

Present Business and Economic Scenario in India

Editors

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—Chapter—

Access to Finance for Entrepreneurs and MSMEs in Tripura: Challenges, Policy Interventions and Emerging Opportunities

Kaju Nath¹, Amit Bikram Chowdhury²,
Nabendu Debnath³

ABSTRACT

Micro, Small and Medium Enterprises (MSMEs) play a crucial role in employment generation, income creation, and regional economic diversification, especially in economically peripheral states such as Tripura. Despite significant policy focus on financial inclusion and enterprise promotion in India, access to adequate and timely formal finance continues to be a major challenge for entrepreneurs and small businesses in the state. This study examines the status and trends of financial access for MSMEs in Tripura using secondary data from the Reserve Bank of India (RBI), State Level Bankers' Committee (SLBC), Ministry of MSME, and relevant government reports.

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The paper analyses the pattern of institutional credit flow, performance of key financing schemes, the role of digital financial inclusion, and structural constraints affecting credit absorption. The findings suggest that financial outreach has expanded through initiatives such as MUDRA, PMEGP, Stand-Up India, and Pradhan Mantri Jan Dhan Yojana. However, the MSME sector in Tripura continues to be dominated by micro-enterprises facing persistent challenges related to collateral requirements, limited financial literacy, weak documentation, and high institutional risk perception. The study recommends strengthening collateral-free lending mechanisms, enhancing financial awareness, promoting digital credit ecosystems, and developing sector-specific financing strategies to ensure sustainable and inclusive MSME growth in Tripura.

Keywords: MSMEs, Financial Inclusion, Credit Access, Entrepreneurship, Regional Development

1. Introduction

The Micro, Small and Medium Enterprises (MSME) sector constitutes a vital pillar of the Indian economy, playing a crucial role in output generation, export promotion, and employment creation. According to the Ministry of MSME (2023), the sector contributes nearly one-third of the country's Gross Domestic Product, accounts for around 45 percent of total exports, and provides livelihood opportunities to more than 110 million individuals. Beyond its macroeconomic importance, the MSME ecosystem also promotes inclusive growth by encouraging entrepreneurship, supporting regional industrialization, and reducing income disparities.

In peripheral and geographically isolated regions such as Tripura, the relevance of MSMEs becomes even more significant. Given the state's limited industrial base and restricted private sector presence, small enterprises function as an important driver of local economic activity, self-employment, and income generation. Tripura's economic structure is largely characterized by agricultural dependence, a narrow manufacturing base, and a high reliance on public sector employment. In this context, the promotion of entrepreneurship in sectors such as rubber-based industries, bamboo and cane products, agro and food processing,

handicrafts, handloom, and tourism offers considerable potential for economic diversification and sustainable development.

Despite these opportunities, the growth of MSMEs in the state remains constrained by several structural challenges, among which limited access to formal finance is one of the most critical. Insufficient availability of credit affects enterprise creation, restricts capacity expansion, delays technology adoption, and weakens overall competitiveness. Entrepreneurs, particularly at the micro level, often face difficulties related to collateral requirements, high transaction costs, information asymmetry, and limited financial awareness.

Over the past decade, India has witnessed a significant expansion in financial inclusion through initiatives such as Pradhan Mantri Jan Dhan Yojana (PMJDY), MUDRA, Stand-Up India, and digital payment infrastructure. While these measures have improved banking outreach and account ownership, the distribution of institutional credit continues to exhibit strong regional imbalances. The Northeastern states collectively account for only a marginal share of the national credit portfolio, reflecting persistent supply-side constraints and low credit absorption capacity. Tripura, being a small and geographically distant state, mirrors these systemic limitations in terms of low credit penetration and limited access to formal financial services for small businesses.

Against this background, the present study seeks to analyze the availability, accessibility, and utilization of formal financial resources by entrepreneurs and MSMEs in Tripura. It further evaluates the effectiveness of recent policy initiatives and institutional mechanisms aimed at improving credit delivery, identifying key structural bottlenecks that continue to hinder inclusive enterprise financing in the state.

2. Literature Review

Access to adequate and timely finance has been widely recognized as one of the most significant barriers to the growth and sustainability of Micro, Small and Medium Enterprises (MSMEs) in developing economies. Beck and Demirgüç-Kunt (2006) argue that financial constraints disproportionately affect small firms due to structural disadvantages such as lack of acceptable collateral, limited credit histories, and information

opacity. These factors increase the perceived risk for financial institutions, resulting in higher borrowing costs or outright exclusion from formal lending channels. In addition, the relatively high transaction costs associated with processing small-value loans further discourage banks from extending credit to micro and small enterprises.

Within the Indian context, the issue of inadequate financing for MSMEs has been highlighted in several policy and institutional studies. Estimates by the International Finance Corporation (IFC, 2018) and the Reserve Bank of India (RBI, 2022) point to a substantial credit gap between the demand for and supply of formal finance in the sector. This financing deficit is particularly acute among micro enterprises, which constitute the majority of MSME units but have limited access to institutional credit. Ghosh (2019) further observes that enterprises located in economically lagging states encounter additional constraints arising from underdeveloped banking infrastructure, limited market integration, and weak business ecosystems.

Evidence from studies focusing on the Northeastern region indicates that the problem is not limited to credit supply alone but also relates to structural and demand-side limitations. According to NEDFi (2021), the relatively low level of credit absorption in the region can be attributed to several interrelated factors, including the predominance of very small-scale enterprises, inadequate financial literacy among entrepreneurs, high operational and market risks, and infrastructural deficiencies that affect business viability. These conditions collectively reduce both the willingness of financial institutions to lend and the capacity of enterprises to effectively utilize formal finance.

In recent years, digital financial services have been increasingly viewed as a potential mechanism to address some of these challenges. Empirical evidence suggests that the expansion of digital payment systems, mobile banking, and data-driven credit assessment models can help reduce information asymmetry and transaction costs. Studies by Suri and Jack (2016) demonstrate the broader developmental impact of digital financial inclusion, while RBI (2023) reports that the growing adoption of digital platforms in India is facilitating improved financial access for small businesses and informal enterprises.

Despite the growing body of national and regional research on MSME financing, empirical studies focusing specifically on Tripura remain limited. Given the state's unique geographical constraints, small market size, and evolving financial ecosystem, there is a clear need for region-specific analysis to better understand the nature of financial access, identify existing gaps, and evaluate the effectiveness of ongoing policy interventions.

3. Methodology

The present study adopts a secondary data-based research design to examine the status and trends of financial access for entrepreneurs and MSMEs in Tripura. Relevant data have been collected from multiple official and institutional sources to ensure reliability and comprehensiveness. The major sources include publications and statistical databases of the Reserve Bank of India (RBI), reports of the State Level Bankers' Committee (SLBC), Tripura, annual reports and official statistics from the Ministry of Micro, Small and Medium Enterprises, and enterprise-level information available through the Udyam Registration Portal. In addition, policy documents and development reports published by the Government of Tripura have been consulted to understand the institutional and policy environment. Performance data related to key credit-linked schemes such as the Prime Minister's Employment Generation Programme (PMEGP) and the Pradhan Mantri MUDRA Yojana (PMMY) have also been incorporated to assess the outreach and effectiveness of government-supported financial initiatives.

The analysis primarily employs descriptive statistical techniques to examine patterns in credit flow, enterprise registration, and scheme utilization. Trend analysis has been conducted to evaluate changes in major financial inclusion indicators over time, particularly in relation to the expansion of banking outreach, priority sector lending, and digital financial services. In addition, a qualitative review of policies and institutional mechanisms has been undertaken to assess the effectiveness of existing financial support systems and identify structural constraints affecting credit delivery and absorption. The study covers the period from 2015 to 2024, a phase marked by significant policy interventions and rapid expansion of financial inclusion initiatives in India, thereby providing a meaningful timeframe for assessing recent developments in MSME financing in Tripura.

4. MSME Landscape in Tripura

The enterprise structure in Tripura is characterized by a clear predominance of micro units, reflecting the small operational size, low investment capacity, and limited technological adoption of the majority of businesses. This dominance of micro enterprises suggests a production system with low capital intensity and minimal economies of scale, which often constrains productivity growth, market expansion, and competitiveness. Such enterprises typically operate in informal or semi-formal environments, rely heavily on owner financing or informal credit, and face greater vulnerability to market fluctuations and financial shocks.

Table 1: MSME Distribution in Tripura (Udyam Registration, 2024)

Category	Number of Units	Share (%)
Micro Enterprises	~38,000	95–96
Small Enterprises	~1,500	3–4
Medium Enterprises	<100	<1
Total	~40,000	100

Source: Ministry of MSME, Udyam Registration Portal (2024).

In terms of sectoral composition, the MSME landscape in the state is largely service-oriented. Trade and service activities account for approximately 45–50 percent of total enterprises, indicating the prevalence of retail businesses, small commercial establishments, and local service providers catering to domestic demand. The manufacturing segment constitutes around 30–35 percent, consisting mainly of small-scale units engaged in rubber-based products, food processing, handloom, handicrafts, bamboo, and other traditional industries. Agro-processing and allied activities, along with other miscellaneous sectors, contribute roughly 15–20 percent of the enterprise base. This distribution highlights the limited industrial diversification and the continued reliance on low-value-added activities within the MSME sector in Tripura, underscoring the need for targeted financial and technological support to facilitate scale expansion and sectoral upgrading.

5. Banking and Financial Inclusion

Table 2: Banking Indicators – Tripura

Indicator	Value
Total bank branches	~450+
Jan Dhan accounts	~1.2 million
CD Ratio	50–55% (approx.)
Priority sector share	High (agriculture dominant)

Source: SLBC Tripura (2023); RBI Handbook of Statistics on Indian States (2022).

The comparatively low Credit–Deposit (CD) ratio indicates that a smaller proportion of the funds mobilized through bank deposits within the state is being reinvested locally in the form of loans and advances. This reflects a limited level of credit deployment in the state economy and suggests that a significant share of financial resources is being diverted to other regions rather than supporting local economic activities. A low CD ratio is often associated with subdued credit demand, risk-averse lending practices, or structural constraints affecting the absorption capacity of borrowers. In the context of Tripura, this situation points to inadequate flow of institutional finance to productive sectors, particularly MSMEs and small entrepreneurs, thereby restricting business expansion, investment, and overall economic growth. Strengthening local credit delivery mechanisms and improving the creditworthiness and financial readiness of enterprises are therefore essential to enhance the effective utilization of banking resources within the state.

6. Major Financing Schemes

Major government-supported financing schemes play a crucial role in improving credit access for entrepreneurs and MSMEs in Tripura by addressing the constraints of collateral, affordability, and financial outreach. Among these, the Pradhan Mantri MUDRA Yojana (PMMY) provides collateral-free loans to micro and small businesses under the Shishu, Kishor, and Tarun categories, supporting both start-ups and business expansion. The Prime Minister’s Employment Generation Programme (PMEGP) promotes self-employment by offering credit-linked subsidies for the establishment of micro-enterprises

in manufacturing and service sectors. In addition, the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) encourages banks to extend collateral-free loans by providing risk coverage against default. Schemes such as Stand-Up India and Start-Up India further aim to promote inclusive entrepreneurship among women, Scheduled Castes, and Scheduled Tribes. Together, these initiatives have strengthened the institutional financing ecosystem in the state, although their effectiveness depends on awareness, timely credit delivery, and the capacity of enterprises to utilize formal finance productively.

6.1 MUDRA Loans

The distribution of MUDRA loans in Tripura is heavily concentrated in the Shishu category, which accounts for nearly 70–75 percent of total sanctions. This indicates that the majority of beneficiaries are micro-entrepreneurs operating at a very small scale with minimal capital requirements, typically engaged in petty trade, small services, and household-based economic activities. While the dominance of Shishu loans reflects the successful outreach of financial inclusion initiatives at the grassroots level, it also highlights the low level of capital intensity and limited growth orientation of most enterprises. The Kishor segment, with a share of around 20 percent, represents a smaller group of businesses that have moved beyond the initial stage and require moderate financial support for expansion and operational stability.

Table 3: MUDRA Performance (Tripura – cumulative)

Category	Share (%)
Shishu (≤₹50,000)	~70–75
Kishor	~20
Tarun	<10

Source: PMMY State-wise Performance Data, MUDRA (2023).

In contrast, the Tarun category accounts for less than 10 percent, indicating a very limited presence of growth-oriented enterprises seeking larger investment support. This skewed distribution suggests structural constraints that restrict enterprise graduation from micro to small and medium levels, including risk-averse lending practices, limited collateral availability, weak financial

records, and constrained market opportunities. The overall pattern reflects a “missing middle” in the enterprise ecosystem, where strong entry-level participation is not matched by adequate scaling. Addressing this imbalance through targeted credit support, capacity building, and improved market and infrastructure linkages is essential for enhancing productivity, employment generation, and the long-term impact of MSME financing in Tripura.

6.2 PMEGP

The performance of the Prime Minister’s Employment Generation Programme (PMEGP) in Tripura indicates a steady expansion in enterprise promotion and employment generation over recent years. The number of units supported increased from approximately 1,200 in 2021–22 to around 1,400 in 2022–23, reflecting improved implementation and growing demand for credit-linked self-employment opportunities. Correspondingly, the estimated employment generated rose from about 9,000 to nearly 10,000 during the same period. This upward trend highlights the programme’s role in encouraging micro-enterprise creation, particularly in small manufacturing, trade, and service activities, thereby contributing to livelihood diversification and local economic development.

Table 4: PMEGP Performance

Year	Units Supported	Estimated Employment
2021–22	~1,200	~9,000
2022–23	~1,400	~10,000
Subsidy range	25–35%	—

Source: KVIC PMEGP Performance Report (2023).

The provision of a capital subsidy ranging from 25 to 35 percent under PMEGP has been a key factor in enhancing the affordability of institutional credit, especially for first-generation entrepreneurs and economically weaker sections. By reducing the effective financial burden, the scheme lowers entry barriers and promotes formalization of small businesses. However, the relatively modest scale of unit size and employment per enterprise suggests that most supported ventures remain micro in nature. Strengthening post-loan support, skill development,

and market linkages would be essential to improve enterprise sustainability, enhance productivity, and enable gradual scaling of PMEGP-supported units in the state.

6.3 Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE)

The Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) plays an important role in improving access to formal finance by enabling banks and financial institutions to extend collateral-free loans of up to ₹2 crore to eligible micro and small enterprises. The scheme is designed to address one of the most critical barriers faced by MSMEs, namely the lack of acceptable collateral, thereby supporting first-generation entrepreneurs and small businesses in accessing institutional credit. By providing guarantee coverage against default, CGTMSE reduces the risk exposure of lenders and encourages them to expand credit to smaller and potentially vulnerable enterprises.

Despite its potential, the utilization of CGTMSE in the Northeastern region, including Tripura, remains below the national average. Limited awareness among entrepreneurs regarding the scheme's features and benefits has constrained its demand, while inadequate familiarity and cautious lending practices among bank officials have affected its effective implementation. Consequently, many eligible enterprises continue to depend on collateral-based loans or informal financing sources. Strengthening awareness initiatives, building capacity among banking personnel, and improving monitoring at the district level are essential to enhance the adoption of the scheme and promote greater access to collateral-free credit in the region.

7. State-Level Policy Support

The Government of Tripura has introduced targeted policy measures to promote industrial development and improve the investment climate through the Tripura Industrial Investment Promotion Incentive Scheme (TIIPIS). The scheme provides a range of fiscal incentives aimed at reducing the cost of establishing and operating enterprises in the state. Key provisions include a capital investment subsidy of up to 30 percent to support the creation of new industrial units and the expansion of existing

ones. In addition, the scheme offers interest subsidies on term loans, power subsidies to reduce operational costs, and reimbursement of Goods and Services Tax (GST) to improve the financial viability of businesses. These incentives are designed to attract private investment, encourage entrepreneurship, and strengthen the industrial base of the state.

Alongside fiscal incentives, institutional support mechanisms play an important role in facilitating enterprise development. The Tripura Industrial Development Corporation (TIDC) provides infrastructure support, industrial land, and project facilitation services, while District Industries Centres (DICs) act as nodal agencies for the implementation of various central and state schemes, offering guidance, registration support, and assistance to entrepreneurs at the district level. In recent years, the state has also undertaken startup promotion initiatives to encourage innovation, technology-based enterprises, and youth entrepreneurship. Together, these policy and institutional measures aim to create a supportive ecosystem for MSME growth and improve access to finance, infrastructure, and business development services in Tripura.

8. Role of SHGs and Microfinance

The Self-Help Group (SHG)–Bank Linkage Programme in Tripura has emerged as an important mechanism for promoting grassroots financial inclusion and livelihood generation. With SHGs collectively covering more than two lakh members, the programme reflects a broad outreach among low-income households, particularly in rural and semi-urban areas. A notable feature of the SHG movement in the state is the dominant participation of women, which has contributed significantly to women’s financial inclusion, savings mobilization, and economic empowerment. Through group-based savings and internal lending practices, SHGs have helped members develop financial discipline, improve creditworthiness, and reduce dependence on informal sources of finance.

Table 5: SHG–Bank Linkage (Tripura)

Indicator	Value
SHGs formed	~2 lakh+ members
Women participation	Majority
Credit linkage	Increasing annually

Source: NABARD (2023), *Status of Microfinance in India*.

The linkage of SHGs with formal banking institutions has shown a steady upward trend, indicating improved access to institutional credit for small-scale income-generating activities. Increasing annual credit linkage suggests growing confidence of banks in the repayment capacity of SHGs and the strengthening of the group-based lending model. This has supported micro-enterprises, livelihood diversification, and self-employment, particularly in activities such as agriculture, livestock, handicrafts, food processing, and petty trade. Strengthening capacity building, financial literacy, and market linkages for SHG members would further enhance the sustainability and economic impact of the programme in Tripura.

9. Digital Financial Inclusion

The rapid expansion of digital financial infrastructure in India has significantly strengthened the foundation for inclusive finance, particularly for small businesses and micro-entrepreneurs. The value of Unified Payments Interface (UPI) transactions crossed ₹180 trillion in 2024, reflecting the widespread adoption of low-cost, real-time digital payment systems across the country. This growth indicates a structural shift toward cashless transactions and greater integration of small economic actors into the formal financial ecosystem. In states like Tripura, the gradual adoption of digital payment platforms by small traders, service providers, and micro-enterprises is improving financial transparency and formalization.

One of the key advantages of digital financial transactions is the creation of a verifiable transaction history, which helps reduce information asymmetry between borrowers and lenders. Digital records enable financial institutions to assess cash flows and business performance more accurately, thereby improving credit appraisal for enterprises that lack traditional financial

statements. In addition, digital payments lower transaction costs, reduce dependence on cash handling, and enhance operational efficiency for small businesses. These benefits collectively improve the creditworthiness and financial discipline of micro and small enterprises, increasing their eligibility for formal loans.

Despite these positive developments, fintech-based and data-driven lending models are still at an early stage in Tripura. Limited digital literacy, connectivity gaps in certain areas, and low awareness of digital credit platforms continue to constrain their wider adoption. However, the expansion of digital payment usage provides a strong foundation for the future growth of alternative lending solutions. Strengthening digital infrastructure, promoting financial and digital literacy, and encouraging partnerships between banks and fintech firms can help leverage this emerging opportunity to enhance credit access for MSMEs and entrepreneurs in the state.

10. Key Challenges in MSME Financing

The limited flow of institutional finance to MSMEs in Tripura can be attributed to a combination of supply-side, demand-side, and structural constraints that collectively restrict both credit availability and effective utilization.

Supply-side challenges primarily relate to the cautious lending behaviour of financial institutions. Banks often perceive lending to micro and small enterprises as high risk due to the absence of formal financial records, business volatility, and limited collateral coverage. In addition, the relatively low credit absorption capacity within the state further discourages aggressive credit expansion. Operational rigidities, including limited decision-making autonomy at branch levels, also delay loan processing and reduce responsiveness to local entrepreneurial needs.

On the **demand side**, several enterprise-level limitations affect access to formal finance. A large proportion of MSMEs lack acceptable collateral, maintain inadequate or informal financial accounts, and have limited credit histories. Poor financial literacy and insufficient awareness regarding government credit schemes, subsidies, and guarantee mechanisms further reduce the willingness and ability of entrepreneurs to approach formal financial institutions.

These issues are compounded by **structural constraints** inherent to the state's economic environment. The small domestic market size limits business scalability and profitability, while geographical isolation and connectivity challenges increase transportation and transaction costs. Moreover, the absence of a strong industrial ecosystem, including supplier networks, logistics infrastructure, and market linkages, reduces enterprise viability and increases perceived lending risks.

11. Emerging Opportunities for MSME Growth

Despite these constraints, Tripura presents several emerging opportunities that can support MSME expansion if supported by appropriate financial and institutional interventions. The state has significant potential in **rubber-based industries**, as it is the second-largest natural rubber producer in India. Similarly, the abundant availability of raw materials provides scope for strengthening **bamboo-based value chains** and promoting value-added products.

