) are particularly relevant because they demonstrate that renewable energy should not be viewed exclusively through the lens of emissions reduction. Its contribution to sustainable development also depends on energy security and affordability. Their analysis further identifies environmental regulation and energy efficiency as important mechanisms through which renewable energy and green technology influence the energy trilemma.

The literature also highlights the importance of finance and infrastructure in accelerating renewable-energy deployment. Investment in renewable energy requires substantial initial capital, appropriate transmission infrastructure, grid flexibility and technological capability. Recent research on green finance in India identifies financing bottlenecks, policy implementation issues and limitations in renewable-energy integration as continuing barriers to the country's energy transition. The study also highlights the increasing role of green bonds, international climate finance and public financial support in mobilising resources for renewable-energy development.

Consequently, renewable-energy expansion cannot be considered an independent determinant of sustainable development. Its developmental contribution depends upon financial availability, technological capability, infrastructure, regulation, human capital and institutional coordination. This supports the integrated approach adopted in the present study.

4.4 Green Technology and Innovation

Technological innovation is another major component of the green economy literature. Green technologies can improve energy efficiency, reduce emissions, minimise waste and enable the development of new products and production processes. Technological change is therefore widely regarded as an important mechanism for achieving environmental and economic objectives simultaneously.

The relationship between green technology and sustainable development, however, is complex. Technological innovation can reduce environmental pressure, but its effectiveness depends on the speed and scale of adoption. A technology that exists but remains inaccessible to firms because of high costs, inadequate infrastructure or lack of skills may have limited developmental impact.

Behera et al. (2024) provide important evidence in this regard. Their analysis finds a positive but statistically insignificant effect of green technology innovation on India's energy trilemma and emphasises the need for further technological advancement, stronger environmental regulation and increased financial support for research and development.

This finding challenges a purely technology-centred interpretation of the green economy. Technological innovation must be supported by finance, institutions, human capital and appropriate regulatory systems. The diffusion of green technologies is particularly important because technological benefits may otherwise remain concentrated among large firms or technologically advanced regions.

The literature consequently supports a socio-technical interpretation of green transformation. Innovation should be examined not only in terms of technological invention but also in terms of adoption, diffusion, affordability, skills and institutional capacity.

4.5 Green Employment and Green Skills

Employment represents a critical link between green economic transformation and social development. The ILO (2018) argues that environmental sustainability and employment generation can be mutually reinforcing when green investments generate decent and productive work. Green jobs can emerge in renewable energy, sustainable construction, waste management, energy efficiency, sustainable agriculture, environmental services and resource recovery.

However, the literature also emphasises that green transition can produce both employment opportunities and employment risks. New green industries may create jobs, but workers employed in carbon-intensive sectors may experience job displacement or occupational restructuring. Consequently, the employment effects of the transition depend on the pace of structural change, the transferability of worker skills and the availability of reskilling and social-protection mechanisms (ILO, 2018).

Recent empirical evidence provides a more detailed understanding of India's green employment structure. Ham et al. (2025) analyse green and carbon-intensive employment using India's Periodic Labour Force Survey and examine the distribution of these jobs across sectors and states. Their study also considers the characteristics and wages of workers engaged in green and carbon-intensive occupations, thereby highlighting the importance of education and skills within India's labour-market transition.

The findings are important because they demonstrate that the green transition is not spatially or occupationally neutral. The ability of workers to benefit from green employment depends on their skills, location, sector and occupational characteristics. This reinforces the need for targeted human-capital policies.

A systematic review of green jobs in developing economies similarly identifies a tension between short-term economic priorities and long-term sustainability objectives. Mathieu (2024), based on a review of 516 scientific articles, argues that the creation of green jobs depends on specific economic, institutional and labour-market conditions rather than occurring automatically as a consequence of environmental investment.

The ILO's more recent framework provides an even broader perspective by linking climate change

and green transition with the economy, labour market, poverty and inequality. The framework identifies physical climate impacts, transition risks and transition opportunities as interconnected factors affecting employment and livelihoods (ILO, 2025).

For India, therefore, green employment must be considered in relation to education, vocational training, reskilling, informality, regional inequalities and social protection. The development of green skills becomes an enabling condition rather than merely an outcome of the transition.

4.6 Circular Economy and Resource Efficiency

The circular economy has emerged as an important extension of green economy thinking because it addresses the material and resource foundations of production and consumption. The traditional linear model of extraction, production, consumption and disposal creates substantial environmental pressure through resource depletion, waste generation and pollution. Circular economy approaches seek to extend product life, reduce material use, promote reuse and repair, increase recycling and recover value from waste.

The circular economy literature increasingly links resource efficiency with economic competitiveness and environmental sustainability. Ghosh et al. (2020) highlight the importance of integrating circular economy practices with energy and waste-management systems in India. Their analysis suggests that stronger integration across these systems is necessary to realise the full potential of circularity.

The Indian circular economy literature also identifies regulatory and institutional barriers. Limited awareness, inadequate infrastructure, fragmented waste-management systems and insufficient incentives can constrain circular business models. These constraints are particularly relevant for MSMEs, which may lack the capital and technical capabilities required to redesign production processes.

Circular economy approaches nevertheless offer significant opportunities for entrepreneurship and employment. Activities such as recycling, repair, remanufacturing, resource recovery and sustainable product design can create new markets and occupational opportunities. Circularity can therefore contribute simultaneously to resource efficiency, innovation, employment and economic diversification.

From a sustainable-development perspective, circular economy is consequently important because it connects environmental objectives with industrial competitiveness. The literature suggests that circularity should not be treated simply as a waste-management policy; rather, it represents a transformation in production and consumption systems.

4.7 Green Finance and Sustainable Investment

Finance is widely recognised as one of the most important enabling conditions for green economic transformation. Renewable-energy infrastructure, clean technologies, sustainable transportation, energy-efficient buildings and circular production systems require substantial investment. Consequently, the availability and affordability of green finance can influence the speed and scale of the transition.

Green finance includes green bonds, sustainable loans, climate finance, renewable-energy investment, blended finance and other financial instruments designed to support environmentally sustainable activities. In the Indian context, green finance has expanded alongside renewable-energy development and increasing climate-policy commitments.

Recent research on India's green-finance architecture indicates that green finance has become an increasingly important mechanism for supporting renewable-energy investment and sustainable

infrastructure. However, financing bottlenecks, high capital requirements, policy uncertainty and limited access to innovative financial instruments continue to constrain the transition.

The literature further suggests that green finance should not be evaluated solely by the volume of capital mobilised. The quality, distribution and accessibility of finance are equally important. Large renewable-energy projects may attract substantial institutional investment, while smaller enterprises and MSMEs may continue to experience difficulty obtaining affordable capital.

This has significant implications for inclusive green growth. If green finance is concentrated among large firms and capital-intensive sectors, the economic benefits of the transition may remain unevenly distributed. Therefore, mechanisms such as credit guarantees, concessional finance, blended finance and targeted MSME support may be necessary to broaden participation in the green economy.

Green finance also interacts with technological innovation. Firms with access to finance are better positioned to adopt energy-efficient technologies, invest in cleaner production and develop new green products. Finance can therefore act as a catalyst linking technological innovation with environmental performance.

4.8 Sustainable Agriculture and Rural Transformation

Agriculture represents another important dimension of India's green economy because of its relationship with employment, rural livelihoods, food security, water consumption, land use and biodiversity. Conventional agricultural practices can generate environmental pressures through excessive use of water, chemical inputs, soil degradation and loss of biodiversity. Sustainable agriculture seeks to address these concerns while maintaining productivity and livelihood security.

The literature increasingly emphasises climate-resilient agriculture, efficient irrigation, renewable-energy applications, soil conservation, agroecological approaches and sustainable resource management. These approaches can potentially reduce environmental pressure while improving the resilience of rural livelihoods.

The agricultural dimension also highlights the importance of regional and social inclusion. Unlike capital-intensive green industries, sustainable agriculture involves millions of small and marginal producers whose ability to adopt new practices may be constrained by finance, information, technology and market access.

Consequently, the green economy literature needs to incorporate rural transformation alongside industrial decarbonisation. A green economy that focuses primarily on renewable energy and urban infrastructure may fail to capture the environmental and socio-economic significance of agriculture.

4.9 Sustainable Infrastructure and Urban Development

Rapid urbanisation has made sustainable infrastructure an increasingly important component of India's green transition. Transport, buildings, water systems, waste management and urban energy consumption have major implications for resource use and environmental quality.

Sustainable infrastructure can reduce energy consumption, emissions and resource intensity while simultaneously improving the quality of urban life. Public transportation, electric mobility, energy-efficient buildings, renewable-energy integration, wastewater treatment and decentralised waste management represent important areas of green investment.

Infrastructure investment also creates linkages between environmental sustainability and employment. Construction, transport, energy services and urban waste management can generate substantial employment opportunities when green technologies and labour standards are incorporated

into infrastructure development.

However, infrastructure-led green development requires substantial financial resources and effective institutional coordination. The literature therefore reinforces the argument that sectoral interventions must be supported by appropriate finance, governance and human capabilities.

4.10 Institutional Capacity and Policy Coordination

Institutional capacity represents an important but sometimes underemphasised dimension of green economic transformation. Green transition policies cut across multiple ministries, sectors and levels of government. Energy, environment, labour, finance, industry, transport and agriculture policies may all influence sustainability outcomes.

Behera et al. (2024) demonstrate that environmental regulation and energy efficiency are important mechanisms linking renewable energy and green technology to India's energy-trilemma outcomes. This finding reinforces the importance of institutional and regulatory conditions.

The ILO (2025) similarly argues for coherent employment and social policies that integrate climate, labour-market and distributional considerations. The ILO's India-specific assessment further highlights the need to strengthen policy readiness for green jobs and a just transition (ILO, 2024).

Institutional fragmentation can create conflicting incentives, duplication of initiatives and implementation gaps. Effective green transformation therefore requires coordination across central and state governments, local authorities, financial institutions, industry, workers, educational institutions and civil society.

This suggests that institutional capacity should be considered a cross-cutting determinant of green economic performance rather than a separate policy domain.

4.11 MSMEs, Entrepreneurship and Green Economic Transformation

MSMEs occupy an important position within India's employment and production structure and are therefore critical to the success of the green transition. Green transformation can create entrepreneurial opportunities in renewable energy services, recycling, sustainable products, energy efficiency, green logistics, organic agriculture and environmental services.

However, smaller enterprises frequently face constraints related to access to finance, technological capabilities, managerial expertise and information. These limitations may prevent them from adopting green technologies or participating in emerging green value chains.

The literature on green entrepreneurship suggests that entrepreneurship can act as a bridge between environmental challenges and economic opportunity. New business models based on circularity, resource recovery, renewable energy and sustainable consumption can create economic value while addressing environmental problems.

Nevertheless, green entrepreneurship requires an enabling ecosystem. Finance, incubation, skills, digital infrastructure, market access and supportive regulation can determine whether environmentally oriented entrepreneurial ideas become viable businesses. This reinforces the role of MSME support within the integrated conceptual framework developed in the present study.

4.12 Social Inclusion and the Just Transition

A major development in the contemporary literature is the growing emphasis on the distributional consequences of green transformation. A transition can be environmentally successful while

producing socially unequal outcomes if its benefits and costs are distributed unevenly.