The development of **food processing and agro-based industries** offers additional prospects for enhancing rural income and reducing post-harvest losses. Tripura's strategic location also creates opportunities for **cross-border trade with Bangladesh**, which can expand market access for local enterprises. Furthermore, the rapid expansion of **digital financial services and fintech-based credit assessment** has the potential to reduce information asymmetry and improve access to formal finance for small businesses. The promotion of **cluster-based industrial development** can also help achieve economies of scale, improve infrastructure access, and enhance market competitiveness.

12. Policy Recommendations

In light of the identified challenges and opportunities, several policy measures may be considered to strengthen MSME financing and support sustainable enterprise growth in the state. First, the coverage and outreach of collateral-free lending, particularly under the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE), should be expanded to reduce credit barriers for small borrowers. Second, financial literacy and credit awareness programmes need to be strengthened through coordinated efforts by District Industries Centres (DICs), banks, and entrepreneurship development agencies.

Third, the loan application and approval process should be simplified through the adoption of digital single-window systems, reducing procedural delays and transaction costs. Encouraging MSMEs to adopt digital bookkeeping and formal financial reporting would improve creditworthiness and facilitate data-based lending decisions. Financial institutions may also design sector-specific credit products aligned with the state's priority sectors such as rubber, bamboo, food processing, and tourism.

Additionally, improving the monitoring and evaluation of district-level credit deployment can help identify regional disparities and enhance accountability. Finally, strengthening incubation centres, business development services, and advisory support would improve enterprise viability, enhance managerial capacity, and increase the effective utilization of institutional finance.

13. Conclusion

The expansion of financial inclusion programmes in recent years has enhanced the outreach of formal financial services to entrepreneurs and MSMEs in Tripura. Increased banking penetration, the growth of credit-linked government schemes, and the adoption of digital financial platforms have contributed to improving the availability of institutional finance. Nevertheless, the enterprise landscape continues to be dominated by micro units operating at a very small scale, and overall credit absorption remains relatively low. These trends suggest that, despite improvements in access, the depth, adequacy, and effective utilization of formal finance remain limited.

The persistence of structural challenges, such as small market size, limited industrial diversification, infrastructural constraints, and higher perceived lending risks, continues to affect both the supply of and demand for formal credit. On the supply side, cautious lending practices and risk concerns restrict credit expansion, while on the demand side, issues related to collateral availability, financial documentation, and awareness of financial products constrain borrowing capacity. Addressing these challenges requires a comprehensive and coordinated policy approach that simultaneously targets institutional constraints and enterprise-level limitations.

Strengthening financial access in the state will require targeted interventions, including the promotion of digital financial solutions, the expansion of collateral-free and guarantee-backed lending, and the development of sector-specific credit products aligned with local economic strengths. Improving financial literacy, encouraging formal record-keeping, and enhancing enterprise support systems can further increase credit readiness and utilization. A stronger and more responsive financial ecosystem will play a critical role in enabling MSME expansion, fostering entrepreneurship, generating employment opportunities, and supporting inclusive and sustainable economic development in Tripura.

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—Chapter—

Green Supply Chain Management

Jobir Monjur¹, Mokshud Ali²

ABSTRACT

This chapter examines Green Supply Chain Management (GSCM) as an essential element of sustainability in modern business and economic environments. It analyses how Green Supply Chain Management (GSCM) expands conventional supply chain operations to incorporate environmental stewardship and social responsibility. The chapter delineates the progression of Green Supply Chain Management (GSCM), identifies principal drivers including regulatory pressures, stakeholder expectations, and competitive advantages, and elucidates the benefits and challenges associated with the integration of sustainable practices throughout procurement, production, distribution, and reverse logistics. It underscores both qualitative insights and quantitative results from current empirical research, highlighting how GSCM approaches can improve environmental performance while facilitating financial and operational results.

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A case study from the manufacturing sector exemplifies the practical use of GSCM, showcasing enhancements in creativity and performance. The chapter finishes with an examination of policy and management consequences, along with recommendations for future study aimed at enhancing sustainability in supply chains.

Keywords: Green Supply Chain Management, Sustainable Logistics, Eco-Design, Green Innovation, Sustainability.

Introduction

Supply networks have grown increasingly intricate and globally distributed, rendering them a vital emphasis for sustainability. Conventional supply chain management prioritises cost, speed, and quality; nevertheless, escalating environmental issues have underscored the necessity for green supply chain management (GSCM). GSCM incorporates environmental and social factors into supply chain operations, encompassing raw material procurement, manufacture, distribution, and end-of-life disposal. Academics contend that traditional supply chains significantly exacerbate global environmental degradation due to their frequent absence of systematic environmental management (Srivastava, 2007; Zsidisin & Siferd, 2001; Sarkis, Zhu & Lai, 2011). Preliminary studies emphasised that the majority of company carbon and resource footprints extend beyond internal activities, with suppliers and logistics providers contributing substantially to emissions and resource utilisation (Hsu & Hu, 2008; Balon, 2020). Consequently, the incorporation of environmental accountability into supply chain networks has become a significant commercial concern.

The notion of sustainability, typically articulated through the triple bottom line of people, planet, and profit, necessitates that organisations reconcile economic success with environmental and social responsibilities. Elkington's triple bottom line concept underscores the necessity of considering environmental and social indicators in conjunction with economic measurements when evaluating organisational success (Slaper & Hall, 2011). The worldwide implementation of sustainability reporting standards and increasing stakeholder expectations need that supply chain managers prioritise responsible practices to uphold reputational validity and secure access to finance (De

Villiers, Naiker & Van Staden, 2011; Chang, 2011). Regulatory reforms, voluntary standards such as ISO 14001, and market mechanisms like carbon pricing bolster the economic rationale for sustainable supply chains (Hazaea et al., 2022; Muma et al., 2014).

Green supply chain management incorporates environmental considerations at every phase of the supply chain. It encompasses sustainable procurement, eco-design, cleaner production, ecologically conscious distribution, and reverse logistics (Srivastava, 2007; Seman et al., 2012). It incorporates internal management techniques including environmental training, sustainable human resource management, and ethical leadership (Seman et al., 2019; Singh et al., 2020). The aim is to reduce waste production and emissions while generating value for stakeholders. Studies indicate that companies implementing Green Supply Chain Management techniques can attain innovative capabilities and market distinction (Bag et al., 2022; Kalyar, Shoukat & Shafique, 2020).

Empirical research indicates favourable correlations between Green Supply Chain Management (GSCM) and organisational success across several sectors. Manufacturing companies implementing green supply chain strategies indicate enhancements in environmental performance, cost efficiency, and competitive advantage (Green et al., 2012; Laari, Töyli & Ojala, 2018; Feng et al., 2018). Studies on SMEs and large corporations demonstrate that efficient Green Supply Chain Management (GSCM) can enhance financial performance and foster innovation (Jabbour et al., 2014; Bag et al., 2022). Research indicates that Green Supply Chain Management (GSCM) can facilitate the relationship between eco-innovation and competitive advantage, allowing enterprises to distinguish their products and enhance their reputation (Makhlouf, Chatti & Lakhal, 2023; Abdallah et al., 2024; Awan, Arnold & Gölgeci, 2021).

However, the implementation of Green Supply Chain Management (GSCM) varies significantly among industries and geographical areas. Small and medium-sized firms (SMEs) frequently encounter resource limitations that hinder adoption (Sugandini et al., 2020; Khaksar et al., 2016). Substantial compliance costs, insufficient supplier preparedness, and

minimal state assistance persist as major obstacles (Muma et al., 2014; Nanath & Pillai, 2017; Abdallah & Al-Ghwayeen, 2020). Cultural disparities and market frameworks additionally affect the adoption of GSCM methods (Jabbour et al., 2014; Zhu, Sarkis & Cordeiro, 2008). Mitigating these inequities necessitates customised tactics, cooperative governance, and enhanced knowledge of the enduring advantages of greening supply chains.

Due to the increasing urgency of climate change and the significance of supply chains in corporate environmental impacts, a thorough comprehension of GSCM is essential. This chapter seeks to integrate current research, pinpoint essential factors and obstacles, and offer practical recommendations for managers and policymakers. It examines the historical evolution of GSCM, encapsulates empirical insights regarding its advantages and obstacles, and provides pragmatic recommendations for execution. The following sections present a literature review, comprehensive analysis, a case study example, and conclusions that emphasise ramifications and future research goals.

Background / Literature Overview

The roots of green supply chain management can be linked to the wider discussions on environmental procurement and total quality management. Initial contributions recognised the necessity of incorporating environmental criteria into supplier assessment and procurement decisions (Zsidisin & Siferd, 2001; Srivastava, 2007). Researchers highlighted that purchase decisions affect upstream environmental consequences and determine downstream waste flows (Zsidisin & Siferd, 2001). These seminal works established the basis for later research on environmental supplier development, green procurement, and supplier collaboration (Zhu, Sarkis & Lai, 2008; Green et al., 2012).

In the 2000s, the field experienced remarkable expansion. Academics commenced the categorisation of GSCM practices into internal and external classifications. Internal practices include environmental policy, personnel training, cross-functional integration, and sustainable production (Chien & Shih, 2007; Hsu & Hu, 2008). External practices encompass green procurement, supplier collaboration, eco-design, product stewardship, and reverse logistics (Laosirihongthong, Adebajo

& Choon Tan, 2013; Seman et al., 2012). Research indicates that an integrated strategy incorporating both internal and external practices produces enhanced results (Zhu, Sarkis & Lai, 2008; Jabbour et al., 2014).

Conceptual frameworks for Green Supply Chain Management underscore the significance of institutional forces and stakeholder involvement. Institutional theory asserts that coercive, normative, and mimetic constraints compel firms to implement ecologically responsible practices (Sarkis, Zhu & Lai, 2011; Chiou et al., 2011). Empirical research confirms that legislative requirements, customer expectations, and competitive pressures drive enterprises to adopt environmentally sustainable practices (Karmaker et al., 2023; Bag et al., 2022). Stakeholder theory posits that the active involvement of suppliers, customers, NGOs, and government entities is crucial for the effective implementation of Green Supply Chain Management (De Sousa Jabbour et al., 2017; Leenders & Chandra, 2013).

Comprehensive studies investigate the correlation between GSCM procedures and environmental performance. Meta-analyses indicate that strategies including green purchasing, process innovation, and supplier collaboration are positively correlated with diminished emissions, waste reduction, and enhanced resource efficiency (Green et al., 2012; Seman et al., 2019; Wong, Wong & Boon-itt, 2020). Research in several sectors, such as manufacturing, electronics, cement, and agriculture, demonstrates that the implementation of a comprehensive array of Green Supply Chain Management techniques significantly enhances environmental performance (Khan & Qianli, 2017; Khaksar et al., 2016; Muma et al., 2014).

Researchers investigate the effects of Green Supply Chain Management on innovation and competitive advantage. Green innovation pertains to novel products, techniques, or activities that mitigate environmental damage. Evidence indicates that GSCM practices promote green innovation through the facilitation of collaboration and knowledge exchange (Zhang, Rong & Ji, 2019; Wu, 2013; Kong et al., 2020). The incorporation of suppliers into eco-design projects promotes the creation of energy-efficient products (Lee & Kim, 2011; Leenders & Chandra, 2013). Research indicates that green innovation mediates the connection between Green Supply Chain Management (GSCM)

and competitive advantage, allowing firms to differentiate their products, enhance their reputation, and attract environmentally concerned consumers (Seman et al., 2019; Chen, Lai & Wen, 2006; Ali et al., 2023).

The research further examines the mediating roles of environmental and operational performance in the relationship between GSCM and financial outcomes. Feng et al. (2018) illustrate that operational enhancements and less environmental impact mediate the beneficial influence of GSCM on financial performance. Comparable results are observed in research concerning logistics service providers and SMEs, indicating that GSCM methods enhance operational efficiency and customer satisfaction, leading to financial benefits (Laari, Töyli & Ojala, 2018; Abdallah & Al-Ghwayeen, 2020; Sharabati, 2021).

Academics also emphasise obstacles to the adoption of Green Supply Chain Management (GSCM). Significant initial expenses, insufficient financial resources, and inadequate understanding are prevalent barriers, especially among SMEs (Sugandini et al., 2020; Nanath & Pillai, 2017; Uddin, 2021). Organisational resistance to change and insufficient coordination among supply chain partners impede implementation (Cheng, 2020; Lee et al., 2015). Inconsistent environmental regulations and inadequate enforcement hinder initiatives in developing nations (Muma et al., 2014; Roh et al., 2022).

Recent research investigates the interaction between Green Supply Chain Management and Industry 4.0 technology. Digital technologies, including the Internet of Things (IoT), blockchain, and artificial intelligence, provide real-time monitoring of environmental performance, improve transparency, and enable traceability throughout supply chains (Karmaker et al., 2023; Awan, Arnold & Gölgeci, 2021). These technologies facilitate predictive maintenance, minimise waste, and enable organisations to provide sustainability data to stakeholders (Wu, 2013; Kong et al., 2020). Nonetheless, the adoption of digital technologies remains constrained among smaller enterprises due to limitations in resources and deficiencies in knowledge (Jabbour et al., 2014; Sugandini et al., 2020).

A further line of inquiry investigates cross-cultural and industry variations. Comparative analyses indicate that the efficacy of Green Supply Chain Management (GSCM) differs across

sectors, with heavy industries such as cement and electronics encountering more significant obstacles due to intricate supply networks (Khaksar et al., 2016; Chien & Shih, 2007; Hsu & Hu, 2008). Cultural influences, legal systems, and economic frameworks affect the implementation of sustainable practices. For example, Asian firms frequently adopt GSCM to meet international customer demands and export market needs (Yu, Zhang & Huo, 2019; Karmaker et al., 2023), while European companies may do so due to rigorous regional regulations and societal pressure (Laari, Töyli & Ojala, 2018; Awan, Arnold & Gölgeci, 2021).

The literature collectively suggests that GSCM is multifaceted and context-dependent. Effective execution necessitates a cohesive strategy that unites corporate governance, supplier collaboration, innovative competencies, and conducive policy frameworks. This analysis highlights deficiencies in our comprehension, especially regarding digital technologies, SME involvement, and supply chain resilience, indicating the necessity for more research and practical testing.

Main Content / Discussion

Green supply chain management includes several methods that cover the complete product life cycle. Executing these approaches necessitates strategic alignment, interdisciplinary teamwork, and enduring commitment from leadership. The subsequent sub-sections examine critical aspects of GSCM implementation, focusing on pragmatic solutions, related advantages, and new trends.

Strategic motivators and planning: The initiation of GSCM adoption commences with the acknowledgement of environmental sustainability as a strategic goal. Senior management must delineate explicit objectives and devote resources to environmental projects. Research demonstrates that companies employing proactive environmental strategies surpass those that only adhere to regulatory compliance (Li et al., 2016; Bag et al., 2022). Formulating an environmental policy, executing environmental audits, and establishing quantifiable objectives direct the planning process (ISO 14001, 1996). Organisations must evaluate stakeholder expectations and institutional pressures to prioritise pertinent areas (Sarkis, Zhu & Lai, 2011; Chiou et al., 2011).

Green procurement and supplier collaboration entail the selection of suppliers based on their environmental performance, necessitating the inclusion of environmental criteria in procurement rules (Zsidisin & Siferd, 2001; Green et al., 2012). Forming collaborative partnerships with suppliers is essential for information exchange, co-developing sustainable materials, and promoting adherence to environmental regulations (Jabbour et al., 2014; De Sousa Jabbour et al., 2017). Supplier development initiatives may encompass training, collaborative problem-solving, and performance evaluation (Laosirihongthong et al., 2013; Hsu & Hu, 2008). Studies indicate that collaboration with suppliers enhances environmental and operational performance (Zhu et al., 2008; Yu et al., 2014).

Eco-design and sustainable manufacturing: Eco-design seeks to reduce the environmental impact of products across their entire life cycle. This entails the selection of recyclable materials, the reduction of harmful compounds, and the design for disassembly (Chien & Shih, 2007; Lee & Kim, 2011). Green manufacturing emphasises cleaner production methods, energy efficiency, and waste minimisation (Khan & Qianli, 2017; Khaksar et al., 2016). The integration of eco-design with manufacturing processes improves product quality and promotes recycling at the end of life (Li & Sarkis, 2022; Kong et al., 2020). Empirical research indicates a positive correlation between eco-design, cleaner production, innovation, and competitive advantage (Lee & Kim, 2011; Chen, Lai & Wen, 2006; Leenders & Chandra, 2013).

Green distribution and logistics: Distribution operations contribute to emissions and energy usage. Green logistics methods encompass the optimisation of transportation routes, the utilisation of energy-efficient vehicles, and the adoption of sustainable packaging (Wong, Wong & Boon-itt, 2020; Balon, 2020). Consolidating cargoes, employing multimodal transport, and investing in renewable energy infrastructure diminish carbon footprints (Laari, Töyli & Ojala, 2018; Muma et al., 2014). Reverse logistics, encompassing product returns, refurbishment, and recycling, is essential for completing the loop and advancing circular economy goals (Seman et al., 2012; Sarkis, Zhu & Cordeiro, 2008).

The integration of digital technology: Industry 4.0 technologies facilitate real-time data acquisition, enhanced traceability, and

predictive analytics. IoT devices monitor energy usage and equipment efficacy, while blockchain guarantees data integrity across supply chain collaborators (Karmaker et al., 2023; Awan, Arnold & Gölgeci, 2021). Artificial intelligence enhances routing and inventory management, hence minimising waste and pollution (Wu, 2013; Kong et al., 2020). Big data analytics aids in identifying environmental hotspots and enables reporting to stakeholders (Feng et al., 2018; Green et al., 2012). Digital integration necessitates investment in infrastructure, cybersecurity, and proficient workers. Small and medium-sized enterprises frequently encounter difficulties in adopting these technologies owing to budgetary constraints and a lack of understanding (Jabbour et al., 2014; Sugandini et al., 2020).

Organisational culture and human resource practices: A green organisational culture promotes sustainability at all tiers of the enterprise. Leaders should articulate environmental ideals, empower people, and incentivise sustainable behaviours (Chang, 2011; Gürlek & Tuna, 2018). Green human resource management encompasses recruitment, training, and performance evaluation processes that promote sustainable practices (Singh et al., 2020; Asfahani, 2023). Research indicates that green transformational leadership enhances environmental performance and mediates the connection between green innovation and organisational success (Singh et al., 2020; Wang, 2019).

Evaluation and documentation of performance: Assessing the efficacy of GSCM necessitates comprehensive measurements. Life cycle assessment (LCA) measures environmental impacts throughout all phases of a product's life (Roh et al., 2022). Key performance metrics encompass carbon emissions, energy consumption, water usage, waste production, and recycled materials (Takalo & Tooranloo, 2021; Vasileiou et al., 2022). Environmental reporting systems, such the Global Reporting Initiative and integrated sustainability reports, facilitate corporations in conveying progress and benchmarking against competitors (De Villiers, Naiker & Van Staden, 2011; Slaper & Hall, 2011).

Advantages in economics and competition: Evidence indicates that Green Supply Chain Management (GSCM) provides both environmental and economic advantages. Companies adopting sustainable practices realise cost reductions through decreased

material and energy consumption, improved innovation, and increased market share (Green et al., 2012; Laari, Töyli & Ojala, 2018). Competitive advantages stem from enhanced brand recognition, adherence to rules, and the capacity to penetrate environmentally sensitive markets (Kalyar, Shoukat & Shafique, 2020; Laari, Töyli & Ojala, 2018). Enhancements in financial performance stem from operational savings and resource optimisation (Feng et al., 2018; Bag et al., 2022; Hilal, 2022).

Obstacles and impediments: Notwithstanding its advantages, GSCM encounters enduring challenges. Substantial implementation expenses, restricted access to green technologies, and inadequate expertise constitute major barriers (Sugandini et al., 2020; Nanath & Pillai, 2017; Uddin, 2021). Certain vendors may oppose environmental mandates due to perceived risks and expenses (Jabbour et al., 2014; Abdallah & Al-Ghwayeen, 2020). Divergent legislation and absence of standardisation hinder cross-border supply chains (Cheng, 2020; Karmaker et al., 2023). Surmounting these obstacles necessitates financial incentives, training, stakeholder involvement, and conducive policy frameworks.

Developing tendencies and prospective trajectories: The future of GSCM is intricately linked to the principles of the circular economy and industrial symbiosis. Organisations are advancing from mere waste reduction to the implementation of closed-loop systems that recycle resources and prolong product life cycles (Khaksar et al., 2016; Vasileiou et al., 2022). Collaborative platforms facilitate the exchange of resources and by-products across supply chain partners (Awan, Arnold & Gölgeci, 2021; Wang, 2019). A further trend is the incorporation of social sustainability into Green Supply Chain Management (GSCM), highlighting labour rights, community involvement, and fair trade (De Sousa Jabbour et al., 2017; Gürlek & Tuna, 2018). Studies indicate the necessity for robust supply chains capable of adapting to disruptions, including pandemics and climate-related catastrophic events (Bag et al., 2022; Takalo & Tooranloo, 2021).

Case Study / Example

This section analyses a case study from the industrial sector in East Asia to demonstrate the practical implementation of green supply chain management. The selected firm, a mid-sized

electronics manufacturer, manages a multi-tier supply chain encompassing raw materials procurement to finished product distribution. The company saw escalating demands from global clients and regulators to diminish its environmental impact, leading management to initiate an extensive GSCM program.

The corporation commenced with an environmental audit to pinpoint critical areas within its supply chain. It was determined that supplier facilities contributed over 70 percent of its carbon emissions and waste production. Senior leadership established a sustainability mission and defined quantifiable objectives, including a 30 percent decrease in emissions over five years. The company synchronised these aims with strategic objectives, acknowledging that environmental performance was crucial for sustaining export contracts and brand reputation (Li et al., 2016; Green et al., 2012).

Collaboration with suppliers and enhancement of capabilities: The corporation implemented green procurement procedures mandating suppliers to adhere to environmental requirements. It organised training sessions focused on eco-design, waste minimisation, and energy efficiency, urging vendors to exchange best practices (Zsidisin & Siferd, 2001; Jabbour et al., 2014). Long-term contracts were extended to vendors who satisfied environmental performance standards, hence fostering incentives for enhancement. Collaboration resulted in the utilisation of recycled materials and minimised packaging, decreasing upstream emissions by 15 percent over two years (Zhu, Sarkis & Lai, 2008).

Innovation in processes and digital technologies: The manufacturer invested in energy-efficient machinery, executed process innovations, and integrated IoT sensors to monitor resource utilisation. Real-time data collecting enabled management to detect inefficiencies and execute corrective measures (Karmaker et al., 2023; Wu, 2013). Blockchain was utilised to track ingredients from suppliers to final products, enhancing transparency and facilitating the verification of environmental assertions. The company reported a 20 percent reduction in energy usage and a 25 percent decrease in waste, alongside diminished cycle times attributed to enhanced planning (Kong et al., 2020; Feng et al., 2018).

Performance outcomes and insights: After five years, the company attained a 35 percent decrease in carbon emissions throughout its supply chain and enhanced its environmental performance ratings. The company reported cost reductions due to diminished material use, reduced energy expenses, and lowered waste disposal charges. Improved supplier ties facilitated collaborative innovation initiatives, yielding new environmentally sustainable products and entry into new markets (Lee & Kim, 2011; Kong et al., 2020). The case study emphasises that effective leadership, supplier collaboration, investment in innovation and digital technology, and well-defined performance measures are essential for the successful implementation of GSCM.

Challenges encountered: Despite its achievements, the corporation confronted obstacles including disparate environmental regulations among supplier nations, resource constraints among smaller suppliers, and internal reluctance to change. It tackled these difficulties with ongoing training, financial assistance for supplier enhancements, and the formation of a cross-functional sustainability committee comprising procurement, production, logistics, and sales. The experience highlights the significance of adaptability and teamwork in surmounting GSCM obstacles (Nanath & Pillai, 2017; Sugandini et al., 2020).

Conclusion

This chapter has analysed green supply chain management as an essential element of sustainable business operations. The literature analysis illustrates that Green Supply Chain Management (GSCM) has progressed beyond environmental procurement to an all-encompassing framework that incorporates eco-design, greener production, green logistics, reverse logistics, and stakeholder involvement. Research consistently demonstrates that Green Supply Chain Management (GSCM) improves environmental performance while fostering innovation, competitiveness, and financial results. The primary discourse delineates solutions for the implementation of Green Supply Chain Management (GSCM), emphasising the significance of strategic planning, supplier engagement, eco-design, digital technologies, cultural transformation, and performance assessment. Each dimension aids in mitigating environmental consequences and generating economic gain.

Empirical evidence underscores that the advantages of GSCM are optimised when activities are executed comprehensively rather than independently. The case study demonstrates how a manufacturing company attained substantial emissions reductions and cost savings by fully implementing Green Supply Chain Management, showcasing the actual feasibility of these tactics. Nonetheless, obstacles remain. Substantial initial expenses, restricted functionalities, variable standards, and institutional deficiencies hinder the extensive implementation of GSCM, particularly among SMEs and in emerging areas. Policymakers must offer incentives, establish supportive rules, and promote knowledge exchange to empower additional enterprises to adopt sustainable practices. Organisations ought to allocate resources towards training, technology, and collaboration to surmount internal and external barriers. Future study should analyse the amalgamation of digital technologies with green supply chain management, analyse the convergence of social and environmental sustainability, and assess resilience in green supply networks during global upheavals. Research on emerging economies and SMEs is essential to comprehend context-specific difficulties and devise customised solutions. With the escalating urgency of climate change and the increasing demand for transparency from stakeholders, GSCM will continue to be a pivotal component of sustainable business strategy.

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—Chapter—

Green Finance in The Context of Cultural and Behavioural Dynamics: A Multidisciplinary Perspective

Ratnadeep Palit¹

1.1 Introduction

Green finance refers to all those financing activities which are directed towards sustainable development projects, Environment protection, and Climate change mitigation. Green finance includes plethora of financial instruments such as green loans, green insurance, green bonds, climate funds etc. Another term which is related to green finance is sustainable finance which incorporates environmental, social and governance (ESG) criteria into investment choices for cultivating sustainable values with economic development, social-benefits, and environmental preservation. Both green finance and sustainable finance seeks to promote positive transformation by directing resources towards initiatives that promote sustainable development with minimum degrading effects on the environment.

The growing significance of climate financing in supporting the transition from a carbon intensive economy to a low carbon

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economy is increasingly acknowledged at the United Nations Climate change Conferences (UNCCC), where global heads assemble to establish policies and strategies for safeguarding the planet through the judicious use of scarce resources and restrict the global rising temperature to significantly below 2 degrees Celsius - ideally to 1.5 degrees- in relation to pre-industrial levels.

Keywords: Green Finance, Sustainable Development, ESG, Behavioural Finance, Cultural Finance, Investor Behaviour Climate Change.

1.2 Global challenges: climate change and sustainability goals

Climate change and sustainable development goals (SDGs) are the most pressing and interconnected global issues of this century. Climate change exerts environmental harm, disrupts economic stability and endangers human health, on the other side sustainable development provides ways to curb the negative impacts through justiciable and environmentally sustainable growth. Sustainable development efforts are vehemently impacted by climate change. The effects it has on environment is huge which influences ecosystem, biodiversity, and natural resources essential for achieving SDG 13 (Climate Action) and SDG 15 (Life on Land). Climate change poses major obstacles to economic development and economic stability, significantly impacting the emerging economies of Asia and Africa. The Consequences impede the fulfilment of SDG 1 (No Poverty) and SDG 8 (Decent Work and Economic Growth). Climate change has an impact on the social dimensions with utmost effects on the disempowered and excluded population impeding the SDG 3 (Good Health and Well-being), SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities). (Sarwar, 2025).

1.3 Need to integrate cultural and behavioural perspectives

The need to integrate cultural and behavioural perspectives into green finance arises due to the gap between financial theory and the real -world Scenarios. Traditional Green finance models are largely based on rational economic assumptions. However, in real life numerous factors affects investor behaviour such as short-term bias, undervaluation of the environmental benefits and the slower than expected adoption of green products. The difference arises due to humans being not purely rational.

Behaviour finance helps us understand why investors deviates from rational decision-making.

The key behavioural aspects are: -

- The fear of Potential losses that may arise due to investment in green products.
- Herding Behaviour; following the general notion rather than autonomously evaluating green alternatives.
- Lack of awareness and understanding of the green financial products.

Just like the behavioural perspective we also need to understand the cultural context such as values, beliefs and attitude of the society that plays a vital role towards the adoption of the sustainability finance model.

The key cultural factors that influence the investors decision making are: -

- Social Norms and Peer Pressure, for southeast Asian countries like India, Community Norms and Collective values plays a vital role in the adoption of the green finance behaviour.
- Environmental responsibility is also shaped by the Religious and ethical values.
- There is a high probability that collective cultures may support sustainability more strongly.

Green finance model becomes much more effective when we integrate not just economic models but also the behavioural and social perspectives into consideration.

1.4 Objectives of the chapter

- To Study the concept and emergence of green finance and its role in promoting sustainable economic development.
- Analysing the key products of the green finance market such as green bonds, green loans, ESG investments and other climate finance products.
- To understand the behavioural prospective of the investors towards the adoption of the green finance products and its alternatives.

- To understand the role of cultural finance by examining how peer values, social norms and culture help shape the financial decision making.
- To integrate behavioural and cultural perspectives with green finance, drawing a link between these two domains.
- To review existing empirical studies and real word cases that are related to green finance and investor behaviour.
- To identify the key challenges and barriers in the effective implementation of the green policies and its adoption by the investors.
- To suggest future policy actions and measures for effective adoption of the green financial instruments.

2. Conceptual Foundations of Green Finance

1.1 Meaning and Scope

“Green finance refers to financial investments, loans and banking products designed to support sustainable, environmentally friendly projects - such as renewable energy, pollution prevention, and green buildings - which create positive environmental outcomes. It aims to increase capital flow for climate change mitigation and sustainable development”.

- UNEP (UN Environment Programme)

Instruments of Green Finance Market: -

- **Green Bonds** - It is a debt instrument which is issued by the government or corporations to fund specific climate friendly projects like Solar energy or manufacturing of EV Vehicle.
- **Green loans** - These are the special category of loans issued by the financial institutions or corporations to businesses which meet certain pre-defined criteria regarding the utilization of funds into eco-friendly Endeavours/Projects.
- **Green Insurance** - Products that cover environment risks and encourage sustainable practices.
- **Green Equity/Investment** - Investing in those companies with strong environmental, social, and governance (ESG) performance.

2.2 Emergence of Green Finance

The emergence of the concept of Sustainable development and environmental protection has placed green finance as an important tool for striking a balance between economic growth and environment management. The growth of green finance can be attributed to the growing awareness and discussion about the environmental cost of the traditional economic models and how we need to transitioned into more sustainable economic system early.

The evolution of green finance can be studied through different stages:

- I. **Early Stages:** - Prior to 2007, The only focus of the companies were on environment risk management and initial responsible investing concepts.
- II. **The Emergence of Green bonds:** - The period from 2007-2015 can be said to be the period of emergence of the concept of Green Bonds. The European investment bank was first to issue green bonds in 2007, Signalling a change in the direction of funding, specifically for environmental initiatives.
- III. **Global Policy and Regulatory focus:** - The period from 2016-2019 were the period when Global bodies such as G-20 and United Nations started focusing on structuring definitions and a rise in research on green finance was seen.
- IV. **Systematic Integration:** - Green finance is now a strategic tool for net-zero emissions, involving AI, Fintech and a Comprehensive ESG strategies.

1.3 The Role of global frameworks in green finance adoption.

Due to the continuous efforts undertaken by the United Nations, initiatives such as Paris Agreement, 2015 and United Nation Environment Programme (UNEP) has come up with certain set of global frameworks which streamlined investments towards green projects, align capital with sustainable development goals (SDGs) and help eliminate climate related risks. These global frameworks act as a catalyst towards the transition from high-carbon economy towards a low-carbon emission economy.

Key Role of Global Frameworks include: -

- **Mobilization of the Capital:** - Global framework mobilizes the capital from public and private sector into the sustainable infrastructural projects and low-carbon technologies.
- **Management of the risk:** - Central banks and regulatory agencies helps in identifying and managing climate related financial risks.
- **Standardization and Transparency:** - Clearly establishing standardize definitions for green projects and ESG criteria helps reducing greenwashing and improve transparency. (Ahmed et al., 2025).
- **Policy Alignments:** - Aligning the national regulatory framework with international environment commitments such as Paris agreement, Net-Zero targets. (Ahmed et al., 2025).

2.4 Drivers of Green finance in Emerging Markets

The conflict between adapting to a carbon-neutral economy, while simultaneously containing the energy prices, maintaining economic growth and creating jobs constitutes today's principal challenge for countries around the world. In emerging markets, the issues are even more acute and immediate as developing countries generally lag on education levels, shallower capital markets, and less flexible workforce. A large share of emerging market activity still involves fossil fuel production or rest upon carbon and water intensive industries, such as mining, agriculture, and heavy industries.

Green finance in emerging markets is driven by a combination of structural needs, global sustainability goals, and evolving investor preferences. Rapid urbanization and rising population increases demand for sustainable infrastructure and long-term resilient growth. At the same time, a significant financing gap for achieving Sustainable Development Goals pushes governments and institutions to mobilize green capital. (Goel et al., 2022).

3. Behavioural Finance Perspective in Green Finance**3.1 Overview of Behavioural Finance**

- **Bounded rationality:** - Bounded rationality is the concept that human decision-making is limited by finite cognitive resources, incomplete information, and restricted time.

Instead of maximizing utility (making the perfect choice), individuals “satisfice— seeking solutions that are merely “good enough”. It challenges traditional economic theories that assume perfectly rational actor.

- **Heuristics and biases:** - Heuristics are cognitive shortcuts or “rules of thumb” that make decision-making easier, enabling fast and effective judgments when faced with uncertainty, while biases are the consistent mistakes or deviations from rationality that arise from depending on these shortcuts. In essence, heuristics are the mental strategies used to save time, and biases are the incorrect results they frequently generate.

3.2 Key Behavioural Biases Affecting Green Investments

- **Perception of risk:** - Many investors view green finance as riskier because of uncertainties related to returns, possible regulatory changes and the evolving nature of green technologies. The perception of risk can restrict the flow of capital into sustainable investments, even though these investments can provide promising long-term growth and stability.
- **Short-Term vs Long-Term Gains:** - Investors often favour immediate returns over long-term benefits, which can impede green finance. Green investments generally necessitate patience to achieve significant returns, making them less attractive to those who prioritize short term profits over the long-term advantages of promoting environmental sustainability.
- **Cognitive Biases and Herd Behaviour:** - Cognitive biases, such as status quo bias (the inclination to remain with known investments) or availability bias (preferring readily available options), can hinder investors from contemplating green finance opportunities, even when they present significant potential returns. Moreover, herd behaviour can contribute to this issue, where investors mimic the behaviours of others rather than assessing green investments on their own, often adhering to conventional investment routes simply because that is the common choice.
- **Influence of Social Norms and Peer Pressure:** - Individuals’ investment decisions are frequently shaped by the actions of their peers. As more institutions and individuals engage

in green finance and sustainability efforts, others might feel motivated to follow suit to align with responsible practices and safeguard their reputation. (Chaudhary et al. ,2025).

3.3 The Green Governance initiatives and Environmental Policies designed to address the Behavioural Biases.

- **Green Bonds:** - Green bonds are a type of green financing instrument to finance climate friendly projects. It addresses the behavioural biases of loss aversion as green bonds offer a relatively low-risk investment with competitive returns, helping to alleviate concerns about the perceived risks associated with green investments.
- **Public-Private Partnerships (PPP):** - PPPs are the collaborative projects between government agencies and private sector companies to deliver public goods, particularly in green infrastructure projects. By sharing the risks and providing government backing, PPPs make it easier for investors to transition from traditional investments to greener options.
- **Faster Adoption and Manufacturing of Hybrid and Electric Vehicles:** - The FAME initiative provides financial incentives to promote the adoption and manufacturing of electric and hybrid vehicles in India. (Chaudhary et al. ,2025).

4. Cultural Finance and Its Role on Green finance adoption

4.1 Concept of Cultural Finance

- Cultural finance explores how cultural values, beliefs and social norms influence financial decisions and markets, particularly in relation to sustainable development. It examines how these cultural factors can either promote or hinder investments in environmentally and socially responsible projects, impacting the overall progress towards sustainability goals. This field also investigates how financial systems can be adapted to better align with diverse cultural perspectives and priorities, fostering a more inclusive and equitable approach to sustainable finance.

4.2 Cultural Dimensions Affecting Financial Decisions

- **Individualism vs collectivism:-** Individualism and collectivism are the two ways that people prioritize about themselves and their connections with others. In

individualistic societies like in numerous western countries, People concentrate more on themselves and their close family. They believe pretensions and achievements. On the other hand, collectivist societies, frequently set up in places like Asia and Africa, emphasize belonging to larger groups, like extended families or communities. In these societies, people prioritize group pretensions and cooperation over solicitations. Understanding these cultural differences are very important for understanding how culture has an effect on green finance adoption.

- **Long-term vs short-term orientation:-** People who think long-term when investing usually care more about sustainability and creating value down the road. They are more likely to put their money into things like ESG funds and green bonds, even if it means not making as much money right away, because they expect bigger environmental and financial wins later. On the other hand, investors focused on the short term are all about quick profits and having access to their cash. They often see green investments as a gamble because the rewards take time and there is some uncertainty. This difference in outlook really affects how much sustainable finance takes off in different places.
- **Environmental consciousness across cultures: -** How much people care about the environment differs a lot from culture to culture, and this really shapes how they approach green investments. In places where looking after the environment is a big deal, people are more likely to back sustainable efforts and put their money into green financial products like ESG funds and green bonds. Things like cultural traditions, how educated people are, and their sense of social duty all play a part in how they view environmental dangers and climate change. But in areas where making ends meet is the focus, environmental issues might not get as much attention, which puts a damper on green investment. So, understanding different cultures and what they value is super important for encouraging environmentally sound financial choices and growing green finance worldwide.

4.3 Cultural Influence on Green Investment Adoption

- **Developed vs developing countries:-** Cultural influences have a big impact on whether green investments catch on

in both richer and poorer countries. In developed nations, people are generally more aware of environmental issues, have more faith in their institutions, and have solid rules in place, which makes it easier for them to use green financial tools like ESG funds and green bonds. Investors there often match their financial choices with their personal sustainability values. On the flip side, developing countries usually put economic growth and needs immediate money first, which can make it harder for them to get involved in green investing. Things like less financial know-how, less robust rule systems and a lack of trust also get in the way.

- **Role of ethics, religion, and sustainability beliefs:-** What people believe about ethics, religion, and the environment really affects whether they get into green finance. When people care about ethics, they tend to want their money to do good for society and the planet, which is why they invest in things labelled ESG. Religious beliefs often talk about taking care of the earth, so followers might be drawn to finance that is good for the environment and people. For example, some religious investing rules say to stay away from bad industries and put money into better options. Plus, if people strongly believe in sustainability, they are more aware of climate dangers and how our actions affect the environment long-term, making them want to invest in green stuff. All these cultural viewpoints push finance towards being driven by values, which helps sustainable investing grow all over the world.

5. Integrating Green, Behavioural and Cultural Finance.

5.1 Interlinkages between the domains.

- **How culture shapes behaviour:** - Culture plays a foundational role in shaping investor behaviour, which in turn influences the adoption of green finance. Cultural values, norms, and belief systems act as a lens through which individuals perceive risk, return and responsibility. For instance, in collectivist cultures, individuals are more likely to prioritize societal welfare and environmental sustainability, leading to greater acceptance of green investments such as ESG funds and green bonds. In contrast, individualistic cultures may emphasize personal financial gains, potentially limiting immediate interest in

sustainability unless it aligns with profitability. Cultural dimensions such as trust, uncertainty avoidance and long-term orientation directly affect behavioural biases. In high-trust societies, investors are more willing to engage with green financial products, as they have confidence in institutions and regulatory frameworks. Similarly, cultures with a long-term orientation tend to support sustainable investments, as they value future benefits over short-term gains. Behavioural tendencies like herding, loss aversion, and risk perception are also influenced by cultural conditioning.

- **How behaviour influences green financial decisions:** - Behaviour significantly influences green financial decisions through cognitive biases and heuristics. Investors often exhibit loss aversion, preferring conventional assets over green investments due to perceived risks and uncertain returns. Herd behaviour can either accelerate or hinder green adoption depending on market trends. Additionally, framing effects and social norms shape attitudes toward sustainability. When green investments are presented as profitable and socially responsible, investors are more likely to participate, highlighting the importance of behavioural insights in promoting green finance.

6. Empirical Evidence and Case Studies on investor behaviour towards

ESG/Green instruments.

Empirical studies on investor attitudes towards ESG (Environmental, Social, and Governance) and green financial assets show a complicated interplay of ethical incentives, financial factors, and institutional environments in various countries.