The concept of a just transition addresses this concern by seeking to ensure that climate and environmental policies are accompanied by decent work, social dialogue, social protection, skills development and support for affected communities (ILO, 2018, 2025).

The ILO's 2025 Green Employment Diagnostics framework explicitly connects climate and environmental transition with the economy, labour market, poverty and inequality. It distinguishes between physical climate impacts, transition risks and transition opportunities and emphasises the importance of sectoral and regional analysis.

This perspective is particularly important for India because the labour market contains substantial informal employment and significant regional variation. Workers in carbon-intensive industries, informal waste management, agriculture and small enterprises may experience the transition differently from highly skilled workers employed in emerging green industries.

Recent ILO research on waste-value chains in Indian cities also demonstrates the importance of integrating informal workers into green transformation. Evidence from Pune and Ahmedabad highlights the potential for inclusive, decentralised waste-management systems to generate green and decent employment while improving sustainability outcomes.

Thus, social inclusion should not be treated as a secondary outcome of green development. It should be incorporated into the design of the transition itself.

4.13 Regional and Spatial Dimensions of India's Green Transition

The green transition is unlikely to occur uniformly across India. Differences in industrial structure, natural-resource endowments, energy systems, labour markets, infrastructure and institutional capacity create substantial regional variation.

Ham et al. (2025) demonstrate that green and carbon-intensive employment varies across Indian states, highlighting the importance of geographic and occupational characteristics in understanding the labour-market effects of the transition.

Similarly, state-level assessments of green economic opportunities indicate that different regions may possess different comparative advantages. States with renewable-energy potential may develop solar and wind industries, while industrial regions may focus on green manufacturing and circular production. Agricultural regions may derive greater benefits from sustainable agriculture, bioeconomy and nature-based solutions.

This regional perspective suggests that India's green economy requires differentiated policy approaches rather than a uniform national strategy. National policy can establish broad objectives and standards, but implementation should account for state- and region-specific economic and ecological conditions.

4.14 Interrelationship Among Green Economy Dimensions

The reviewed literature increasingly demonstrates that individual components of the green economy are interdependent. Renewable energy requires investment and infrastructure; investment requires finance; technological adoption requires skills; circular production requires appropriate regulation and markets; green employment requires training and social protection; and inclusive outcomes require institutional coordination.

For example, renewable-energy expansion can increase demand for skilled workers, but without

appropriate training the employment potential may remain unrealised. Similarly, circular economy initiatives can reduce waste, but without appropriate markets, technology and regulation they may remain limited to isolated projects. Green finance can accelerate investment, but without adequate project pipelines and institutional capacity, financial mobilisation may not translate into meaningful sustainability outcomes.

This interconnectedness is increasingly reflected in recent research. Behera et al. (2024) demonstrate the interaction between renewable energy, green technology, environmental regulation and energy efficiency in India's energy transition. The ILO (2025) framework similarly connects climate transition with economic, labour-market and distributional outcomes. Recent Indian policy-oriented research also identifies multiple interconnected pathways involving investment, jobs, circular economy and sustainable livelihoods (Jain et al., 2025).

The literature therefore supports a systems perspective in which green economic transformation is understood as an interaction among sectors, institutions, technologies and social groups.

4.15 Critical Synthesis of Existing Literature

The literature reviewed above provides substantial evidence that the green economy can contribute to sustainable development through multiple pathways. Renewable energy can support energy security and environmental sustainability; green technology can improve resource efficiency and productivity; circular economy practices can reduce resource dependence; green finance can mobilise investment; and green employment can create new livelihood opportunities (UNEP, 2011; ILO, 2018; United Nations, 2015).

However, the literature also demonstrates that these benefits are neither automatic nor evenly distributed. Renewable energy requires infrastructure and finance; green technologies require skills and institutional support; circular economy models require regulatory and market development; and green jobs require appropriate education and labour-market institutions. The transition may also create adjustment costs for workers and enterprises associated with carbon-intensive activities (ILO, 2018, 2025).

A further limitation of the existing literature is its tendency towards sectoral analysis. Studies frequently focus on renewable energy, employment, circular economy, finance or technological innovation individually. Although such studies provide valuable evidence, they do not always explain how these dimensions interact to produce broader sustainable-development outcomes.

For example, the renewable-energy literature tends to emphasise energy security and emissions, while the employment literature focuses on jobs and skills. Similarly, circular-economy studies emphasise resource efficiency, while green-finance research focuses on investment mobilisation. The interaction between these dimensions and their collective implications for economic prosperity, environmental sustainability and social inclusion remains comparatively underdeveloped.

Recent studies have begun to address this fragmentation. Behera et al. (2024) integrate renewable energy, green technology, environmental regulation and energy efficiency within a single framework. The ILO (2025) integrates economic, labour-market and inequality dimensions within its just-transition framework. Recent Indian green-economy assessments similarly connect investment, employment, circular economy and sustainability within a broader development perspective (Jain et al., 2025).

These developments indicate an emerging shift from a **sector-specific understanding of the green economy towards an integrated transformation perspective.**

5. Research Gap

Despite the growing literature, four important gaps remain.

First, much of the existing research examines individual components of green transformation independently. There remains a need for an integrated framework that connects renewable energy, circular economy, green finance, technology, employment, skills and sustainable infrastructure within a common sustainable-development perspective.

Second, relatively greater attention has been given to environmental and economic outcomes than to the simultaneous interaction of economic prosperity, environmental sustainability and social inclusion. The distributional implications of green transformation, particularly for workers, MSMEs, informal workers and vulnerable communities, require greater conceptual attention (ILO, 2025).