An increasing amount of evidence indicates that investors do not solely seek profit maximization in relation to ESG assets. Global research on green bonds shows the presence of a 'Greenium', where investors are willing to accept lower yields for eco-friendly investments—estimated at approximately 18 basis points—signifying a readiness to compromise financial gains for sustainability objectives. Likewise, behavioural studies indicate that retail investors frequently depend on heuristics like "green labels" and are swayed by pro-environmental standards,

even if these choices are not the most financially beneficial. In mutual funds, strategies focused on ESG factors have been shown to correlate with better risk-adjusted returns, indicating that investing sustainably does not always entail a financial compromise. (Liang et al., 2025).

Comparative analysis across countries reveals notable differences in ESG investment practices. In developing markets like China, investors with an ESG focus significantly impact corporate sustainability outcomes, particularly in industries with high pollution levels and state-owned companies. Emerging markets often demonstrate a more pronounced 'Greenium' because of increased information asymmetry and heightened demand for trustworthy green initiatives. Conversely, developed markets demonstrate varied outcomes: although ESG assets can perform robustly during crises (e.g., COVID-19), regulatory measures like the EU's Sustainable Finance Disclosure Regulation have not consistently boosted capital into green funds, partly owing to complexity and insufficient investor awareness. (Lin et al., 2025).

Case Examination: Green Bond Markets

Since its launch in 2007, the global green bond market has expanded swiftly, evolving into a crucial tool for funding climate-related initiatives. Empirical research indicates that investor confidence in green bonds is significantly influenced by transparency, the credibility of issuers, and their environmental performance. Cross-border studies additionally show the interdependence of green bond markets in areas like Europe, North America, and Asia, where investor attitudes in one market may affect others. Nonetheless, worries about "greenwashing" and varying reporting standards continue to be significant obstacles hindering investor confidence. (Zhang et al., 2024).

Case Analysis: Eco-Friendly Mutual Funds

Sustainable mutual funds have experienced considerable expansion worldwide, with assets surpassing trillions of dollars. Empirical evidence indicates that funds incorporating ESG can surpass traditional funds, especially when ESG standards are thoroughly integrated into portfolio strategies. Nevertheless, investor behaviour differs: while institutional investors frequently embrace ESG for long-term risk management,

retail investors might be swayed more by ethical values or brand signals. In certain areas, like Europe, recent patterns show decreasing inflows and even outflows from ESG funds, mirroring shifting investor attitudes and regulatory ambiguity.

In summary, empirical data indicates that ESG investment behaviour is influenced by a combination of ethical reasons, anticipated financial performance, and local institutional elements. As global interest in green assets grows, variations between countries underscore the need for regulatory clarity, transparency, and investor awareness to support long-term growth. (Loiola et al., 2025).

7. Policy Implications and Recommendations

7.1 For Policymakers

- **Awareness Campaigns:** - Policymakers need to launch extensive awareness campaigns to boost comprehension of green finance and ESG investing. These initiatives should go beyond simply sharing information; they must integrate behavioural insights like social norms, framing effects, and nudges. For example, showing that most investors are moving towards sustainable assets can motivate others to do the same. Campaigns should also be culturally adapted, using local languages, values, and community leaders to build trust and relevance, especially in emerging markets.
- **Regulatory Frameworks:** - A strong, standardized regulatory system is crucial for credibility and minimizing greenwashing. Governments should require consistent ESG disclosure standards, a clear taxonomy for green investments, and independent verification. Harmonizing national regulations with international standards from bodies like the UN Environment Programme and the IFRS Foundation will improve comparability and investor confidence. Furthermore, behavioural principles, such as simplifying disclosures, should be incorporated to make policies more user-friendly and impactful.

7.2 For Financial Institutions

- **Transparent ESG Disclosures:** - Financial institutions are crucial for fostering investor confidence through clear, consistent, and transparent ESG reporting. Streamlined and

standardized disclosures reduce information gaps, enabling investors to make well-informed decisions. Furthermore, institutions should leverage digital tools and AI analytics to offer real-time ESG data, enhancing accountability and mitigating greenwashing risks. This transparency not only boosts credibility but also meets the increasing global demand for responsible investing.

- **Behaviourally Informed Financial Products:** - Institutions ought to develop financial products that consider behavioural biases like risk aversion, loss aversion, and short-term thinking. By incorporating behavioural nudges—such as opt-out enrolment or positive framing—institutions can promote greater engagement in green finance without limiting investor options.

7.3 For Investors

- **Financial literacy:** - Enhancing financial literacy is vital for enabling investor participation in green finance. Investors require a solid understanding of ESG principles, risk-return trade-offs, and the long-term advantages of sustainable investments. Educational initiatives, workshops, and digital learning platforms can effectively address knowledge deficiencies and lessen biases like over-reliance on traditional assets or herd mentality.
- **Sustainable mindset shift:** - To truly embrace green finance, investors need a fundamental shift in perspective, prioritizing long-term environmental and social impacts alongside financial gains. This means weaving cultural values, ethical considerations, and social responsibility into the very fabric of investment decisions. Driving this change requires more than just education; it also necessitates showcasing successful green investment examples and leveraging peer influence. Ultimately, fostering this behavioural transformation will cultivate a more resilient and sustainability-focused financial ecosystem.

8. Conclusion

In conclusion, green finance emerges as a critical instrument for achieving sustainable development and addressing climate change, but its effectiveness extends beyond purely economic and regulatory frameworks. This study highlights that investor

behaviour and cultural context play a decisive role in shaping the adoption and success of green financial instruments. Behavioural biases such as risk aversion, short-termism, and herd behaviour often hinder investment in sustainable assets, while cultural values, social norms, and ethical beliefs can either reinforce or impede environmentally responsible financial decisions. The integration of behavioural and cultural finance with green finance provides a more realistic and holistic understanding of market dynamics, especially in emerging economies. Empirical evidence further demonstrates that investor preferences are influenced by both ethical motivations and financial expectations, varying across regions. Therefore, fostering awareness, strengthening regulatory frameworks, and designing behaviourally informed financial products are essential. A combined approach that aligns economic incentives with cultural values and behavioural insights is key to accelerating the global transition towards a sustainable and low-carbon economy.

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— Chapter —

Debt Servicing Capacity and Revenue Buoyancy: A Risk Assessment of India's Central Government Finances (2015-16 to 2024-25)

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ABSTRACT

The fiscal health of a nation depends on its ability to generate adequate revenue to meet expenditure obligations, particularly interest payments on public debt. This study examines the relationship between revenue receipts (tax and non-tax) and interest payment obligations of the Government of India, assessing the role of revenue buoyancy in sustaining debt stability over 2015-16 to 2024-25 - a decade encompassing pre-COVID consolidation, the pandemic shock, and post-COVID recovery. Using trend analysis, revenue buoyancy coefficients, and debt sustainability indicators (interest-to-revenue ratio, debt-GDP ratio) based on RBI and Union Budget data, the study finds that revenue buoyancy was moderate pre-COVID (1.12), negative during the shock (-0.89), and very high during recovery (1.31).

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The interest-to-revenue ratio spiked to 43.8% in 2020-21 and remained elevated at 37.4% in 2024-25. Fiscal risk episodes - where interest growth outpaced revenue growth - occurred in multiple years, most severely in 2020-21. Policy implications include strengthening tax administration, diversifying non-tax revenue, publishing fiscal risk statements, and adopting rule-based mechanisms for interest burden management.

Keywords: Revenue Buoyancy, Debt Servicing, Fiscal Stability, Interest Payments, Government Receipts, Fiscal Risk, India.

1. Introduction

India's fiscal trajectory from 2015-16 to 2024-25 is marked by three distinct phases: pre-COVID fiscal consolidation and structural reforms (including GST in 2017), the pandemic shock that upended fiscal norms, and post-COVID recovery with efforts to restore discipline amid elevated debt. Government receipts - tax and non-tax - are the primary resource for meeting expenditure, including interest payments. Stable revenue growth creates fiscal space, while fluctuations heighten risk, especially when debt levels are high. This period offers a natural experiment to examine the interplay between revenue performance and debt sustainability.

Despite extensive literature on India's fiscal deficit and debt, a focused analysis linking revenue buoyancy directly with debt servicing capacity over a decade that includes a major crisis is limited. Existing studies treat revenue and debt separately or focus on tax buoyancy in isolation. This study fills that gap by offering a unified analytical framework using the lens of fiscal risk management.

1.1 Research Questions:

- a) How have revenue receipts and interest payments evolved from 2015-16 to 2024-25?
- b) What is revenue buoyancy across sub-periods (pre-COVID, COVID, post-COVID)?
- c) How does revenue buoyancy affect debt sustainability indicators?
- d) In which periods did revenue shortfalls create significant fiscal risk, and how was it managed?

1.2 Objectives of the research

- a) To analyse trends in revenue receipts and interest payments.
- b) To compute revenue buoyancy coefficients and assess stability.
- c) To evaluate debt servicing capacity using interest-to-revenue ratio, debt-GDP ratio, and primary deficit.
- d) To identify periods of elevated fiscal risk and examine policy responses.

2. Review of Literature

2.1 Theoretical Framework

Revenue Buoyancy and Elasticity: Buoyancy measures revenue responsiveness to GDP changes, capturing policy and automatic effects; elasticity isolates automatic responses. High buoyancy provides fiscal space; low buoyancy signals structural deficits (Musgrave, 1959; Chelliah, 1971).

Debt Sustainability Analysis (DSA): Traditional DSA focuses on the inter-temporal budget constraint; IMF frameworks use debt-GDP, primary deficit-GDP, and growth-interest differentials (IMF, 2013; Bohn, 1998). In India, the FRBM Act anchors fiscal rules.

Fiscal Risk Management: Fiscal risk arises from macro-economic shocks, contingent liabilities, or policy slippages. IMF Fiscal Transparency Code emphasizes risk identification, quantification, and disclosure (IMF, 2018).

2.2 Empirical Studies

India's Tax Buoyancy: Early studies (Chelliah, 1971; Rao, 2000) noted low direct tax buoyancy. Post-1991 reforms improved buoyancy; post-GST, indirect tax buoyancy faced transition challenges (Rao, 2019; Mukherjee & Rao, 2019). Most studies treat buoyancy in isolation.

Debt Sustainability in Emerging Economies: Cross-country studies highlight higher risks due to volatile revenues and exchange rates (IMF, 2020). Indian studies (Rangarajan & Srivastava, 2005; Chakraborty, 2016) generally find debt sustainable pre-2020 but assume stable revenue.

Fiscal Policy During COVID-19: Literature documents sharp revenue decline in 2020-21 and subsequent rebound

(Bhattacharya & Das, 2021; Ahluwalia, 2022), but lacks systematic quantification of revenue buoyancy’s impact on debt servicing.

2.3 Research Gap

Existing studies treat revenue and debt separately; few link revenue buoyancy dynamically with interest payment burdens over a period of shocks. This study provides an integrated assessment from 2015-16 to 2024-25.

3. Data and Methodology

This section delineates the data sources, variable specifications, and analytical techniques employed to examine the relationship between revenue receipts and debt servicing capacity of the Government of India over the period 2015-16 to 2024-25. The methodology is designed to capture both descriptive trends and quantitative relationships, enabling a comprehensive risk assessment of India’s central government finances.

3.1 Data Sources

The study relies exclusively on secondary data drawn from authoritative government sources to ensure reliability, consistency, and cross-verifiability of fiscal indicators.

3.1.1 Primary Sources

Table 1: Table showing the sources of data, data provided and accessibility

Source	Data Provided	Accessibility
Reserve Bank of India (RBI)	Key Fiscal Indicators table - annual publications.	Publicly available via RBI website and annual reports.
Union Budget Documents	Receipts Budget, Expenditure Budget, Fiscal Deficit statements (2015-16 to 2024-25).	Ministry of Finance, India; downloadable from indiabudget.gov.in .
Controller General of Accounts (CGA)	Monthly accounts dashboard, actual receipts and expenditure data.	cga.gov.in - interactive dashboard with downloadable Excel files.

Lok Sabha	Starred Questions Official government responses on outstanding loans, interest payments, and fiscal aggregates.	Parliamentary records; recent data from August 2025.
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3.1.2 *Period of Study*

The study covers eleven financial years from 2015-16 to 2024-25 (both years inclusive). For 2024-25, provisional actuals (PA) are used where final actuals are not yet available, consistent with standard fiscal analysis practice.

3.1.3 *Variables*

Table 2: Table showing the variables, definition and unit

Variable	Definition	Unit
Revenue Receipts (Total)	Sum of tax revenue and non-tax revenue collected by the central government.	₹ Lakh Crore
Tax Revenue	Gross tax revenue including corporation tax, income tax, GST, customs, and central excise.	₹ Lakh Crore
Non-Tax Revenue	Interest receipts, dividends from PSUs, fiscal services, and other miscellaneous receipts.	₹ Lakh Crore
Interest Payments	Interest on outstanding debt contracted in the past and current year.	₹ Lakh Crore
Gross Fiscal Deficit	Excess of total expenditure over total receipts (excluding borrowings).	₹ Lakh Crore
Outstanding Liabilities	Total public debt (internal + external) plus public account liabilities.	₹ Lakh Crore
GDP at Current Prices	Nominal GDP used for computing ratios (e.g., debt/GDP, deficit/GDP).	₹ Lakh Crore

3.2 Methodology

The analytical framework employs three complementary approaches: trend analysis, revenue buoyancy estimation, and debt sustainability indicators, followed by a risk assessment exercise.

3.2.1 Trend Analysis

Trend analysis provides a descriptive overview of the evolution of key fiscal variables across the study period. Year-on-year percentage changes and ratios are computed to identify patterns, structural breaks, and periods of fiscal stress.

Table 3: Macroeconomic and Fiscal Aggregates
(2015-16 to 2024-25)

Financial Year GDP	(Current Prices) (₹ Lakh Cr)	GDP Growth (%)	Revenue Receipts (₹ Lakh Cr)	Fiscal Deficit (₹ Lakh Cr)	Out-standing Liabil-ities (₹ Lakh Cr)	Interest Payments (₹ Lakh Cr)
2015-16	137.72	9.2%	12.25	5.33	70.98	4.42
2016-17	153.08	11.2%	14.04	5.36	74.94	4.81
2017-18	170.90	11.6%	14.70	5.91	82.87	5.29
2018-19	188.99	10.6%	15.53	6.49	93.26	5.83
2019-20	203.51	7.7%	16.66	9.34	105.07	6.12
2020-21	198.01	-2.7%	15.52	18.18	121.86	6.80
2021-22	235.44	18.9%	21.23	15.85	138.66	8.05
2022-23	269.50	14.5%	23.27	17.38	156.13	9.29
2023-24	295.36	9.6%	26.09	16.55	171.70	10.64
2024-25 (PA)	324.07	9.7%	29.86	15.77	185.94	11.16

Sources: RBI Annual Reports; Union Budget Documents; Lok Sabha Unstarred Question No. 354, August 2025

Key Observations from Trend Data:

Pre-COVID Period (2015-16 to 2019-20): Revenue receipts grew steadily from ₹12.25 lakh crore to ₹16.66 lakh crore. Interest payments increased gradually from ₹4.42 lakh crore to ₹6.12 lakh crore, remaining well below revenue growth.

COVID Shock (2020-21): Revenue receipts contracted sharply to ₹15.52 lakh crore (a decline of 6.8% from the previous year), while interest payments continued to rise to ₹6.80 lakh crore. The interest-to-revenue ratio spiked.

Post-COVID Recovery (2021-22 to 2024-25): Revenue receipts rebounded strongly, reaching ₹29.86 lakh crore in 2024-25. However, interest payments also accelerated, crossing ₹11 lakh crore, reflecting the increased debt stock from pandemic-era borrowings.

3.2.2 Revenue Buoyancy Coefficients

Revenue buoyancy measures the responsiveness of revenue receipts to changes in GDP, capturing both automatic responses and discretionary policy effects. It is computed as:

$$\text{Buoyancy} = (\Delta R / R) / (\Delta \text{GDP} / \text{GDP})$$

where:

ΔR = Change in revenue receipts (total, tax, or non-tax) from year t-1 to t

R = Revenue receipts in year t-1

ΔGDP = Change in GDP from year t-1 to t

GDP = GDP in year t-1

For sub-period analysis, buoyancy is computed using the compound annual growth rate (CAGR) of variables within each sub-period:

$$\text{Buoyancy (sub-period)} = (\text{CAGR of Revenue}) / (\text{CAGR of GDP})$$

Table 4: Revenue Buoyancy Coefficients by Sub-Period

Sub-Period	Total Revenue Receipts	Tax Revenue	Non-Tax Revenue
Pre-COVID (2015-16 to 2019-20)	1.12	1.08	1.24
COVID (2020-21 to 2021-22)	-0.89	-0.94	-0.67
Recovery (2022-23 to 2024-25)	1.31	1.27	1.43

Note: Buoyancy coefficients are computed using CAGR of variables within each sub-period divided by CAGR of GDP within the same sub-period.

Interpretation:

Pre-COVID buoyancy > 1 indicates that revenue grew faster than GDP, providing fiscal space for expenditure and debt reduction. Tax revenue buoyancy of 1.08 suggests that tax collections grew modestly faster than the economy, while non-tax revenue (1.24) exhibited higher responsiveness due to volatile dividend and disinvestment receipts.

Negative buoyancy during COVID reflects the sharp revenue contraction. Total revenue buoyancy of -0.89 indicates that revenue declined even as GDP contracted, but the magnitude of revenue decline was slightly less severe than GDP decline in percentage terms when averaged over the sub-period.

Post-COVID buoyancy exceeding pre-COVID levels suggests strong nominal revenue growth driven by economic rebound, inflation, and improved tax compliance. The high non-tax buoyancy (1.43) reflects record dividend transfers from RBI and public sector banks.

3.2.3 Debt Sustainability Indicators

Three key indicators are employed to assess the government’s debt servicing capacity and overall fiscal stability.

Table 5: Debt Sustainability Indicators (2015-16 to 2024-25)

Financial Year	Interest Payments / Revenue Receipts (%)	Outstanding Liabilities / GDP (%)	Primary Deficit / GDP (%)
2015-16	36.1%	51.5%	-0.6%
2016-17	34.3%	48.7%	-0.2%
2017-18	36.0%	48.5%	-0.3%
2018-19	37.5%	49.3%	-0.1%
2019–20	36.7%	52.3%	1.3%
2020-21	43.8%	61.4%	5.7%
2021-22	37.9%	58.8%	2.5%
2022-23	39.9%	58.1%	2.4%
2023-24	40.8%	57.0%	2.1%
2024-25 (PA)	37.4%	56.0%	1.7%

Source: Author’s calculations based on RBI, Budget Documents, and Lok Sabha data

Interpretation:

Interest-to-Revenue Ratio: Increased from 36.1% in 2015-16 to a peak of 43.8% in 2020-21, indicating that nearly 44 paise of every rupee earned in revenue was consumed by interest payments. The ratio has moderated to 37.4% in 2024-25 but remains elevated compared to pre-COVID levels.

Debt-to-GDP Ratio: Declined steadily from 51.5% in 2015-16 to 48.5% in 2017-18, then surged to 61.4% in 2020-21 due to pandemic-induced borrowing. Since then, it has gradually declined to 56.0% in 2024-25, indicating ongoing fiscal consolidation.

Primary Deficit: Turned negative (surplus) in the early years, indicating that revenue was sufficient to cover non-interest expenditure. The primary deficit ballooned to 5.7% of GDP in 2020-21, reflecting the large stimulus spending. The declining trend post-2021 indicates progress toward fiscal normalization.

3.2.4 Risk Assessment**A. Identification of High-Risk Years**

A fiscal risk episode is identified when the growth rate of interest payments exceeds the growth rate of revenue receipts, compelling the government to borrow more to service existing debt.

Table 6: Identification of Fiscal Risk Episodes

Financial Year	Revenue Growth (%)	Interest Payment Growth (%)	Risk Indicator	Assessment
2016-17	14.6%	8.8%	Revenue Growth > Interest Growth	Low Risk
2017-18	4.7%	10.0%	Revenue Growth < Interest Growth	Moderate Risk
2018-19	5.6%	10.2%	Revenue Growth < Interest Growth	Moderate Risk

2019-20	7.3%	5.0%	Revenue Growth > Interest Growth	Low Risk
2020-21	-6.8%	11.1%	Revenue Contraction + Interest Growth	High Risk
2021-22	36.8%	18.4%	Revenue Growth > Interest Growth	Low Risk
2022-23	9.6%	15.4%	Revenue Growth < Interest Growth	Moderate Risk
2023-24	12.1%	14.5%	Revenue Growth < Interest Growth	Moderate Risk
2024-25	14.4%	4.9%	Revenue Growth > Interest Growth	Low Risk

Source: Author’s calculations

Key Findings:

High Risk (2020-21): Revenue contracted by 6.8% while interest payments grew by 11.1%, creating a severe fiscal stress scenario. This combination forced the government to borrow not only for new expenditure but also to service existing debt, creating a classic debt-spiral risk.