Third, existing literature often evaluates the green transition through individual indicators such as renewable-energy capacity, emissions, investment or employment. A broader qualitative synthesis is required to understand how institutional, technological, financial and human-capital conditions jointly determine transition outcomes.

Fourth, although India's green transition is increasingly connected with long-term national development objectives, there remains scope for a conceptual framework that explicitly links green economic transformation with inclusive growth, resilience, employment and the broader developmental aspirations associated with Viksit Bharat.

The present study addresses these gaps by developing an integrated qualitative framework that connects the principal dimensions of India's green economy with the three pillars of sustainable development. The framework positions green finance, skills, technology, institutions, MSME support and social protection as enabling mechanisms through which green-sector transformation can produce economic, environmental and social outcomes.

The study therefore contributes to the literature by shifting the analytical focus from **individual green sectors to the interconnected architecture of green economic transformation**. It further emphasises that India's green transition should be evaluated not only in terms of environmental performance but also in terms of economic opportunity, employment generation, social inclusion, resilience and institutional capacity.

Overall, the literature supports the proposition that India's green economy should be understood as a **structural socio-economic transformation** rather than simply an environmental policy agenda. The success of this transformation depends on the ability to align green investment, technological innovation, human-capital development, institutional capacity and social protection with environmental objectives. This integrated perspective provides the theoretical and analytical foundation for the conceptual framework developed in the subsequent section.

6. OBJECTIVES OF THE STUDY

The study has the following objectives:

1. To examine the conceptual relationship between green economy and sustainable development.
2. To analyse the major dimensions of India's green economic transition.
3. To examine the potential of green transformation for employment, investment and innovation.
4. To identify economic, technological, institutional and social barriers to India's green transition.

5. To analyse the importance of inclusive and just transition mechanisms.
6. To propose policy measures for strengthening India's green economy and sustainable development.

7. RESEARCH METHODOLOGY

7.1 Research Design

The present study adopts a **qualitative, descriptive and exploratory research design** to examine the role of the green economy in advancing sustainable development in India. The choice of a qualitative approach is appropriate because the study seeks to understand the interrelationships among economic transformation, environmental sustainability, employment, technological development, institutional capacity and social inclusion rather than to estimate a single causal relationship through econometric techniques.

The study treats the green economy as a multidimensional process of structural transformation rather than as a narrowly defined environmental policy instrument. Accordingly, the analysis incorporates economic, environmental, technological, employment, financial, institutional and social dimensions. This approach enables the study to examine how different components of the green transition interact with one another and how these interactions influence the broader objectives of sustainable development.

The research design is informed by the conceptual foundations of the green economy developed by Pearce et al. (1989), UNEP (2011) and the Sustainable Development Goals framework of the United Nations (2015). The study further incorporates contemporary perspectives on green employment and just transition, particularly the ILO's framework linking environmental transition with economic outcomes, labour-market changes, poverty and inequality (International Labour Organization [ILO], 2025). The methodology therefore combines **conceptual synthesis, documentary analysis and thematic interpretation**.

The study does not attempt to establish statistical causality between green-economy variables and sustainable-development indicators. Instead, it seeks to identify recurring patterns, relationships, opportunities, constraints and policy implications emerging from the existing body of literature and policy evidence.

7.2 Sources of Data

The study is based entirely on **secondary qualitative data** obtained from credible academic, institutional and policy sources. The principal sources include:

1. **Peer-reviewed academic literature** published in scholarly journals in the fields of economics, environmental economics, development studies, sustainability, energy policy, labour economics, innovation and management.
2. **Government publications and policy documents** issued by the Government of India and relevant ministries and agencies concerning renewable energy, green hydrogen, climate policy, sustainable infrastructure, employment, environmental regulation and resource efficiency.
3. **Reports and analytical publications of international organisations**, particularly the United Nations, United Nations Environment Programme (UNEP), International Labour Organization (ILO) and World Bank.
4. **Research and policy reports produced by recognised Indian research institutions and think tanks**, where these provide relevant evidence on green employment, finance, technology, energy transition and sustainable development.
5. **Official policy frameworks and international commitments**, including India's climate and sustainable-development commitments and its Nationally Determined Contributions.

The use of multiple categories of sources provides methodological triangulation and reduces dependence on a single institutional or disciplinary perspective. For example, academic literature contributes theoretical and empirical insights, government documents provide information on policy

direction and implementation, while international and institutional reports provide comparative and analytical perspectives.

Particular emphasis is placed on sources that directly address the Indian context. International literature is used primarily to establish conceptual foundations, analytical frameworks and comparative perspectives, whereas India-specific studies and policy documents are used to interpret the country's distinctive economic, social, institutional and environmental conditions.

7.3 Source Selection Criteria

To strengthen the transparency and credibility of the qualitative analysis, secondary sources were considered according to predefined selection criteria. Sources were included when they satisfied one or more of the following conditions:

- relevance to the green economy or sustainable development;
- direct relevance to the Indian economy or developing-country contexts;
- contribution to one or more dimensions of green economic transformation;
- publication by a recognised academic, governmental or international institution;
- availability of clearly stated concepts, findings, policy evidence or analytical arguments;
- relevance to contemporary policy and developmental debates.

Priority was given to **peer-reviewed journal articles, official government documents and publications of established international organisations**. Foundational works were retained where they were essential to the conceptual development of the green economy or sustainable development. Sources that were purely promotional, lacked identifiable methodological or institutional credibility, duplicated evidence without adding analytical value, or had insufficient relevance to the research objectives were excluded from the core analysis.

The source-selection process was therefore guided by the principles of **relevance, credibility, conceptual contribution, institutional reliability and contextual applicability**.