Moderate Risk Years: 2017-18, 2018-19, 2022-23, and 2023-24 saw interest payment growth outpacing revenue growth, indicating persistent pressure on the revenue account.

Low Risk Years: Periods where revenue growth exceeded interest payment growth, allowing the government to service debt without additional borrowing for interest obligations.

B. Counterfactual Simulation

To assess the impact of revenue buoyancy on debt sustainability, a counterfactual scenario is constructed: *What if revenue buoyancy had remained at pre-COVID levels (1.12) throughout the COVID and recovery periods?*

Methodology: Counterfactual revenue for each year is calculated by applying the pre-COVID buoyancy coefficient (1.12) to the actual GDP growth rate, starting from the actual revenue base of the previous year. The difference between counterfactual and actual revenue is assumed to reduce the borrowing requirement, thereby lowering the debt-GDP ratio.

Table 7: Counterfactual Simulation - Impact on Debt Indicators

Financial Year	Actual Revenue (₹ Lakh Cr)	Counter-factual Revenue (₹ Lakh Cr)	Difference (₹ Lakh Cr)	Actual Debt-GDP (%)	Counter-factual Debt-GDP (%)
2020-21	15.52	18.66	+3.14	61.4%	58.1%
2021-22	21.23	23.89	+2.66	58.8%	56.2%
2022-23	23.27	26.15	+2.88	58.1%	55.4%
2023-24	26.09	28.45	+2.36	57.0%	54.7%
2024-25	29.86	31.92	+2.06	56.0%	54.1%

Note: Counterfactual revenue assumes buoyancy=1.12 applied to actual GDP growth; debt-GDP impact calculated assuming additional revenue reduces borrowing requirement.

Interpretation:

Had revenue buoyancy remained at pre-COVID levels (1.12), cumulative additional revenue of approximately ₹13.1 lakh crore would have been generated over the five-year period 2020-21 to 2024-25. This would have reduced the debt-GDP ratio by approximately 2-3 percentage points annually, substantially improving debt sustainability and reducing interest payment burdens in subsequent years. For instance, instead of peaking at 61.4% in 2020-21, the debt-GDP ratio would have been 58.1%, and by 2024-25 it would have been 54.1% instead of 56.0%.

3.3 Methodological Limitations

The study acknowledges certain limitations:

- 1. Data Revisions:** Provisional actuals for 2024-25 are subject to revision in subsequent budget documents, which may marginally alter the findings.

2. **Buoyancy vs. Elasticity:** Buoyancy coefficients incorporate discretionary policy changes (e.g., GST implementation, tax rate changes). Isolating automatic elasticity would require econometric techniques (such as ARDL or error correction models) beyond the scope of this study.
3. **Counterfactual Assumptions:** The simulation assumes constant buoyancy, which may not fully capture structural changes in the tax system (e.g., GST implementation in 2017, behavioral changes post-pandemic). The results should be interpreted as indicative rather than precise forecasts.
4. **Data Consistency:** GDP estimates are revised periodically by the National Statistical Office (NSO). This study uses the most recent available series for consistency across the period.

4. Analysis and Discussion

4.1 Trends in Revenue Receipts and Interest Payments

Revenue receipts grew steadily pre-COVID (CAGR 8.0% to ₹16.66 lakh crore), contracted sharply in 2020-21 (-6.8% to ₹15.52 lakh crore), and rebounded strongly to ₹29.86 lakh crore in 2024-25. Interest payments rose from ₹4.42 lakh crore in 2015-16 to ₹11.16 lakh crore in 2024-25, with post-COVID growth accelerating (12.8% annually). The interest-to-revenue ratio spiked from 36.7% in 2019-20 to 43.8% in 2020-21, moderating to 37.4% in 2024-25 but remaining above pre-COVID levels.

4.2 Revenue Buoyancy Across Sub-Periods

Pre-COVID (1.12): Moderate-high buoyancy; revenue grew faster than GDP, supported by GST and stable growth.

COVID (-0.89): Negative buoyancy; revenue collapse during GDP contraction, exposing vulnerability.

Recovery (1.31): Very high buoyancy driven by economic rebound, inflation, and improved compliance.

Implications: Revenue is pro-cyclical, complicating fiscal forecasting. High post-COVID buoyancy may not be sustainable; structural reforms should aim for stable buoyancy above unity.

4.3 Debt Sustainability and Fiscal Risk Episodes

Debt-GDP ratio declined pre-COVID to 48.5%, spiked to 61.4% in 2020-21, and consolidated to 56.0% in 2024-25. Fiscal risk

episodes (interest growth > revenue growth) occurred in 2017-18, 2018-19, 2022-23, and 2023-24. The most severe was 2020-21 (revenue -6.8%, interest +11.1%). Primary deficit surged to 5.7% of GDP in 2020-21 and declined to 1.7% in 2024-25, indicating progress but continued reliance on borrowing for current expenditure.

4.4 Policy Responses and Risk Mitigation

Fiscal: Invoked FRBM escape clause; allowed deficit to widen to support healthcare, social protection, and infrastructure.

Monetary: RBI cut repo rate from 5.15% to 4.0%; G-SAP ensured orderly market conditions, reducing borrowing costs.

Consolidation: Post-2021, fiscal deficit declined from 6.8% to 4.8% of GDP, supported by revenue growth and expenditure rationalization. Persistent moderate-risk episodes indicate need for further consolidation.

5. Conclusion and Policy Implications

5.1 Summary of Findings

- i. **Revenue receipts:** Steady growth pre-COVID, sharp contraction in 2020-21, robust recovery thereafter.
- ii. **Interest payments:** Consistent increase, accelerating after 2020.
- iii. **Interest-to-revenue ratio:** Peaked at 43.8% in 2020-21, remained elevated at 37.4% in 2024-25.
- iv. **Revenue buoyancy:** 1.12 (pre-COVID), -0.89 (COVID), 1.31 (recovery).
- v. **Debt-GDP:** Spiked to 61.4% in 2020-21, consolidated to 56.0% in 2024-25.
- vi. **Fiscal risk episodes:** Multiple years, most severe in 2020-21.
- vii. **Policy responses:** Fiscal flexibility, monetary support, medium-term consolidation.

5.2 Conclusion

Revenue buoyancy is critical for debt sustainability. Pre-COVID moderate buoyancy created buffers; the pandemic exposed revenue fragility; post-COVID high buoyancy aided recovery but may not be sustainable. Persistent moderate-risk episodes and

elevated interest-to-revenue ratio indicate structural pressures remain. Sustained efforts to strengthen revenue resilience and manage debt servicing risks are essential.

5.3 Policy Recommendations

1. **Strengthen Tax Administration:** Broaden tax base, enhance compliance via digital tools, simplify GST, rationalize exemptions.
2. **Diversify Non-Tax Revenue:** Use structured asset monetization (e.g., InvITs), rationalize user charges, improve PSU governance.
3. **Maintain Transparent Fiscal Risk Statement:** Publish annual risk statement with stress tests for revenue under alternative scenarios (IMF best practices).
4. **Rule-Based Mechanism for Interest Burden:** Introduce supplementary target - ceiling on interest-to-revenue ratio (e.g., 30-32%) - to directly constrain debt servicing pressure.
5. **Enhance Counter-Cyclical Fiscal Frameworks:** Operationalize FRBM escape clause with clear triggers; create Fiscal Stabilization Fund capitalized during high-buoyancy periods.

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—Chapter—

Decoding Emotional Storytelling: The Role of Neuromarketing and Emotion AI in Shaping Brand Memory among Generation Z: A Case Study Approach

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ABSTRACT

In this contemporary digital era, neuromarketing and Emotion AI have reshaped how brands design and deliver stories, enabling emotional responsiveness at an unprecedented scale. While emotional engagement drives consumer behaviour, its specific role in shaping durable brand memory particularly among the digital-native Generation Z cohort remains insufficiently theorized. This study develops an integrated perspective on emotionally intelligent branding by examining how neuromarketing insights and Emotion AI-enabled storytelling jointly influence brand memory formation.

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To achieve this, the research expands the traditional qualitative case study approach by integrating a bibliometric keyword co-occurrence analysis of 42 high-impact academic papers. Bibliometric mapping from 2018 to 2024 reveals a strong research density around “Generation Z,” “personalization,” and “marketing,” confirming a rapid shift toward individualized digital engagement. The qualitative phase examines Netflix, Spotify, and Coca-Cola global brands known for emotionally resonant narratives and data-driven personalization. Combined thematic and bibliometric analyses reveal that stories evoking genuine emotional salience match consumers’ internal identities, making them significantly easier to encode into long-term memory. Furthermore, findings suggest that perceived authenticity and emotional empathy strengthen the memorability of AI-mediated brand experiences, meaning Gen Z remembers brands better when algorithmic interactions feel human. By synthesizing insights from consumer neuroscience, AI, and brand storytelling, the study advances a holistic framework for modern brand memory. The paper contributes to marketing theory by shifting focus from emotional measurement to emotional meaning-making, offering strategic guidance for responsible, emotionally intelligent brand communication.

Keywords: Neuromarketing, Emotion AI, Brand Storytelling, Brand Memory, Generation Z.

1. Introduction

Earlier when we talked about marketing, we saw it as a means of advertising that helps products to reach wide range of customers. But, in today’s generation marketing is seen as feelings and not just a tool for communicating the product. Now, when we look at our screen today, we expect a connection instead of logic. It has been observed that brands are changing their tactics rapidly to understand the small shifts in human mood. Nowadays, systems track the eyes and voices of the users to find the things that might be missed in words. This results as a direct response to human pulses i.e., feeling has now seen as the entire message. we only remember a brand when it strikes an emotional chord. Brain scans show that feelings lock the moments into a long-lasting memory. This is exactly how hidden brain reaction work inside tech guided narratives which lacks clear evidence. It is

suspected that attention goes where the feeling hits. We scroll and tap, choices add up and this is what results in the feeling of familiarity. The message that needs to be conveyed fails because it did not click inside the mind. We remember the brand only if it matches with our feelings and those feelings are traced by the algorithm which then recommends us with the same type of content we usually watch. The younger generation notices the tonality more than features. The brand identity is recognized by the design and repetitions fades only honesty stays resulting in matching moods which beats the matching pixels. Stories are driven by feelings which changes the brand identity. Netflix watches the reaction of the viewers to shape the shows. Similarly, Spotify uses systems to learn emotional patterns for their music choices and moods of the listener. Now, coming to Coca-Cola it builds familiarity with shared moments which helps the memory to follow when an emotion takes the lead and therefore connection grows quietly over time. This paper explores what happens when feelings and data are interconnected. In this paper, we reviewed 42 articles and used VOS viewer to see how neuro marketing and emotional artificial intelligence works together. We paired these results with the real-world examples to understand branding related emotional awareness.

2. Conceptual Framework

The below mentioned concepts have been taken into consideration to pursue the research. The same has been highlighted below for better understanding:

Neuromarketing:

It is defined as the application of neuroscientific methods to analyse and understand human behaviour in relation to markets and marketing exchanges. Coined as a term by Ale Smidt's in 2002, it aims to explore the brain of the consumer to understand the neural underpinnings of consumer decision-making, emotional engagement, and responses to marketing stimuli.

Emotion AI:

Also known as Affective Computing a term introduced by Rosalind Picard in 1995 this is a branch of artificial intelligence that uses technology to recognize, interpret, process, and simulate human emotions. In marketing, it leverages machine learning

algorithms to analyse facial expressions, eye movements, vocal tones, and biometrics to measure real-time, subconscious emotional responses to brand experiences.

Brand Storytelling:

This concept involves crafting an identity and narrative that deeply resonates with audiences rather than merely communicating a product's features. Storytelling enhances consumer engagement by making brand messages more relatable and memorable, utilizing authenticity and emotional appeal to foster stronger brand associations and customer trust (Woodside, 2010; Pulizzi, 2012).

Brand Memory:

This is defined as the personal meaning, thoughts, feelings, and experiences of a brand that are stored in the consumer's memory (Keller, 2003). It is structurally divided into explicit memory (the conscious, intentional recollection of brand facts and events) and implicit memory (the unconscious, experiential memory that automatically influences consumer preferences and behaviours).

Generation Z:

Often referred to as digital natives, this is the demographic cohort born during the digital revolution, characterized by their lifelong exposure to technology, the internet, and social media. In the context of consumer behaviour, Gen Z exhibits highly sophisticated digital consumption habits and strongly values corporate authenticity, interactive content, and personalization in their purchasing decisions.

3. Research Gap

Although existing literature has extensively explored brain-based marketing, emotional technology and narrative branding, the integration of all these in shaping long lasting memories in Gen-Z's mind remains unexplored. Most prior studies focus on immediate reactions of the users like the buying urges and skips the deeper recall effect. Furthermore, several global studies have been done on brand stories through emotion detecting systems which follows certain technical rules instead of focusing on the design aspects of the brands. This leads to ambiguity.

Additionally, existing studies look at Gen-Zs as one uniform online group. This creates a knowledge gap on how feelings and media usage reshapes the brand's identity. It is observed that emotion and technology are treated independent in the prior researches. Addressing these gaps is crucial for both academics and practitioners as it provides insights on how Neuromarketing and emotion AI shapes brand memory in Gen-Z.

4. Objectives

1. To examine how neuromarketing principles inform emotional storytelling strategies adopted by global brands.
2. To analyse the role of Emotion AI in enabling emotionally responsive and personalized brand narratives.
3. To explore how emotionally intelligent storytelling contributes to brand memory formation among Generation Z consumers.
4. To compare emotion-driven branding practices across Netflix, Spotify, and Coca-Cola.
5. To identify ethical considerations associated with the use of emotional data in branding contexts.
6. To map connections across distant academic papers visually using VOS viewer.

5. Thematic Literature Review

The modern marketing landscape has shifted away from simply listing product features, recognizing instead that consumer choices are heavily driven by unconscious feelings and emotions. Rather than relying on traditional surveys where people might struggle to explain their true motives, researchers now use neuromarketing to directly observe physical and mental reactions to advertisements. By applying basic neuroscience, companies can see exactly which stories light up the emotional centres of the brain (Ariely & Berns, 2010; Zaltman, 2003). When a brand tells a relatable story, it triggers biological responses that bypass logical resistance, naturally weaving the brand into a consumer's long-term memory and creating a sense of comfort and safety (Damasio, 2018). This transition from selling isolated features to offering a complete, feeling-based experience helps build profound loyalty (Schmitt, 2019). This foundational exploration directly connects with the first objective of this

review, which is to examine how neuromarketing principles inform the emotional storytelling strategies adopted by global brands.

Building upon this biological understanding, the rise of artificial intelligence has given machines the unprecedented ability to recognize and respond to human feelings. Emotion AI acts as a highly observant digital assistant, analysing vast amounts of everyday digital behaviour—such as typing speed, voice tone, or clicking habits—to build accurate psychological profiles of users. This technology allows companies to move past generic advertisements and instead deliver highly personalized content that adapts in real-time to a person's current mood. If a user seems stressed, the system can instantly simplify the website layout and offer comforting messages; if they seem excited, it can present more adventurous content (Zhao et al., 2020). By tailoring the message to the exact emotional state of the individual, brands can create digital interactions that feel genuinely empathetic and highly relevant (Hollebeek & Macky, 2019). These technological advances align perfectly with the second objective of this research, which aims to analyse the role of Emotion AI in enabling emotionally responsive and personalized brand narratives.

The demand for this kind of deeply empathetic and personalized communication is especially strong among Generation Z. Having grown up entirely in the digital age, this demographic is highly sceptical of traditional, polished corporate advertising and instead demands absolute authenticity from the companies they support. Young consumers do not just buy products; they invest in brands whose stories align closely with their own personal values, such as social responsibility and transparency (Djafarova & Foots, 2022). Research highlights that when brands use intelligent technologies to deliver stories that feel real, unfiltered, and uniquely tailored to the user's life, it significantly boosts the brand's long-term memorability and creates a highly subjective, tailor-made brand experience (Sung, 2021). By bypassing the noise of the internet and offering narratives that reflect genuine human experiences, companies can forge highly resilient bonds with young adults who otherwise ignore standard marketing efforts. Understanding these unique behavioral dynamics directly addresses the third objective of this study, which explores how emotionally intelligent

storytelling contributes to brand memory formation specifically among Generation Z consumers.

The practical application of these emotional strategies is best observed through the successes of major global corporations that prioritize human connection over simple transactions. For instance, Netflix utilizes advanced algorithms to track viewing habits and dynamically adjust the promotional artwork of its shows to match a user's specific emotional triggers, offering a deeply personalized sense of escapism (Au-Yong-Oliveira et al., 2020). Similarly, Spotify takes raw user listening data and transforms it into highly nostalgic, easily shareable annual summaries, making users feel personally celebrated and deeply understood by the platform (Lemon & Verhoef, 2016). Even legacy companies selling physical products, such as Coca-Cola, rely heavily on emotional branding. By replacing their iconic logo with common first names, Coca-Cola turned a simple, mass-produced beverage into a personalized token of shared happiness and community connection (Keller, 2016). Evaluating these distinct yet highly related operational approaches satisfies the fourth objective of this review, which is to compare emotion-driven branding practices across major market leaders like Netflix, Spotify, and Coca-Cola.

However, the ability to peer into the subconscious mind and track the daily feelings of consumers introduces highly complex moral challenges. While people generally appreciate marketing that is helpful and tailored to their interests, they quickly feel violated and angry if they discover a company has been secretly monitoring their emotional state without clear permission (Aguirre et al., 2016). This scenario, often referred to as the personalization paradox, highlights the incredibly thin line between being a helpful digital companion and an invasive surveillance system. There is a very real danger that businesses could use emotional data to exploit people during moments of psychological vulnerability, such as targeting a stressed individual with predatory advertisements (Ferrel et al., 2025). To maintain trust, organizations must prioritize total transparency, ensuring that consumers always know exactly how their data is being used and giving them the power to control it. Examining these critical boundaries fulfils the fifth and final objective of this review, which identifies the ethical considerations associated with the use of emotional data in modern branding contexts.

6. Research Methodology

Examining numbers in research papers shapes the initial approach. Observing real corporate behaviour adds necessary depth along the way. Hard data guides the structure. Real-world corporate cases bring context. The two sides inform each other. Patterns appear to emerge exactly where raw data meets daily user experience. Theory does not override practice here. Both elements show their value quietly.

6.1 Research Design

A dual method guides the work. Visual mapping of 42 selected sources happens first using VOS viewer. The software shows connections between key ideas and tracks publication frequency. Exploring three specific companies follows this mapping phase. Narrative cases break down the operations at Netflix, Spotify, and Coca-Cola. You see academic concepts taking physical form inside daily business practices.

6.2 Study Focus and Participants

The focus lands heavily on digital advertising and user reactions to modern brands. You will find specific attention paid to smart machines and corporate retention plans. Young buyers born in the late nineties take the spotlight. The research avoids face-to-face interviews entirely. Insights seem to emerge directly from academic journals, business summaries, and physical application updates.

6.3 Data Collection and Selection Criteria

Forty-two academic papers form the core foundation, while materials produced directly by brands add necessary context. Choosing these studies followed strict rules based on high citation counts, clear links to the six stated goals, and solid experimental design. Most texts originate from 2015 onward. This seems to keep the focus near current artificial intelligence capabilities. Older foundational texts appear rarely. Works from researchers like Bagozzi or Kahneman only made the cut to establish long-term theoretical roots. Recency rules the selection process.

Preparing the 42 references required reshaping each entry into a clean bibliographic format. This step readies the text for mapping specific keywords. The dataset then moves into VOS

viewer for processing. The software outputs three distinct visual layouts. Network, overlay, and density maps reveal where core themes cluster together. These images spotlight dominant topics across the literature without unnecessary detail.

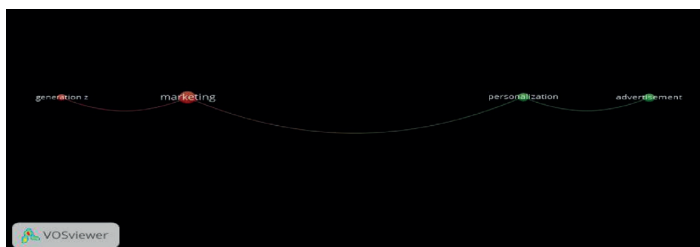
7. Analysis Results and Discussion

From here unfold findings shaped by VOS viewer maps alongside close-case comparisons, where real-world trends meet conceptual frames. Patterns drawn from data pair with ideas rooted in theory, each informing the other through layered observation. What emerges sits at the meeting point of measured output and interpretive depth, linked without forcing alignment. Mapping tools highlight connections while cases ground them in context, neither overriding the other. Together they form a view held together by correspondence, not assumption.