7.4 Analytical Framework

The analysis is organised around seven major dimensions of India's green economy:

1. Renewable energy and energy transition;
2. Green employment and skill development;
3. Sustainable agriculture and rural development;
4. Circular economy and resource efficiency;
5. Green finance and sustainable investment;
6. Sustainable infrastructure and urban development; and
7. Green technology and innovation.

These dimensions were selected because they collectively represent important channels through which environmental objectives can be connected with economic development and social outcomes. The analytical framework further connects these dimensions with three broad sustainable-development outcomes:

- **Economic prosperity**, including investment, productivity, technological upgrading, entrepreneurship and employment;
- **Environmental sustainability**, including resource efficiency, emission reduction, renewable-energy adoption and ecosystem protection; and
- **Social inclusion**, including decent employment, skill development, poverty reduction, affordability and equitable distribution of transition benefits.

The framework therefore moves beyond a sector-by-sector assessment and examines the green economy as an interconnected development system.

7.5 Thematic Analysis

The principal analytical technique employed in the study is **thematic analysis**. Thematic analysis is particularly suitable for qualitative research because it enables the systematic identification, organisation and interpretation of recurring patterns within a diverse body of textual evidence (Braun & Clarke, 2006). Its flexibility allows it to be applied across different types of qualitative documents, including academic literature, policy reports and institutional publications.

The thematic analysis was conducted through the following sequential stages:

Stage 1: Familiarisation with the Literature

The selected literature and policy documents were examined repeatedly to develop an overall understanding of the major debates surrounding India's green economic transition. Particular attention was given to recurring arguments concerning opportunities, constraints, policy effectiveness, employment, finance, technology and social inclusion.

Stage 2: Identification of Initial Codes

Relevant concepts and recurring arguments were identified and grouped into preliminary analytical codes. Examples include renewable-energy expansion, energy security, green investment, green jobs, skill gaps, circularity, resource efficiency, technological innovation, MSME constraints, institutional capacity, regional disparities, affordability and just transition.

Stage 3: Development of Themes

Related codes were subsequently organised into broader themes corresponding to the seven principal dimensions of the study. This process allowed individual findings from different sources to be compared and synthesised within a common analytical structure.

Stage 4: Cross-Theme Comparison

The themes were examined in relation to one another rather than as isolated categories. For example, the analysis considers how renewable-energy expansion creates demand for new skills, how green finance influences technological adoption, how circular-economy practices create entrepreneurial opportunities, and how institutional capacity affects the implementation of green policies.

Stage 5: Interpretation

The final stage involved interpreting the identified themes in relation to the three pillars of sustainable development—economic prosperity, environmental sustainability and social inclusion. This helped identify both synergies and potential trade-offs associated with India's green transition.

The analytical process can therefore be represented as:

Secondary Sources → Initial Coding → Thematic Categorisation → Cross-Theme Synthesis → Sustainable Development Interpretation → Policy Implications

This procedure is consistent with the flexible and systematic application of thematic analysis proposed by Braun and Clarke (2006).

7.6 Policy and Institutional Analysis

Because the green economy is strongly shaped by government policy, the study supplements thematic analysis with **qualitative policy analysis**. Relevant policy documents are examined to identify the objectives, instruments, institutional mechanisms and implementation priorities associated with India's green transition.

The policy analysis considers four broad dimensions:

Policy direction: The extent to which national policies recognise renewable energy, green technology, circularity, green employment, sustainable finance and resource efficiency as components of development strategy.

Institutional mechanisms: The roles of government ministries, regulatory institutions, financial institutions and other stakeholders in implementing green-economy initiatives.

Implementation challenges: Financing limitations, technological constraints, skill shortages, institutional fragmentation, regional disparities and other barriers that may limit policy effectiveness.

Distributional implications: The extent to which the benefits and costs of green transition are likely to be distributed across workers, enterprises, households, regions and socioeconomic groups. This approach is particularly relevant to the concept of a **just transition**, which requires environmental transformation to be considered alongside employment, livelihoods and inequality. The ILO's Green Employment Diagnostics framework similarly examines the interaction between climate and environmental change, the economy, labour markets, and poverty and inequality.

7.7 Comparative and Integrative Synthesis

The study uses **comparative qualitative synthesis** to identify areas of convergence and divergence across the literature. Findings from different sectors and sources are compared to determine whether similar patterns emerge across renewable energy, agriculture, manufacturing, finance, employment, infrastructure and technology.

The synthesis is structured around three analytical questions:

1. **What opportunities does the green economy create for India's economic and sustainable development?**
2. **What structural, technological, financial and institutional barriers constrain the transition?**
3. **What policy mechanisms are required to ensure that the transition is economically viable, environmentally effective and socially inclusive?**

The comparative synthesis is particularly important because individual studies frequently focus on specific sectors or indicators. By bringing these findings together, the present study develops an integrated interpretation of India's green economic transition.

7.8 Analytical Matrix

To ensure systematic organisation of the evidence, the literature and policy material are conceptually mapped using an analytical matrix consisting of five elements:

Analytical Dimension	Key Issues Examined	Expected Developmental Link
Renewable Energy	Energy transition, energy security, clean-energy adoption	Emission reduction and energy resilience
Green Employment	Green jobs, skills, labour-market transition	Employment generation and social inclusion
Sustainable Agriculture	Resource efficiency, climate resilience, rural livelihoods	Rural development and food security
Circular Economy	Waste reduction, reuse, recycling, resource efficiency	Productivity and environmental sustainability
Green Finance	Green investment, bonds, blended finance, capital access	Investment and technology adoption
Sustainable Infrastructure	Transport, buildings, urban systems, waste management	Inclusive and resilient development
Green Technology	Innovation, R&D, technology adoption and diffusion	Productivity and environmental performance
Institutional Capacity	Regulation, coordination, implementation	Policy effectiveness and governance
Social Inclusion	Affordability, informal workers, regional inequality,	Equitable distribution of benefits

Analytical Dimension	Key Issues Examined	Expected Developmental Link
	just transition	

This matrix provides a common structure for interpreting evidence across otherwise diverse sources.

7.9 Credibility and Trustworthiness of the Analysis

In qualitative research, methodological quality depends not only on the volume of sources but also on the credibility, consistency and transparency of the analytical process. Accordingly, the study incorporates several measures to strengthen trustworthiness.

First, **source triangulation** is used by comparing evidence from academic studies, government documents and international institutional reports.

Second, **conceptual triangulation** is employed by examining the green economy from economic, environmental, technological, employment and social perspectives rather than relying on a single theoretical lens.

Third, the analysis maintains a clear distinction between **evidence-based findings and the authors' interpretation**. Where evidence is mixed or context-dependent, the study avoids presenting a single interpretation as universally applicable.

Fourth, attention is given to **negative cases and constraints**, rather than focusing exclusively on the potential benefits of green economic transformation. This is important because the green transition can simultaneously generate opportunities and adjustment costs.

Finally, the analytical categories are linked directly to the research objectives and conceptual framework, thereby improving internal consistency between the literature review, methodology, findings and policy recommendations.

7.10 Temporal and Contextual Scope

The study focuses primarily on developments relevant to **India's contemporary green economic transition**, while incorporating foundational literature necessary to establish the theoretical evolution of the green economy and sustainable development.

Recent academic studies, policy documents and institutional reports receive particular attention because the green economy is a rapidly evolving field influenced by technological change, climate commitments, energy-market developments, employment transformation and emerging financing mechanisms.

The geographical scope of the study is **India**, although selected international literature is incorporated to provide theoretical, methodological and comparative perspectives. Where evidence indicates substantial regional variation within India, the analysis recognises such differences rather than treating the country as a completely homogeneous economic system.

7.11 Ethical Considerations

Since the study relies exclusively on publicly available secondary sources and does not involve primary data collection from human participants, no participant intervention or personal-data collection was undertaken. The study follows standard academic principles of responsible scholarship, including accurate attribution of sources, faithful representation of published findings and avoidance of unsupported claims.

7.12 Limitations of the Methodology

Despite its analytical breadth, the study has several limitations.

First, the study is based on **secondary evidence** and therefore depends on the availability, quality and scope of existing literature and policy documentation. It does not generate primary evidence from firms, workers, policymakers, households or communities.

Second, because the study employs qualitative thematic analysis, its findings are intended to provide **analytical and conceptual insights rather than statistically generalisable estimates**.

Third, differences in definitions and measurement approaches across sources may limit direct comparability. The meaning and measurement of concepts such as green jobs, green investment,

green technology and circular economy can vary across institutions and studies.

Fourth, India's green transition is characterised by significant regional and sectoral diversity. Consequently, national-level findings may not fully capture differences among states, industries, urban and rural areas, or formal and informal workers.

Fifth, the policy environment is evolving rapidly. New climate commitments, technological developments, financing mechanisms and employment policies may alter the green-transition landscape over time.

These limitations do not undermine the purpose of the study; rather, they indicate that the findings should be interpreted as a **qualitative synthesis and conceptual assessment of India's green economic transition**, providing a basis for future empirical and comparative research.

7.13 Methodological Alignment with the Research Objectives

The methodology is directly aligned with the objectives of the study. The descriptive component identifies the major dimensions of India's green economy; the thematic analysis examines opportunities and challenges associated with these dimensions; the policy analysis evaluates institutional and policy requirements; and the integrative synthesis connects green economic transformation with economic prosperity, environmental sustainability and social inclusion.

Accordingly, the methodological sequence can be summarised as:

Literature and Policy Review → Source Screening → Thematic Coding → Seven-Dimensional Analysis → Cross-Theme Synthesis → Identification of Opportunities and Challenges → Policy Interpretation → Integrated Sustainable Development Framework

This methodological structure enables the study to move beyond a descriptive review of environmental initiatives and develop a **systematic qualitative assessment of green economic transformation as a pathway towards inclusive and sustainable development in India**.

8. THEMATIC ANALYSIS

8.1 Renewable Energy and the Energy Transition

Renewable energy is a central component of India's green economic transformation. The economic significance of renewable energy extends beyond emission reduction. It can stimulate infrastructure investment, technology development, manufacturing, employment and energy diversification (Behera et al., 2024).

Behera et al. (2024) demonstrate that renewable energy contributes positively to India's energy trilemma, which involves balancing energy security, affordability and sustainability. Their findings suggest that renewable energy has positive effects in both the short and long run.

India's 2031–2035 NDC further strengthens the country's energy-transition ambitions by establishing a target of 60 percent cumulative installed electricity capacity from non-fossil fuel sources by 2035 (Government of India, 2026).

Nevertheless, the transition involves challenges related to energy storage, grid infrastructure, transmission, financing and affordability.

Renewable energy can also contribute to energy security by reducing dependence on imported fossil fuels. Solar and wind energy have significant potential, while green hydrogen may provide opportunities for decarbonising difficult-to-abate sectors (Government of India, Ministry of New and Renewable Energy, 2023).

8.2 Green Employment and Skill Development

Green transformation has significant implications for India's labour market. Emerging activities include renewable-energy installation, electric mobility, sustainable construction, waste management, recycling, environmental consultancy, energy auditing, green manufacturing and sustainable agriculture.

Ham et al. (2025) demonstrate that green employment represents a significant component of India's labour market. Their analysis also identifies differences in wages, geographical concentration and worker characteristics between green and carbon-intensive occupations.

The emergence of green occupations does not automatically ensure employment opportunities for existing workers. Reskilling and labour-market planning are therefore essential (ILO, 2018, 2025).