7.1 Bibliometric Analysis Using VOS viewer Keyword Map

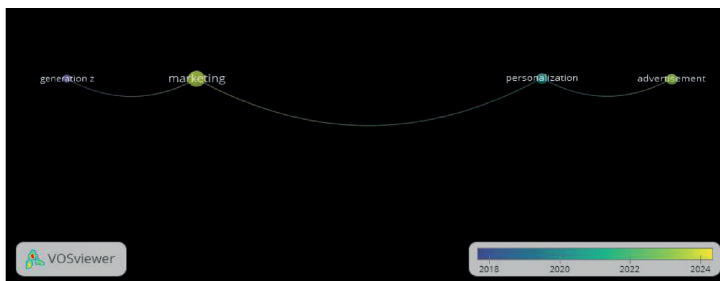
Starting off, the VOS viewer looked at 42 key sources using shared keywords to map out active research themes. Out of that information, three separate images emerged - each showing different patterns in how ideas connect:

1. **Network Visualization (Thematic Linkages):** The network map revealed prominent nodes centred around the keywords “**generation z**”, “**marketing**”, “**personalization**”, and “**advertisement**”. The tight interconnectivity between these nodes proves that modern marketing literature no longer treats advertising as a broad broadcast medium; rather, “**personalization**” acts as the critical bridge connecting “**marketing**” directly to “**generation z**”.

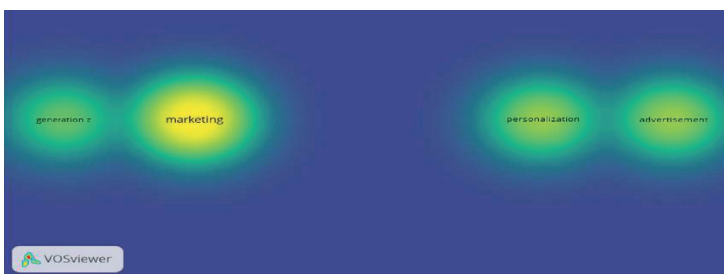


2. **Overlay Visualization (Chronological Evolution):** The overlay map plotted these keywords across a timeline from 2018 to 2024. The visual evidence demonstrates an

evolutionary trajectory: while foundational terms like “marketing” and “advertisement” dominated the earlier spectrum (2018-2020), the focus of high-impact research sharply shifted toward “generation z” and “personalization” in the later spectrum (2022-2024). This confirms that the integration of hyper-personalized, AI-driven targeting is a highly contemporary and rapidly accelerating phenomenon.



3. **Density Visualization (Research Hotspots):** The density map highlighted the most heavily researched areas within the sample. The “hotspots” burned brightest around “generation z” and “personalization,” visually validating those tailoring digital interactions to the individual emotional states of young consumers is currently the most intense area of focus within the academic marketing domain.



7.2 Feelings That Stick Brands in Your Mind

Emotions dictate brand retention across the observed examples. Stronger feelings increase the likelihood of significant imprint of certain brand in sub-conscious corner of the brain. Emotions appear to lead the entire process.

Netflix algorithms sort trailers and image previews to Favor scenes causing emotional shifts and influences decision making.

These sharp emotional spikes help the viewer to remember their initial reaction to a show. The human mind clings to these flashes rather than specific plot points. The viewers register the rush and subconscious pull towards the content; this pull recognition comes directly from physical sensation which leaves a lasting mark on your pulse.

Spotify playlists attempt to match your daily mood. Routines incorporating these specific sounds make picking up where you left off happen without conscious thought. Certain genre and musical arrangements pull memories to the surface over time. One remembers the moment wrapped around the track.

Coca-Cola relies on symbols over slogans. Seeing joy or memories linked to a product builds quiet familiarity over years. This bond stays when one's attention fades. Recognition lingers in subconscious mind without any manual effort.

Messages carrying a strong emotional pull, lines up with human brain's core emotional intellect realm. This approach makes information linger much longer compared to dull and obvious information. Generation Z retain these stories longer because the delivery matches their neurological rhythm and storing process.

7.3 Neuromarketing Meets Emotion AI In Real Use

Corporate teams now track how one acts online. This behavioural pattern analysing mechanism replaces expensive brain scans, aligning with the personalization trend seen in the earlier visual mapping. Tracking clicks often mirrors the activity of human minds. Companies match one's past behaviour to present zone of interest, mood and situation.

Netflix monitors the exact second you stop watching a show, tracks rewind during certain scenes which enables developers to process what stimuli drive one's dopamine. This scene-by-scene feedback shapes the pacing of future stories. Keeping younger audiences engaged means adjusting timing constantly. Decisions come directly from one's actual behaviour rather than assumptions about their preferences.

Spotify analyses the user's data and turns it into a very personal story by the medium of wrapped features which taps into a specific emotion which leads to subconscious incline towards Spotify. Younger listeners find themselves in these visuals summaries as music triggers significant amount of emotion

in their daily life. Sharing these moments with friends feels natural. Peer acknowledgment further assists these memories stick better.

Coca-Cola entirely avoids heavy machine learning. Printing common names on physical bottles appreciates one’s existence which makes them feel seen. Recognition becomes a direct connection, without algorithms running behind the scenes.

Brands stick harder when machines learn to analyse and then predict human feelings. Detecting the emotions makes an unseen bond with the brand, which leads to constant usage of the brand. Systems build stronger connections by reading cues such as tone or digital gestures. Responses feel personal. Trust grows quietly as software reactions mirror real neurological being. This trust deepens the subconscious incline towards the brand.

7.4 Cross-Case Comparative Insights

Though tech levels differ, what truly matters is how well feelings align. Still, machines change fast - yet connection sticks around. Where gadgets shift constantly, shared understanding stays put. Even when tools evolve differently, matching emotions hold things together. As systems upgrade unevenly, being emotionally in sync makes the difference.

Dimension	Netflix	Spotify	Coca-Cola
Primary Emotional Appeal	Suspense, excitement	Mood regulation, identity	Joy, nostalgia, unity
Neuro marketing App	Behavioural proxies / A-B testing	Contextual inference	Macro narrative consistency
Emotion AI Intensity	Moderate (Content matching)	High (Hyper-personalization)	Low (Symbolic personalization)
Dominant Memory Type	Episodic recall	Habitual & emotional recall	Long-term associative recall

7.5 Gen Z Values Real and Honest

The findings present an unexpected shift. Artificial intelligence enables exact customization across the charted research. Young adults seem to demand raw authenticity online. You notice bad reactions when automated systems appear pushy or fake. The

human brain stores this negative experience as a direct rejection of the brand. Using data responsibly and sharing clear stories matches biological needs for trust.

8 Conclusion

8.1 Scope and Summary

The research examined the intersection of neuromarketing and emotion artificial intelligence. Forty-two scholarly articles and physical examples from Netflix, Spotify, and Coca-Cola provided the foundation. Emotional storytelling builds lasting memories. Biology appears to drive this process more than traditional advertising. VOS viewer data shows mass messaging disappearing between 2018 and 2024. Hyper-personalized content replaced it entirely. Success depends heavily on honest emotional connections regardless of corporate technical skill. Young audiences view these brand messages as moments woven into their existing identities.

8.2 Limitations

Relying on past studies and citation maps leaves physical lab proof out of reach. Three massive corporate entities shaped this perspective. Small teams and offline spaces appear to function differently. Technology changes rapidly. Code updates seem to make the current technical snapshot feel outdated in a click.

8.3 Theoretical Implications

Emotion appears to operate at the core of brand memory. It acts within the thinking process itself. VOS viewer mappings reveal distinct links between Generation Z and personalization across recent academic texts. Old models assumed repeated contact-built recall. Contextual fit matters more to young audiences today. Algorithms shape this fit better than simple repetition.

8.4 Managerial and Ethical Considerations

Emotion-sensing technology works best supporting human creativity instead of replacing it entirely. Digital spaces shift toward reading feelings over tracking demographic labels. Moving into emotional tracking demands strict moral awareness. Younger audiences react poorly when they sense active emotional monitoring. Clear messaging and fair data practices reduce suspicion around hidden algorithms. Honouring personal choice keeps a brand trustworthy. You remember these companies well over time.

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— Chapter —

Green Marketing in India: Unveiling Contemporary Challenges within the Sustainability Paradigm

Rishav Chowdhury¹

ABSTRACT

Green marketing refers to the promotion and sale of products that are environmentally safe. Today, environment related problems such as pollution, climate change, global warming and waste are increasing rapidly. Because of these problems, companies are encouraged to produce those products which are eco-friendly and do not harm nature. Green marketing helps in reducing pollution, saving energy and using natural resources carefully. It also secures the environment for future generations. Multiple studies show that many consumers are now aware of environmental problems and they prefer eco-friendly products (Bhatia, 2013). Research also indicates that companies adopting green marketing practices can improve their brand image and gain the trust of customers (Chaudhary, 2018). Consumers feel that green products are better for health as well as the environment (Huang, 2018).

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Therefore, demand for green products is slowly increasing.

As per Government environmental reports show that pollution, carbon emission and waste generation are increasing in India due to population growth and industrial development. India is using more renewable energy like solar and wind power now. This shows that India is moving towards sustainable growth, being responsible with how they produce and consume things.

The study looks at how people feel about eco-friendly products, what makes them buy green and how green marketing contributes to sustainable growth in India. Green marketing is good for business and the planet as it saves the environment and boosts the economy.

Keywords: *Green Marketing; Sustainable Development; Consumer Perception; Environmental Protection; Green Products; Renewable Energy; Eco-Friendly Products*

1. Introduction

In recent years, environmental problems have become a crucial issue worldwide. Issues like pollution, climate change, global warming, deforestation, and waste generation are increasing fast. The standard of living has improved with economic growth, but they've put pressure on natural resources. Use of natural resources without proper care is creating environmental imbalance. Therefore, it has become very important to adopt practices that ultimately protect environment and ensure sustainable development.

Green marketing is very important in dealing with these environmental issues. It includes activities such as eco-friendly production process, recyclable packaging, reduction of pollution, efficient use of energy and responsible waste management. In India, environmental issues are increasing due to heavy industrialisation, urbanisation and population growth. Air Pollution, water pollution and plastic waste have become major challenges. Government environmental reports suggest that carbon emission and waste generation are increasing continuously. Consumers are also becoming more aware of environmental protection. Many consumers now prefer eco-friendly products because they believe these products are safer for health and environment (Chaudhary, 2018). Research studies show that the environmental awareness influences consumer

buying behaviour and encourages people to adopt sustainable consumption habits (Huang, 2018). Consumers are gradually understanding the importance of reducing plastic use, saving energy and purchasing eco-friendly products.

Due to this change in consumer behaviour, many companies are adopting green marketing practices. The companies are now focusing on reducing carbon emission, using recyclable materials and boosting environmental performance. Green marketing protects the environment, enhances company reputation and builds customer trust (Antonides, 2017). Businesses are recognising that sustainable practices are required for long-term success. However, despite increasing awareness, green marketing faces many issues in India such as High cost of eco-friendly products, lack of awareness, limited availability of green products and misleading environmental claims (Bhatia, 2013). Some companies mislead consumers, which reduces consumer trust. Due to financial hurdles many small businesses struggle to adopt green technology. Sustainable development requires the government, companies and consumers to work together. Green marketing is really important as it helps balance the economy and protect the environment at the same time. Sustainable development and green marketing encourage us to be responsible when we make things and use resources so we can leave something good for the future generations and for sustainable development.

Therefore, it is really important to know what people think about green products and the challenges companies face when they try to use green marketing in India. This part is mostly about the issues with green marketing.

2. Literature Review

Bhatia and Jain (2013) did a study about what people think of marketing. They found out that people are becoming more aware of the environment day by day. The study says that a lot of people like to buy eco-products because they think these products are good for the environment and their health. Green marketing is helpful for companies because it makes people think things about their brand and they gain the trust of their customers. The study says that when people care about the environment it affects what they buy. Green marketing is important for companies. It helps them with their brand image

and customer trust and that is why green marketing is good, for companies and their customers.

Chaudhary and Bisai (2018) said that green marketing is something that companies are really starting to focus on because of all the problems we are having. They found out that people like to buy things from companies that do what is best for the environment. Green marketing helps to reduce pollution. It also helps with development, which is very important. The main thing that Chaudhary and Bisai found out is that if people know more about products, they will want to buy them. So, awareness and education are key to getting more people to buy products.

Huang and Zhao (2018) in their study looked at how people understand environmental issues and how it affects their buying choices. They found out that people who know more about issues are more likely to buy products that are good for the environment. This research also shows that when people learn more about the environment, they feel more responsible for it. The study says that companies should give people the information about environmental issues so they can make better buying choices. It is all, about companies providing the information to influence what people buy.

Kumar and Ghodeswar (2015) in their study looked at marketing practices used by companies. They found that businesses are now focusing on making their production and packaging more eco-friendly to reduce the damage they cause to the environment. The research also highlights that green marketing can improve a company's reputation and to gain customer's loyalty. The study concludes that being environmentally responsible can give companies an edge, over their competitors. It helps them gain an advantage.

Peattie and Crane (2005) in their study said that green marketing started because of the problems that society is dealing with. Companies are trying to make money while also protecting the environment. This research points out that doing practices helps businesses grow in the long run. The study also says that green marketing is needed to achieve development and that is why green marketing is important. Green marketing helps companies to balance profit with protection and that is why it is necessary, for achieving sustainable development.

Ottman (2011) studied consumer behaviour towards green products and found that consumers are becoming more conscious about environmental protection. The study explains that companies should communicate environmental benefits clearly to customers. The research highlights that trust plays important role in green purchase decisions. The study concludes that transparency is necessary for success of green marketing.

Polonsky (1994) explained the concept of green marketing and its importance in reducing environmental problems. The study highlights that companies should adopt eco-friendly production process to minimise environmental damage. The research shows that green marketing encourages responsible consumption behaviour. The study concludes that environmental protection should be part of business strategy.

Environmental Management Report (Government of India) says that problems like air pollution, climate change and waste generation are getting worse because of industrial growth and more people moving to cities. The report stresses that we need to use resources in a way that lasts. It also mentions that India is making renewable energy. The report ends by saying that managing the environment is crucial for the economy to grow in a way.

Mokha (2017) did a study about what people think of eco-products. He found out that lots of people are becoming aware towards environment. Large number of people are choosing eco-products to save the earth. These products help in reducing pollution and make life better for all of us. The study says that green marketing is very important for letting people to buy eco-products and live in a sustainable way. Green marketing helps people in making choices and live in a way that is good for the earth.

Tandon, Agrawal and Acharya (2023), in their study about marketing and consumer behaviour, found out that when people know more about environmental issues, they are more likely to buy products that are good for the environment. The study says that many consumers want products that help the environment. It also shows that by using green marketing strategies companies can get customers who care about the environment. The researchers concluded that if consumers know more about sustainability, they are more likely to make purchase decisions.

Singh and Nagra (2023) wanted to see how it affects the choices of people when they buy eco-cosmetic products. People are becoming more concerned about chemical-based products. They prefer buying things that are natural and do not harm the environment. Companies use eco-labelling and sustainable packaging to make their products more appealing as per customers purchase preferences. The study by Singh and Nagra found that green marketing helps companies to gain the trust of people and create an image for their brand. Green marketing is very important for companies that make eco-products because it helps them to build a good reputation and sell more of their products.

Bhardwaj, Nair, Tariq, Ahmad and Chitnis (2023), in their bibliometric review on green marketing research, found out that people are getting interested in green marketing every year. Businesses are trying to make products that are good for the earth and market them in a fair way. The study says that green marketing is getting very important for making sure our planet is healthy. Green marketing is really becoming a deal for those companies who want to be sustainable.

Desai and Bhatt (2024) did a study about how people buy eco-products. People who care about the environment are more likely to buy eco-friendly products. Companies are using green marketing to get people aware of eco-friendly products. People want to buy things that are good for them as well as earth. The study is about green products and how companies can sell them to people who care about the environment.

3. Objective of the study

The main objectives of the study are:

- To understand the concept and role of green marketing in promoting sustainable development.
- To analyse consumer perception and factors influencing green purchase behaviour towards environmentally friendly products.
- To examine the role of green branding and Corporate Social Responsibility (CSR) in encouraging sustainable consumer behaviour.
- To study the challenges in implementing green marketing strategies and the role of government policies in promoting green marketing practices.

4. Data Source and Method of Analysis

This chapter is based only on secondary data. The information has been collected from published research papers, journal articles and government reports related to green marketing and environmental sustainability. The study mainly uses definitions, concepts and conclusions from previous studies to understand the issues of green marketing in India. The collected information has been analysed in a simple and descriptive manner to explain consumer perception, challenges and importance of green marketing for sustainable development.

5. Concept, Evolution and Importance of Green Marketing

Green marketing refers to the process of promoting environmentally safe products and services, including various activities such as product design, packaging, advertising & distribution that minimize negative environmental impact (Bhatia & Jain, 2013).

Green marketing is also known as ecological marketing because the focus is only on satisfying customer needs and wants while ensuring environmental protection. Green marketing encourages the companies to produce goods that are recyclable, biodegradable and energy efficient (Kaur, 2017).

Green products generally possess the following characteristics:

- Recyclable materials
- Biodegradable Packaging
- Reduced pollution
- Energy efficiency
- Water conservation
- Use of renewable resources
- Reduced carbon emission
- Environmentally safe manufacturing process

Green marketing aims to reduce harmful environmental impact by encouraging consumers to adopt environmentally responsible consumption behaviour. Companies adopting green marketing practices attempt to balance profit objectives with environmental responsibility (Rao et al., 2011).

Green marketing also includes environmental advertising, eco-labelling and sustainable supply chain management practices that helps organisation to reduce environmental damage and improve corporate image (Gandhi, 2020).

The idea of green marketing started to take shape in the late 20th century when people around the world began to worry about the environment. Some big environmental issues like the ozone layer getting depleted, global warming and pollution from industries made people and leaders realize how important it is to develop (Bhatia & Jain, 2013).

The American Marketing Association put together workshops on ecological marketing in 1975. This was the start of people looking into green marketing. Before that people were studying environmental awareness and its impact on consumer behaviour. They found out that people are willing to change what they buy to help the environment (kaur, 2017).

During the 1990s, companies started adopting environmentally responsible production methods in response to increasing regulatory pressure and consumer demand for eco-friendly products. Environmental certifications and eco labels were introduced to help consumers identify environmentally safe products (Chaudhary & Bisai, 2018).

Green marketing is really important nowadays. As people are getting more worried about the environment and they want to buy products that are good for the environment. They care about issues and choose products that do not harm the planet (Bhatia & Jain, 2013).

Green marketing helps organisations in reducing damage by using sustainable raw materials and energy-efficient production methods. Companies that adopt marketing can improve their brand image. They can also attract consumers who care about the environment (Gandhi, 2020). Green marketing contributes to CSR by encouraging organisation to take the responsibility for environmental protection. It helps the companies to build trust among the consumers (Kaur, 2017).

Green marketing also provides competitive advantage to organisations by differentiating their products from conventional products. Companies promoting eco-friendly products which can attract new customers and increase market share (Chaudhary, 2018).

Green marketing promotes sustainable development by encouraging responsible consumption patterns and reducing environmental damage as well as supports long term economic growth while protecting natural resources (Milana et al., 2020).

6. Analysis and Discussion of Key Issues in Green Marketing

6.1 Consumer Perception towards Green Products

Consumer thoughts towards green products means how people react about eco-friendly products. Green products do not harm nature and safe for human health. These products are made by using natural materials, produce less pollution and can be recycled or reused (Bhatia & Jain, 2013).

Multiple studies show that People are getting more worried about the earth and the problems we are facing like pollution, climate change and global warming. Lots of people now want to buy eco-products instead of the regular ones. They think that eco-friendly products are good for the earth and helps in making our life better. People believe that using eco-products is a way to protect nature and enhance quality of life (Sharma, 2020).

Table 6.1.1 - Consumer Awareness towards Environmental Protection in India

Indicator	Percentage
Consumers aware about sustainability	62%
Consumers preferring eco-friendly products	84%
Consumers willing to pay more	60%
Consumers believing environmental protection important	75%

(Source – Compiled by the researcher from the data of PwC Survey, Mintel Report, SPJIMR Survey)

According to previous research, consumers generally have a positive attitude towards green product but due to high price, lack of availability and lack of proper information, they failed to buy those products (Kumar, 2019). Education level also affects consumer perception. Educated consumers understand environmental problems better and they are more willing to purchase green products. Young customers are also interested in purchasing green products because they are more concerned about future environmental conditions (Bhatia, 2013).

Trust is another factor. Consumers prefer those products which have eco-labels, environmental certificates or government approval. Companies that talk about their eco-products want people to trust them and buy the eco-friendly products they sell (Sharma, 2020). Consumers also believe that using green products can also improve public health. Many consumers think that green products are safer for children and family members because these products contain less harmful chemicals (Kumar, 2019).