Universities, vocational institutions and industry bodies need to collaborate in developing curricula aligned with emerging green occupations.

Skills relating to renewable energy, environmental management, energy efficiency, sustainable finance, circular production and green technology are likely to become increasingly important.

Green employment should also be assessed in terms of job quality. Employment that is environmentally sustainable but insecure or poorly paid may not fully contribute to inclusive development (Ham et al., 2025).

8.3 Sustainable Agriculture and Rural Development

Agriculture is an important component of India's sustainable-development transition because rural livelihoods remain closely connected with natural resources.

Climate change increases risks associated with irregular rainfall, water scarcity, extreme temperatures, crop losses and declining ecological resilience (World Bank, 2022).

Sustainable agriculture can respond through crop diversification, efficient irrigation, soil conservation, agroforestry and climate-resilient practices.

Small and marginal farmers require affordable credit, extension services, market access, technology, crop insurance and appropriate incentives.

The green transition in agriculture should therefore combine environmental objectives with livelihood security.

8.4 Circular Economy and Resource Efficiency

The circular economy provides a mechanism for reducing the resource intensity of economic growth.

The conventional linear economic model follows:

Extraction → Production → Consumption → Disposal

The circular model instead seeks:

Reduce → Reuse → Repair → Recycle → Recover → Remanufacture

Circularity can create opportunities for MSMEs and entrepreneurs in recycling, repair, waste recovery, sustainable packaging, remanufacturing, product redesign and resource-efficient manufacturing (Ghosh et al., 2020).

Ghosh et al. (2020) highlight the need for greater integration between waste management, renewable energy and sustainability policies in India.

Policy barriers, weak incentives, fragmented waste systems and inadequate awareness can limit adoption.

The informal waste sector must also be incorporated into India's circular-economy strategy.

8.5 Green Finance

Green transformation requires substantial capital for renewable energy, green hydrogen, electric mobility, sustainable buildings, recycling and clean manufacturing.

Green bonds, sustainability-linked finance and blended finance can support the transition.

However, access to finance is uneven, and MSMEs often face greater constraints than large corporations. Green finance policies should therefore enable smaller enterprises to undertake sustainable investment.

The financial system can contribute to the transition by incorporating environmental risks into investment and lending decisions and directing capital towards sustainable infrastructure and technologies.

8.6 Sustainable Infrastructure

Rapid urbanisation presents both a challenge and an opportunity.

Sustainable infrastructure includes mass public transportation, electric mobility, energy-efficient buildings, renewable-energy systems, water conservation, waste-management systems, green spaces and climate-resilient infrastructure.

Investment can produce long-term benefits by reducing resource costs, congestion and environmental damage (World Bank, 2022).

Urban infrastructure should increasingly incorporate climate-risk assessment and resource-efficiency

considerations.
Decentralised planning and stronger urban local institutions are also important for implementing sustainable infrastructure effectively.

8.7 Green Technology and Innovation

Technological innovation can increase the efficiency and affordability of green economic transformation.
Important areas include battery storage, green hydrogen, renewable-energy technology, electric mobility, sustainable materials, waste-to-resource technologies, energy-efficient manufacturing and digital environmental monitoring.
Behera et al. (2024) find that green technology innovation has a positive but statistically insignificant effect within their energy-trilemma framework. They consequently highlight the need for stronger technological development, environmental regulation, energy efficiency and R&D investment.
India's universities, research institutions and private enterprises can contribute significantly to domestic innovation. Stronger university-industry collaboration can help commercialise research and develop technologies appropriate to Indian economic conditions.

9. MAJOR CHALLENGES

The thematic analysis identifies seven major challenges:

Table 1. Major Challenges to India's Green Transition

Challenge	Implication
Financing constraints	Limits adoption of green technologies
Technology gaps	Reduces productivity and competitiveness
Skill mismatch	Restricts green employment
Regional inequality	Produces uneven transition outcomes
Informal employment	Increases vulnerability of workers
Institutional fragmentation	Weakens policy implementation
Affordability concerns	May create unequal access to green goods and services

These challenges demonstrate that environmental policy alone cannot deliver a successful green transition.
Financing constraints may particularly affect MSMEs and small producers. Technology gaps can limit competitiveness. Skill mismatches can prevent workers from benefiting from emerging green employment opportunities (Ham et al., 2025).
Institutional fragmentation is another important challenge because green economic transformation requires coordination across multiple ministries and levels of government.
Affordability is equally important. Green products and technologies may initially involve higher costs, potentially excluding low-income households unless suitable financial and policy mechanisms are introduced.

10. JUST AND INCLUSIVE GREEN TRANSITION

A central finding of the study is that India's green transition must be just and inclusive.
A transition can be environmentally successful but socially unequal. Renewable-energy expansion can create investment but may generate local land-use conflicts; coal-sector restructuring can reduce emissions but affect workers; automation and green technologies can change labour demand; and environmental regulations can increase adjustment costs for MSMEs.
The ILO (2025) framework for green employment diagnostics explicitly connects the green transition with the economy, labour markets, poverty and inequality.
Therefore, India's green transition should incorporate worker reskilling, social protection, MSME support, community participation, affordable clean energy, women's participation in green

employment, regional transition strategies and support for informal workers.

A just transition is not simply a social-policy concern. It is also an economic requirement because social exclusion can weaken public acceptance of environmental policies and slow the pace of transformation (ILO, 2018, 2025).

11. INDIA'S 2031–2035 NDC AND VIKSIT BHARAT @2047

India's latest climate commitments significantly strengthen the relevance of the green economy.

The Government of India approved the Nationally Determined Contribution for 2031–2035 in March 2026. The new targets include reducing the emissions intensity of GDP by 47 percent from 2005 levels by 2035, achieving 60 percent cumulative installed electricity capacity from non-fossil sources by 2035, and creating a 3.5–4.0 billion tonne CO₂-equivalent carbon sink through forest and tree cover by 2035 (Government of India, 2026).

The NDC is aligned with India's vision of Viksit Bharat @2047 and the long-term objective of achieving net-zero emissions by 2070 (Government of India, 2026).

These commitments demonstrate that India's climate strategy is increasingly linked with economic development.

If future investment in energy, manufacturing, infrastructure, transport and urbanisation is designed around resource efficiency and low-carbon technologies, India can potentially avoid future costs associated with carbon-intensive infrastructure.

The green economy can therefore become a strategic component of Viksit Bharat @2047 rather than being treated as a separate environmental agenda.

12. KEY FINDINGS

The study identifies seven major findings.

Finding 1: Green Transformation is an Economic Transformation

The green economy affects investment, employment, innovation, productivity and industrial structure (UNEP, 2011; World Bank, 2022).

Finding 2: Renewable Energy is Central but Insufficient by Itself

Renewable energy is essential for reducing emissions and improving energy security, but storage, transmission, affordability and institutional capacity remain important (Behera et al., 2024).

Finding 3: Green Employment Requires Green Skills

The emergence of green sectors creates new employment opportunities, but workers require appropriate technical and managerial skills to access them (Ham et al., 2025; ILO, 2018).

Finding 4: Circular Economy Can Support Both Sustainability and Entrepreneurship

Circular business models can reduce resource use while creating opportunities for MSMEs and entrepreneurs (Ghosh et al., 2020).

Finding 5: Finance Determines the Speed of Transition

Green investment requires substantial capital. Unequal access to finance may produce unequal transition outcomes.

Finding 6: Institutional Coordination is Critical

Green transformation crosses the boundaries of energy, industry, agriculture, employment, finance and urban development.

Finding 7: The Transition Must Be Socially Inclusive

The benefits of green growth should be broadly distributed, while workers and communities affected by structural transformation require appropriate support (ILO, 2025).

13. POLICY RECOMMENDATIONS

13.1 Develop an Integrated Green Economy Policy

Green objectives should be incorporated into industrial, employment, agricultural, infrastructure and financial policy.

13.2 Establish a National Green Skills Framework

Universities, vocational institutions and industries should collaborate to identify future green

occupations and develop industry-relevant curricula. This is particularly important given the changing structure of green employment in India (Ham et al., 2025).

13.3 Strengthen MSME Green Finance

Special financing mechanisms should help MSMEs purchase energy-efficient equipment and adopt circular production practices.

13.4 Support Workers in Carbon-Intensive Industries

Workers affected by industrial restructuring should receive retraining, employment support and social protection (ILO, 2018, 2025).

13.5 Promote Green Entrepreneurship

Start-ups should be encouraged in recycling, sustainable packaging, renewable energy, electric mobility, green construction and environmental services.

13.6 Strengthen Local Community Participation

Large renewable-energy and infrastructure projects should incorporate transparent consultation and community participation.

13.7 Improve Circular Economy Governance

Waste management, recycling, resource recovery and renewable-energy policies should be better integrated (Ghosh et al., 2020).

13.8 Increase Green R&D

Government funding and university-industry partnerships should support domestic innovation in batteries, green hydrogen, renewable energy, sustainable materials and resource recovery (Behera et al., 2024).

13.9 Protect Affordability

Green policies should ensure that low-income households are not disproportionately burdened by the costs of transition.

13.10 Strengthen Monitoring

India should develop stronger systems for monitoring green jobs, green investment, green productivity, resource efficiency, emissions intensity and distributional impacts.

14. ORIGINAL CONTRIBUTION OF THE STUDY

The principal contribution of this paper is the development of an integrated qualitative framework for understanding India's green economy as a socio-economic transformation.

Unlike approaches that examine renewable energy, employment or circular economy independently, the present study connects these dimensions through three major outcomes: economic prosperity, environmental sustainability and social inclusion.

The study therefore proposes that the success of India's green transition should not be evaluated solely through renewable-energy capacity or emissions indicators.

A broader assessment should consider:

Green Transition Success = Environmental Effectiveness + Economic Viability + Social Inclusion + Institutional Capacity

This framework provides a holistic perspective for analysing India's transition towards a sustainable economy.

15. CONCLUSION

The green economy represents an important pathway for India to reconcile economic development with environmental sustainability and social inclusion. The literature demonstrates that green economic transformation can influence investment, employment, innovation, energy security and resource efficiency (UNEP, 2011; United Nations, 2015).

The analysis demonstrates that India's green transition encompasses renewable energy, green employment, sustainable agriculture, circular economy, green finance, sustainable infrastructure and technological innovation. Evidence from recent research reinforces the importance of renewable energy and green skills in this transition (Behera et al., 2024; Ham et al., 2025).

The country's 2031–2035 climate commitments further demonstrate the increasing integration of environmental sustainability with long-term economic development (Government of India, 2026).

However, the success of the transition will depend on more than technological adoption. Financing constraints, skill shortages, institutional fragmentation, regional disparities and unequal distribution of transition costs remain important challenges.

The central argument of this study is that India's green economy should be understood as a socio-economic transformation rather than simply an environmental transition.

A successful green economy must create economic opportunities while protecting ecological systems and ensuring that workers, households, MSMEs and vulnerable communities are not excluded from the transition.

India's Viksit Bharat @2047 vision provides an opportunity to embed sustainability into the country's future development model. The green economy can contribute to this vision by promoting resource efficiency, technological innovation, employment generation, energy security and climate resilience. The long-term success of India's green transition will ultimately depend on the country's ability to align environmental ambition with economic opportunity and social justice.

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