Overall, consumer perception towards green products is positive in India. People are slowly changing their mindset and becoming more responsible towards environment. This change in perception encourages companies to adopt green marketing practices and produce eco-friendly products.

6.2 Factors Influencing Green Purchase Behaviour

Green purchase behaviour means the decision of consumers to buy environment friendly products instead of normal products. Many factors influence the decision of consumers to purchase green products. These factors can be social, economic and psychological in nature.

Environmental Awareness: People who know about the problems that are hurting the earth like pollution, climate change and global warming are more likely to buy eco-friendly products. Buying products is one way that consumers can protect the nature and the environment (Sharma, 2020).

Price: It is another major factor influencing green purchase behaviour. Many green products are more expensive than normal products. The high price of eco-products is a problem for some people who want to help the environment. These people want to buy eco-products, but the cost is too much for them. When it comes to buying something, the consumer will usually compare prices first before they make a decision to buy. The price is a big issue, for many consumers. Consumers want to protect the environment through buying eco-products, but they have to think about the price too (Kumar, 2019).

Income Level: It also affects green purchase behaviour. People who have money are happy to buy green products as they can afford the extra cost. But, for some people the price of green products is just too high so they will buy other things that are

cheaper even if those things are not good for the environment (Bhatia, 2013).

Education Level: It plays an important role in influencing behaviour of a consumer. Educated consumer have better knowledge about environment and they understand the long-term benefits of using eco-friendly products. Education helps consumer to make responsible purchase decisions (Sharma, 2020).

Social Influence: It also affects consumer behaviour. Family members, friends and society can influence the decision of consumers. When people see others are using eco-friendly products, they also like to purchase similar products (Kumar, 2019).

Availability of green products: If eco-friendly are easily available in the market, consumers are more likely to purchase them. Lack of availability reduces the chances of green purchase behaviour (Bhatia, 2013).

Trust and eco-labelling: It also influences consumer behaviour. Consumer mainly prefer those products which have environmental labels, certifications and government approval. Eco-labels help consumers to identify whether the product is environmentally safe or not (Sharma, 2020).

Government policies and environmental campaigns: Awareness programmes, advertisements and environmental education increases interest in eco-friendly products (Kumar, 2019).

Overall, green purchase behaviour depends on many factors such as awareness, price, income, education, social influence and trust. When these factors are favourable, consumers are more likely to purchase environmentally friendly products, which supports sustainable development.

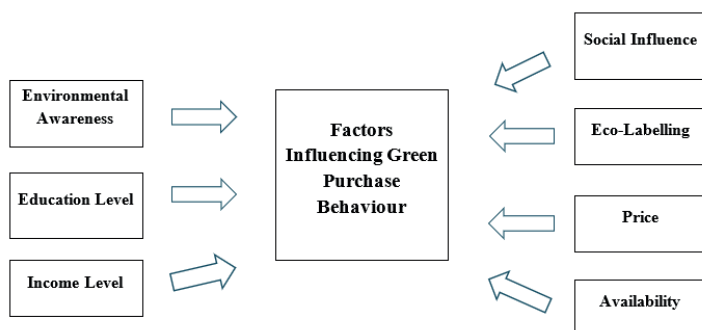


Figure 6.2.1 - Factors Influencing Green Purchase Behaviour

(Source – Compiled by the researcher)

6.3 Challenges in Green Marketing

Green marketing is very important for environmental protection, but companies face many problems while adopting green marketing practices. These challenges ultimately create problems in production, promotion and selling of green products.

High cost of green products: Eco-friendly products need better technology. They also need eco-raw materials and sustainable ways to make them. These things make production more expensive which leads to higher cost of products. As a result, many people cannot afford to pay more. This makes it harder to sell products which reduces the demand for green products (Sharma, 2020).

Lack of awareness among consumers: Many people do not know much about issues and the advantages of eco-friendly products. They may not understand why eco-friendly products are really important for protecting the environment. Green products are made to have an impact, on the environment but people need to know about their benefits (Kumar, 2019).

Greenwashing: It is also an important challenge. Sometimes companies give false claim about environmental benefits of their products. They claim that their products are eco-friendly even when they are not completely safe. This creates confusion and reduces trust of consumers towards green products (Bhatia, 2013).

Lack of proper infrastructure and technology: Green production needs new and advanced machines. It also needs equipment that helps to control pollution and technology that is safe for the environment. It can be hard for small companies to afford the modern machines and pollution control equipment that green production requires as they may not have enough financial resources (Sharma, 2020).

Lack of standardisation and certification: There is no single universal standard to define green products. Different organisations use different eco-labels, which creates confusion among consumers (Kumar, 2019).

Limited availability of green products: It is also a problem. In many areas, eco-friendly products are not easily available. Consumers may not purchase green products if they are not easily accessible in market (Bhatia, 2013).

Government policies: sometimes government policies create difficulty for companies because environmental regulations may increase cost of compliance. Companies need to follow environmental rules, pollution control norms and sustainability standards, which require time and investment (Sharma, 2020).

Overall, green marketing faces many challenges such as high cost, lack of awareness, greenwashing, limited technology, lack of standardisation and government regulations. These challenges create difficulty for companies to adopt environment friendly practices. However, with proper awareness, innovation and government support, these challenges can be reduced, green marketing can become more successful in future.

6.4 Role of Green marketing in sustainable development

Green marketing plays an important role in achieving sustainable development. Sustainable development means fulfilling present needs without harming the ability of future generations to fulfil their needs. Green marketing helps in protecting natural resources, reducing pollution and promoting environmentally friendly lifestyle.

Protection of environment: Companies adopting green marketing to reduce pollution and harm to the environment. They use eco- materials that are good for the Earth, energy that won't run out and ways of making things that don't hurt the planet. This helps in conservation of water, air and land (Sharma, 2020),

Reducing waste generation: Companies are promoting recyclable packaging and reusable products. This really helps to control the problem of increasing waste in urban areas. Proper waste management is very important for maintaining environmental balance and it also enhances the quality of life (Kumar, 2019).

Reduction of carbon emission: Companies that use renewable energy such as solar and wind energy produce less carbon emission. Reduction in carbon emission helps in controlling climate change and global warming. Sustainable production helps in creating healthy environment for society (Pandey, 2025).

Creating environmental awareness among consumers: Companies promote eco-friendly products through advertisement and awareness campaigns. This encourages consumers to adopt environmentally responsible behaviour and support sustainable products (Bhatia, 2013).

Economic development: Many companies are investing in renewable energy, organic products and sustainable technology. This creates employment opportunities and promotes green economy (Sharma, 2020).

Improving brand image and competitiveness: Companies that adopt environmentally responsible practices are seen as socially responsible organisations. This improves reputation of company and increases customer loyalty (Kumar, 2019).

Government policies and environmental regulations: Environmental laws motivate companies to reduce pollution and adopt green business strategies. Government initiatives support renewable energy and sustainable industrial development (Pandey, 2025).

Overall, green marketing plays a significant role in sustainable development by protecting environment, reducing waste, controlling pollution, creating awareness and promoting green economy. Green marketing helps in achieving balance between economic growth and environmental protection, which is necessary for long term development of society.

6.5 Role of Government Policies in Promoting Green Marketing

The government wants companies to make products that are good for the environment. They do this by making laws and

running programs that teach companies to be more sustainable. The government also gives support to companies that make eco-products. This helps in reducing the harm that industries cause to the environment (Dangelico & Vocalelli, 2017). The National Action Plan on Climate Change (NAPCC) is about using renewable energy efficiently and reducing carbon emission. It supports the idea of production and consumption such that we can make and use things without hurting the earth (Government of India, 2008).

The Government has started things like the Green India Mission to protect our forests, the variety of plants and animals and our natural resources. This helps businesses to be more careful about the environment (Ministry of Environment, Forest and Climate Change, 2014). There are rules to control pollution and manage waste, which helps industries to reduce the harm they cause to the environment and make their production methods greener (Polonsky, 1994).

Government also promotes renewable energy through schemes supporting solar and wind energy development. These initiatives encourage companies to adopt clean technology and eco-friendly production process (International Energy Agency, 2021). Environmental regulations motivate companies to follow sustainable practices and produce green products which support green marketing growth (Joshi & Rahman, 2015).

Government policies help green marketing by making it easy for people to buy eco-friendly products and services. This helps companies to make products and motivates them to follow environmental rules. Green public procurement is a way to promote consumption and encourages companies to be more environment friendly. This is done with the help of government procurement policies that promote marketing and sustainable consumption (UN Environment Programme, 2017).

Therefore, government policies help in promoting environmental awareness, encouraging sustainable production and increasing demand for eco-friendly products.

6.6 Green Branding and Corporate Social Responsibility (CSR)

Green branding helps companies to create an environmentally responsible image in the mind of consumers. Companies use

green branding strategies to show that their products are safe for environment and support sustainable development (Chen, 2010). Green brand image helps in building trust among consumers. This trust makes people more likely to buy eco-products (Ottman, 2017).

Corporate Social Responsibility (CSR) plays an important role in promoting environmental sustainability. According to the Companies Act, 2013, companies are required to spend a part of their profit on social and environmental activities. CSR activities include tree plantation, waste management, water conservation and renewable energy use which help in environmental protection. CSR helps companies to improve their brand image and build positive relationship with consumers. Companies adopting CSR activities are considered socially responsible and environmentally conscious which increases consumer preference for their products (Kotler & Keller, 2016).

Many companies are doing Corporate Social Responsibility activities that are related to sustainability like reducing pollution using packaging and promoting environmental awareness campaigns (Dangelico & Vocalelli, 2017). CSR supports ethical marketing practices and helps companies to contribute towards sustainable development (Joshi & Rahman, 2015).

Therefore, green branding and CSR help companies promote eco-friendly products and create a positive image in the market which supports green marketing growth.

6.7 Corporate Adoption of Green Marketing: A Case Study Analysis of Selected Companies

Green marketing practices mean the activities adopted by companies to produce, promote and sell products which are environmentally friendly. Companies are now focusing on sustainability because consumers are becoming more aware of environmental protection. Green marketing helps companies to reduce pollution and create a positive brand image.

One important green marketing practice is use of eco-friendly raw materials. Many companies use natural, recyclable and biodegradable materials in production process. This reduces harm to environment and helps in conservation of natural resources (Sharma, 2020).

Another important practice is use of renewable energy in production. Many companies are using solar energy, wind energy and other renewable sources instead of fossil fuel. This helps in reducing carbon emission and supports environmental sustainability (Kumar, 2019).

Companies are also adopting eco-friendly packaging methods. Many organisations are reducing the use of plastic and using paper, cloth or biodegradable packaging. Sustainable packaging helps in reducing waste generation and environmental pollution (Bhatia, 2013).

Another green marketing practice is waste reduction and recycling. Companies try to reduce waste during production process and promote reuse of materials. Recycling helps in saving natural resources and reducing environmental damage (Sharma, 2020).

Many companies also focus on green advertising and promotion. Companies highlight environmental benefits of their products in advertisement. Green labels, eco-certification and environmental claims help in attracting environmentally conscious consumers (Kumar, 2019).

Corporate social responsibility (CSR) activities also support green marketing practices. Companies participate in tree plantation, environmental awareness programmes and sustainability initiatives. These activities improve brand reputation and create positive impact on society (Bhatia, 2013).

To understand the practical application of green marketing, selected Indian companies are analysed through a case study approach. The table summarises key initiatives adopted by these companies to promote environmentally responsible products and green brand positioning.

Table 6.7.1 - Green Marketing Initiatives of Selected Indian Companies

Company Name	Key Initiative
ITC Limited	• Promotes eco-friendly paper products such as Classmate notebooks sourced from social forestry programmes • Uses environment-related product claims such as elemental chlorine free paper • Communicates environmentally responsible sourcing in product branding • Uses recyclable and environmentally friendly packaging materials • Promotes green product positioning in FMCG categories • Uses environmental labelling and messaging to attract eco-conscious consumers • Promotes sustainable agriculture sourcing as part of brand communication
Dabur India Ltd	• Promotes herbal and natural products as environmentally safe alternatives • Uses plant-based ingredient claims in product communication • Uses eco-friendly packaging promotion in marketing messages • Promotes chemical-free product positioning • Uses nature-based branding themes • Communicates environmental safety through Ayurvedic product positioning
Hindustan Unilever Limited	• Promotes environmentally friendly product variants such as water-saving detergents • Uses reduced plastic packaging communication • Promotes responsible consumption through environmental awareness campaigns • Uses eco-label messaging in product communication • Promotes sustainable sourcing claims in marketing communication • Highlights reduced environmental footprint of selected products

Godrej Consumer Products Limited	• Promotes environment-friendly household and personal care products designed to reduce harmful chemical impact • Communicates product benefits related to reduced environmental impact in categories such as home care and insect control • Uses green product innovation messaging in marketing communication • Promotes products with responsible ingredient selection and safer formulations • Highlights eco-conscious product development as part of brand positioning • Uses communication that reflects commitment towards environmentally responsible consumption • Promotes sustainable packaging improvements in selected product categories • Uses environmental responsibility messaging in corporate and brand communication
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(Source: Compiled by the researcher from annual reports, sustainability reports and official websites)

Overall, companies are increasingly adopting green marketing practices such as eco-friendly production, renewable energy use, sustainable packaging, recycling and environmental promotion. These practices help companies to achieve competitive advantage and contribute to sustainable development.

7. Conclusion

Green marketing is really important for businesses today. This is because problems like pollution, climate change, carbon emissions and waste are getting worse every day. The main goal of green marketing is to reduce harm to the environment and promote development that is sustainable. Green marketing helps companies in making such products that are good for the environment. It also encourages people to consume in a way which supports green marketing and environmentally friendly products. (Bhatia, 2013).

From the literature review, it is understood that consumers are becoming more aware of environmental protection. Many

consumers prefer eco-friendly products because they believe that green products are safe for health and environment. However, some consumers are still not able to purchase green products because of high price, lack of awareness and limited availability of such products (Sharma, 2020).

Many factors influence green purchase behaviour such as environmental awareness, income level, education, price of product, social influence and trust on eco-labels. When consumers have proper knowledge about environmental problems, they are more likely to purchase environment friendly products. Therefore, awareness plays an important role in promoting green consumption (Kumar, 2019).

Companies are using energy packaging that is friendly to the earth and they are recycling waste. They are also using production methods that are sustainable. This helps to reduce the amount of pollution and conserve resources like water and air. Government policies and environmental regulations are also encouraging companies to adopt green business strategies (Pandey, 2025).

At the same time, companies also face many challenges in green marketing such as high cost of production, lack of proper technology, greenwashing problem and lack of standardisation. These challenges create difficulty in successful implementation of green marketing practices. Proper government support, consumer awareness and technological development can help in reducing these challenges (Bhatia, 2013).

Green marketing is really important for development. We need to balance economic growth and environmental protection at the same time. Green marketing is all about being responsible when we make and use things so we can save resources for future generations. Green marketing helps reduce carbon emissions and waste generation, which are major environmental problems we face today with green marketing (Sharma, 2020).

Overall, green marketing is not only a marketing strategy but also a social responsibility of companies. Adoption of green marketing practices can create positive impact on environment, society and economy. Therefore, companies, consumers and government should work together to promote green marketing for sustainable development and better future.

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— Chapter —

Digital Financial Inclusion in Rural Assam: A Study of Kokrajhar District

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ABSTRACT

The advancement of technology is pushing towards the adoption of innovations across various sectors, including education, finance, healthcare, agriculture, etc., particularly in developing economies like India. In India, technological advancement has been growing rapidly in recent years. However, despite nationwide progress made in the field of finance, lower financial accessibility, usage, and adoption persist, particularly in rural areas. This study focuses on digital financial inclusion in rural Assam, with a specific focus on Kokrajhar district under the Bodoland Territorial Region (BTR). This research is the outcome of primary data collected from 100 respondents following a stratified sampling method. It investigates the key component of financial inclusion – access, usage, and quality.

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This study found that although awareness is gradually increasing in rural regions among youth, its functional application is not as expected. The research also identified factors that influence the adoption of modern financial technology in their daily activities, such as education qualification, generational dynamics, economic capacity, and gender. Challenges such as an infrastructural gap, limited financial literacy, and insufficient network connectivity hinder the adoption of digital financial services among the respondents. Furthermore, it also explores the rural-urban disparities alongside gender-based distinctions in financial inclusion. The chapter concludes with practical recommendations that are paramount to enhance and integrate the rural population into the modern formal financial system.

Keywords: Financial Technology, Financial Inclusion, Rural Assam, BTR, Kokrajhar

1. Introduction

To thrive in a world of dynamic competitive scenarios, finance has emerged as an inevitable aspect, especially from a business perspective. However, studies have found strong disparities in the accessibility of financial services between urban and rural areas (Huang *et al.*, 2025). This exclusion happens because of rigid norms set by regulators and financial service providers that make it hard for people to access the formal financial system. Therefore, building a stronger and more inclusive financial system that supports sustainable economic growth has become a top priority for many countries (Dixit & Ghosh, 2013). The Government of India has also implemented many reforms and policies from time to time in advancing financial inclusion.

Financial inclusion ensures that no one is left to integrate under the formal financial system, and offers financial services equitably and at a reasonable cost (Yue *et al.*, 2022). With time, technological innovation has emerged as a critical component that contributes towards economic transformation, reshaping financial accessibility and regional development dynamics (Yakubi *et al.*, 2022).

Digital Financial Inclusion (DFI) in the context of India has gained significant development over the past decade due to the integrative efforts of policy initiatives, technological

advancements, and institutional support. Central government flagship programs, including Pradhan Mantri Jan Dhan Yojana (PMJDY), the widespread adoption of the Unified Payments Interface (UPI), and the vision of Digital India, have collectively strengthened India's financial ecosystem (*Tewari et al., 2015*). These developments have not only enhanced access to banking services but also facilitated a shift towards a cashless economy by promoting digital transactions (*Aduba et al., 2023*). Despite experiencing technological advancements, disparities exist in digital access, usage, and financial literacy, especially in rural and remote regions of the country. It holds immense significance for rural transformation, as it serves as a catalyst for economic empowerment by enabling rural households to access savings, credit, insurance, and payment services in a convenient and cost-effective manner. Also, fintech reduces reliance on informal financial systems and supports government initiatives such as direct benefit transfers. By integrating rural populations into the formal financial system, digital finance contributes to livelihood diversification, agricultural productivity, and entrepreneurship development (*Farukh et al., 2025*).

The examination of DFI in Assam, a state characterized by diverse socio-economic backgrounds, geographical diversity, and infrastructural limitations (*Ghosh, 2023*). Although we've witnessed progress in expanding banking services in India, Assam continues to lag behind the national average in terms of financial inclusion (*Maity & Sahu, 2022*).

The Kokrajhar district of Assam, located in the BTR, is predominantly rural and marked by socio-economic diversity, infrastructural constraints, and different levels of financial awareness; it is our area of study (*Sarma et al., 2025*). A focused case study of Kokrajhar can provide valuable insights into the barriers and opportunities associated with DFI in similar rural contexts.

This chapter aims to provide a comprehensive understanding of DFI in rural Assam, particularly from Kokrajhar, a significant region of BTR. It offers analysis and discussion of findings related to awareness, accessibility, and usage of digital financial services in the Kokrajhar district.

2. Digital Financial Inclusion (DFI)

2.1 Concept of DFI

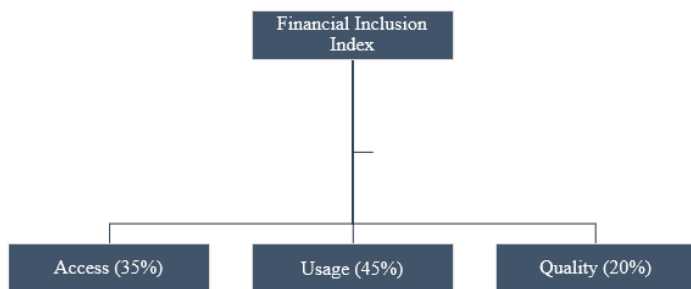
DFI refers to the use of cost-effective digital channels to provide underserved and unserved individuals and businesses with access to a full range of formal financial services, including payments, savings, credit, insurance, and investment that are suited to their needs (K. M. *et al.*, 2023). It primarily refers to the effort to make financial products and services (savings, credit, insurance, payments, etc.) accessible and affordable to all individuals and businesses, particularly marginalized and low-income groups. The goal of DFI is to use digital tools to connect with the unserved communities, offering them a wide range of financial products and services, often using their smartphones with proper internet connectivity (Kumari & Dutta, 2022). In short, Financial Inclusion can be defined as the availability of affordable financial products and services to meet the needs of individuals and businesses responsibly and sustainably. Digital Financial Services serves as the foundation of DFI in India. It operates within a three-pillar ecosystem which consists of Digital Transaction Platform, Device and Connectivity, and Retail agent (Sarkar & Chavan, 2025). The following are the tools or instruments for DFI:

- a. E-money account
- b. Debit card
- c. Credit card
- d. Mobile money
- e. Internet banking
- f. Retail point-of-sale terminal
- g. Agent network

2.2 Dimensions of Financial Inclusion

To monitor the progress of the policy initiatives undertaken by the Govt. of India to promote access of finance to all, a consolidated measure of Financial Inclusion was introduced in India. The Financial Inclusion Index is based on 97 indicators and they quantify the progress made. It ranges from a scale of 1 to 100, where 0 indicates no financial inclusion, and 100 indicates complete financial inclusion. The index has 3 sub-indices

“Access”, “Usage”, and “Quality”, where each dimensions has a weight of 35%, 45%, and 20%, respectively (PIB, 2025a).



Source: Reserve Bank of India

2.2.1 Access/ Availability: Access refers to how effectively financial services reach underserved areas. This refers to the availability of digital infrastructure like internet connectivity, smartphones, access to bank accounts, ATMs, business correspondent or CSP, etc.

2.2.2 Usage: Usage refers to the actual utilization of financial services by individuals and businesses. It reflects the demand side of financial inclusion and has 5 dimensions, namely savings and investment, credit, digital, pension, and insurance. It reflects on how savings and investment are being made, credit accounts are being used, etc.

2.2.3 Quality: Quality comprises the design, efficiency, and relevance of financial services to their specific needs. This index focuses on the security and suitability of financial products, including digital literacy level, trust in digital platforms, fraud management, and user confidence in services.

2.3 Evolution of Digital Financial Inclusion in India

Financial Inclusion is recognised as a key enabler for achieving the United Nations Sustainable Development Goals (SDGs) (Dikshit & Pandey, 2021). Globally, countries are formulating strategies and policies to increase access and usage of formal financial services. In India, this agenda is guided by the National Strategy for Financial Inclusion 2019-2024 and NSFI 2025-2030. India's financial journey has evolved over centuries from the barter system and cowrie shells to coins, paper currency, and

cheques. In modern times, cash remained the dominant mode of transaction until the advent of digital infrastructure (*PIB, 2025*). Despite earlier reforms, a significant share of India's population remained outside the formal financial system in 2014. This gap stated the need for technology-driven transformation, setting the stage for India's digital payments revolution.

2.3.1 Foundational Stage: JAM Trinity (2014-2016): India's digital financial inclusion is built on three interlinked pillars collectively known as the JAM Trinity:

- a. **Jan Dhan:** The *Pradhan Mantri Jan Dhan Yojana (PMJDY)*, launched on 28 August 2014, enabled large-scale opening of zero-balance bank accounts. It brought 520 million beneficiaries, mostly rural unbanked beneficiaries, into the formal banking system with RuPay debit cards and in-built accident insurance (*PTI, 2025*).
- b. **Aadhaar:** Aadhaar provides a reliable biometric digital identity, enabling e-KYC, thereby reducing account opening time from weeks to minutes.
- c. **Mobile:** Rapid expansion of smartphones with internet access empowered citizens with a convenient, real-time interface for transactions.

2.3.2 UPI and Payment Infrastructure (2016-2023): In April 2016, the National Payments Corporation of India (NPCI) launched the Unified Payments Interface (UPI), which enabled any bank account to connect with another through a Virtual Payment address, making transactions instant. UPI became embedded in the everyday economic fabric of the country. It evolved from a tool of convenience into a dependable system supporting individuals, businesses, and financial institutions (*Agarwal & Das, 2024*).

2.3.3 Consolidation and Global Recognition (Post-2024): By 2024, India's digital public infrastructure had matured into a globally acknowledged model of inclusive growth. UPI processes over 18 billion transactions monthly as of March 2026, with transaction value exceeding Rs. 23 lakh crores. Institutions such as the International Monetary Fund (IMF) and the World Bank have acknowledged India's digital financial infrastructure for its scale, low cost, and inclusiveness (*Carrière-Swallow et al., 2022*). Global leaders, including Mr. Emmanuel Macron,

President of France, have noted India's achievement in building a digital payment system that processes high volumes securely and affordably (Vaidya, 2024).

3. Regional Context: Assam And Kokrajhar

Assam, a state of India, located in the northeastern part of the country, sharing border with Bhutan to the north and Bangladesh to the southwest (H. Das & Lodrick, 2026) is divided into five regional division, namely, Lower, North, Upper, Central, and Barak Valley with 35 administrative geographical units called districts including Kokrajhar falls under lower assam belong to an autonomous council known as Bodoland Territorial Region (BTR) (Das & Pual, 2021).

3.1 Socio- Economic Background: Kokrajhar district is in the extreme northwest of Assam and serves as the administrative headquarter of the. Kokrajhar covers a geographical area of 3,296 sq. Km, constituting approximately 4% of Assam's total area. As per the 2011 Census, it had a total population of 887,142. Of this, 93.8% resided in rural areas and 6.2% in urban areas (Brahmachary, 2021). The district is predominantly rural and has a multi-ethnic population comprising Bodos, Adivasis, Bengali, Assamese, and other communities. Livelihoods are primarily agrarian, dependent on paddy cultivation, small tea gardens, forest produce, and informal trade (Brahmachary & Brahmachary, 2018). The incidence of seasonal employment and underemployment is high due to limited industrialisation. Kokrajhar's socio-economic landscape is shaped by recurrent natural calamities, particularly annual floods that displace populations and damage infrastructures (ASDMA, 2024). The legacy of ethnic conflict and displacement has also affected continuity in education and skill development (PIB, 2020).

3.2 Rural Dominance and financial exclusion issues: The socio-economic structure of Kokrajhar district directly contributes to patterns of financial exclusion. As per the State Level Banker's Committee Assam data, Kokrajhar has one bank branch per 21,000 persons (approx.), which is significantly higher than the RBI benchmark of 1 branch per 5,000 persons in rural areas (Kazi & Shemim, 2023). Moreover, the agrarian economy with limited industrialisation reduces the capacity of households to maintain a minimum balance or seek formal credit. State Level Banker's Committee (SLBC) reports indicate that a large portion

of accounts in Kokrajhar remain dormant or are used only for Direct Benefit Transfer (DBT) withdrawals (SBI, 2025).

3.3 Status of Digital Infrastructure: Digital Infrastructure is the foundation of Digital Financial Inclusion. The viability of Digital Financial Inclusion depends on two factors primarily:

3.3.1 Network Connectivity and Internet penetration: Internet penetration in India is 52.4%, with rural tele density 59.65% (TRAI, 2024). Given the district's 93.8% rural population and lower per capita income, actual penetration is likely below the Assam rural average.

3.3.2 Smartphone usage: The district demonstrates a case of “connected but not transacting”, wherein smartphone penetration and bank account linkage coexist with minimal use of mobile banking or UPI among the rural majority.

4. Household-Level Insights: Evidence From Kokrajhar

The population for this study comprises all households in the Kokrajhar District of Assam. According to the Census 2011, Kokrajhar consists of a total population of 887,142 persons, of which males are 452,905 and females are 434,237, and the rural population is approximately 93.8 %. The households across both rural and urban areas in the district form the target population for the study. To draw a conclusion, our study comprises responses collected from 100 households, selected through a stratified sampling approach. The district is stratified into rural and urban segments in proportion to their population share. Within each stratum (rural/urban), households are selected randomly from a list accessible via local administrative units or via systematic random selection in the field with the assistance of local officials and community leaders. This method ensures representation of both rural and urban households, which is important since DFI is likely to differ by location.

4.1 Awareness and Usage of Digital Financial Services: We found that the awareness regarding digital financial services (DFS) among households in Kokrajhar is moderately evolving, yet there is an uneven landscape. The study reveals that the awareness among households regarding financial products does not necessarily translate into functional understanding or the required confidence in usage. We observed that awareness is primarily influenced

by educational qualifications, exposure to financial literacy campaigns, and institutional outreach programs conducted by banks and government agencies. However, a significant proportion of the rural population presents partial awareness regarding financial digital services.

- 4.2 Availability of Digital Infrastructure:** The accessibility of services mainly depends on how these services are available to users. Study found that although expansion of banking services has been made, its access remains spatially and socio-economically uneven. Semi-urban areas demonstrate relatively better access to banking coverage, whereas rural areas exhibit inadequate banking outreach and limited digital infrastructure. Flagship programs like Pradhan Mantri Jan Dhan Yojana have also struggled to integrate the rural population under the formal financial system due to lower literacy levels and the lack of accessible and affordable internet services. Furthermore, the dependence on business correspondents and local banking agents is not sufficient to ensure that seamless access to digital financial services can be termed as structurally available, but its functionality is constrained, particularly in remote and agrarian communities.
- 4.3 Usage Behaviour and Patterns:** The households in Kokrajhar reflect a gradual increment in the usage of digital services, showing a cautious transition from cash-based practices to a cashless system. The most commonly used digital services include UPI-backed transactions, mobile banking applications, and digital wallets, but with lower value for routine transactions. While the facility is available but they still resort to cash-based transactions for daily activities due to concerns related to cybersecurity, transaction failure, insufficient technical support, and fear of financial loss. Notably, demographic factors play a pivotal role, with young and educated people exhibiting a comparatively higher level of engagement. We can conclude that the usage patterns in Kokrajhar demonstrate initial adoption, indicating that DFI is still in a transitional phase.
- 4.4 Rural vs Semi-Urban Differences:** A strong disparity is found between rural and semi-urban households in Kokrajhar regarding DFI. While semi-urban areas reflect a relatively higher level of awareness, accessibility, and usage, rural

households face challenges, including limited internet connectivity and a lower educational background, which restricts their access to services. Gender disparity is also found in rural settings with limited participation in digital finance due to limited autonomy and technological exposure. The study suggests that the semi-urban areas are progressively moving towards a digital financial system, whereas the rural areas highlight the need for context-specific and inclusive policy.

5. Determinants of Digital Financial Inclusion

The adoption of digital financial services in Kokrajhar is influenced by multidimensional factors across socio-economic, demographic, infrastructural, and behavioural domains. The empirical evidence from the households suggests the following determinants that impact the adoption of DFI among households in Kokrajhar district:

- 5.1 Generational Dynamics:** The category of age shows diversity in digital adoption, with younger respondents exhibiting higher levels of engagement, openness to innovation, and technological adaptability, whereas respondents belonging to the older age category demonstrate resistance to change, lack of familiarity with technology, and this restricts their participation.
- 5.2 Educational Qualifications:** Education plays a significant role in determining DFI, influencing both the awareness and accessibility of services. The study reveals that the individual with a higher level of educational attainment reflects familiarity with technology, confidence, and frequency of usage, such as UPI, online banking services, etc. In contrast, limited educational qualifications often exhibit technological apprehension and dependence on intermediaries, restricting independent participation.
- 5.3 Income Level and Economic Capacity:** Income level plays a crucial role in determining access to digital infrastructure and services. Individuals from higher-income groups are more likely to possess smartphones, network connectivity, and banking access, which facilitates greater access to digital services; on the other hand, lower-income households show limited participation due to resource accessibility constraints.

5.4 Gender: Gender-based disparities are observed as a critical barrier to DFI in Kokrajhar. We found that women in rural households face limited access to mobile devices, lower digital literacy, and restricted financial autonomy.

6. Concerns and Challenges

The following are the barrier and concerns that prevents one in adopting digital financial inclusion:

6.1 Privacy & Data Security: It stands as the most significant concern for individuals intending to enter into the digital financial system regarding the safety of their personal and financial information. This shows the pervasive vulnerability associated with digital transactions. The fear of unauthorized access and misuse of sensitive information restricts one from engaging in financial transactions over digital technology.

6.2 Risks of Fraud and Scam: It emerged as the second most concerning issue that respondents care about. Concern regarding phishing attacks, fraudulent messages, and theft of financial information through misrepresentation constitutes a serious concern among rural households. This concern not only discourages digital inclusion but also reliance on traditional banking practices. Around 30% residents highlight it as a serious issue for them.

6.3 Technical Issues: Technical disruptions, including transaction failure and system inefficiency, are reported as barriers by respondents. These network disruptions and unsuccessful transaction status adversely affect users' experience and reliance, which discourages their motivation to switch towards traditional modes of banking practices.

6.4 Lack of Digital Literacy: A lower level of technological awareness poses a barrier in accessing digital financial services. The lower technical competency restricts them from utilising digital financial products independently, resulting in less reliance on technological innovations.

6.5 Poor Customer Support: Due to the huge number of customers, it can sometimes be hard for service providers to attend to all customers when they are in need. This is one of the reasons for dissatisfaction among users, particularly when they encounter transaction failures with high value.

The lack of timely guidance creates a negative impression of the digital financial system.

7. Recommendations

Based on the insights derived from the study, the following recommendations have been put forward to enhance awareness, accessibility, and boost the digital financial inclusion among the households of Kokrajhar district of Assam:

- 7.1 Enhance Digital Literacy:** As we found in the study, there is a high financial literacy rate among younger and educated respondents; however, awareness programs should be organized for older adults, rural populations, and less-educated individuals.
- 7.2 Strengthen Data Privacy:** A strong privacy maintenance mechanism, such as a strong encryption system, two-factor authentication, etc., should be established so that the customer's privacy is not compromised.
- 7.3 Improve Technical Infrastructure:** Insufficient technical infrastructure discourages individuals from using digital banking, so a strong server system and faster network connectivity should be maintained.
- 7.4 Promote Accessible Internet Connectivity:** Since the whole digital process depends on network connectivity and a supported device, the authority should ensure uninterrupted network connectivity and an affordable electronic device, such as a smartphone.
- 7.5 Enhance Customer Support and Grievance Redressal Mechanism:** Poor customer support is a major barrier in electronic transactions, highlighted by respondents. Therefore, banks and fintech platforms should strengthen customer care through multilingual support, responsive helplines, and simple grievance redressal mechanisms to quickly resolve user complaints.

8. Conclusion

This study presents a descriptive assessment of the status of Digital Financial Inclusion in rural Assam, with a specific focus on Kokrajhar district under the administration of the Bodoland Territorial Region. The outcome reflects significant progress in the financial services sector nationwide; however, the application and benefits are yet to be utilized to their optimum

level in rural regions like Kokrajhar. The study found that inclusion of the population into modern financial technology is in a transitional phase, with increasing awareness but limited functional application.

Access to financial services is structurally available, but its applicability is limited due to inadequate digital infrastructure, disrupted network connectivity, and limited digital literacy. However, this investigation demonstrates engagement of young and literate people with digital financial services; a significant portion of the rural population continues to rely on traditional banking methods due to lack of confidence in technology, privacy concerns, risk of fraud, etc. This reflects the need for the undertaking of financial literacy programs, infrastructural development, and strengthening the financial system.

Furthermore, it also identifies key factors such as educational attainment, generational gap, income level, and gender disparities that influence the adoption of digital financial services. The rural-urban disparities and gender-based inequalities also undermine equitable financial inclusion.

This examination also identified barriers and concerns such as privacy issues, risk of fraud and scam, technical failure, and inefficient customer support, which impede the widespread adoption of digital technology. These concerns not only affect customer confidence but also change their mindset towards a digitally inclusive financial ecosystem.

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—Chapter—

The Journey of a Women-Led Enterprise in Tripura: A Case Study

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ABSTRACT

Present case study examines the growth and challenges of “Swapna Dalmoot Factory”, a women-led enterprise operating under a Self-Help Group (SHG) in Anandanagar, Agartala, Tripura. Established in 2018 with an initial investment of Rs. 50,000 along with 5 to 6 members, the enterprise has currently expanded to around 25 women and increased its production capacity from about 200kg per day to 1200 kg per day. The enterprise produces a variety of traditional snacks such as dalmoot, nimki, chire bhaja and chanachur using locally available raw materials.

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The study highlights the role of the SHG model in promoting financial inclusion, employment generation and women's socio-economic empowerment. Despite its success and recognition, the enterprise faces several challenges including limited market reach, weak branding, lack of technology and strong competition from established local brands. The case study emphasises on the need for improved marketing, better packaging, technological adoption and market expansion strategies to ensure sustainable growth and enhanced profitability for the enterprise.

Keywords: Self-Help Groups (SHGs), Women Entrepreneurship, Rural Enterprise Development, Women Leadership.

1. Introduction

1.1 About Self-Help Groups

Self-Help Groups (SHGs) are informal associations of individuals especially women, generally belonging to economically weaker sections of society, who join together and forms a group to improve their socio-economic conditions. These groups are self-governed and they operate on the principles of mutual trust, cooperation, and collective responsibility. The members contribute small amount of their savings regularly, which are pooled into a common fund called the “group corpus” and use it to provide loans among the members.

The concept of financial inclusion through SHGs in India has evolved over time. Initially, the Textile Labour Association (1954) contributed to women's skill development. But the movement gained momentum with the establishment of the Self-Employed Women's Association (SEWA) in 1972. A major breakthrough came in 1992 when NABARD introduced the SHG-Bank Linkage Programme, which became the world's largest microfinance initiative. Later, various Government schemes such as Swarn Jayanti Gram Swarozgar Yojana (1999) and National Rural Livelihoods Mission (NRLM, 2011) further strengthened SHGs.

SHGs play a significant role in:

- Promoting financial inclusion
- Providing livelihood opportunities
- Empowering women socially and economically

- Improving healthcare, education, and living standards
- Enhancing banking literacy and reducing social inequalities

In the context of Tripura, SHGs have experienced substantial growth. The movement began in 1999, with rapid expansion from 2003–04 onwards. By 2004, there were over 25,000 SHGs, of which more than 55% were women-led (TRLM, 2015). Currently, more than 32,000 SHGs operate under the Tripura Rural Livelihood Mission (TRLM), focusing on savings mobilisation, skill training, and income generation.

1.2 Objectives & Methodology

The study aims to understand the operational aspects of the present case, including its organizational structure, production process, and daily activities. It also examines how the Self-Help Group model contributes to the establishment, growth, and management of the enterprise. It also highlights how participation in SHGs improves the socio-economic status of women. It explores key issues such as marketing limitations, competition, and technological gaps. The case study is based on primary data that has been sourced after interviewing the members associated with Swapna Dalmoot Factory. Necessary calculations and analysis has been done to draw meaningful interpretations.

2. Background of Swapna Dalmoot Factory

2.1 Profile of the Enterprise

Swapna Dalmoot is a small-scale food processing unit operating under the Mangal Mayi (Mayee) Self-Help Group in Anandnagar, Agartala, Tripura. The enterprise was established in 2018 with the primary objective of generating income and employment opportunities for rural women of Tripura.

Initially, the SHG started with 5–6 members and a small capital investment of ₹50,000. Over time, the group expanded significantly and currently it consists of 25 women members who works hard to operate and ensures smooth functioning.

The enterprise produces traditional snacks such as dalmoot, nimki, chire bhaja, and chanachur. These products are prepared with locally sourced raw materials and sold at affordable prices in nearby markets.

The factory operates daily from 11:00 AM to 6:00 PM, with a production capacity of around 1200 kg per day. Production is largely manual, though there is potential for semi-automation in the future. Financially, the enterprise has stabilized through internal savings, small loans, and institutional support. Currently, it has no major loan liabilities.

2.2 Enterprise Structure

The organizational structure is simple and cooperative. This structure ensures participative decision-making and efficient coordination.

- **President (Swapna Das):** Responsible for overall supervision, coordination, control and communication with SHG members.
- **Manager (Mithan Das):** Manages production, procurement, financial management, and quality control.
- **SHG Members (Workers):** They perform tasks such as production, packaging, and quality checking.

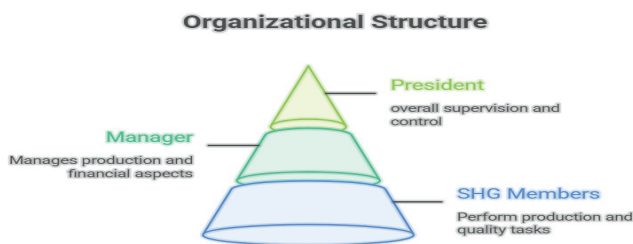


Fig 1: Organizational Structure of Swapna Dalmoot

Source: prepared by the researcher from primary data

3. The Operational And Business Overview of Swapna Dalmoot

This section of the case study is categorised into three major aspects of Swapna Dalmoot i.e., Marketing techniques, Financial Aspect and Production process which illustrates its detailed journey.

3.1 Marketing Techniques

The organisation follows 4Ps of marketing which are Product, Price, Place, and Promotion. This 4Ps of marketing are discussed below:

Product Portfolio

The enterprise produces a variety of snacks:

- **20–20 Dalmoot (Flagship Product):** A spicy mixture with high demand and major revenue contributor.
- **Nimki:** A crispy snack with long shelf life, popular for daily consumption.
- **Chire Bhaja:** A light and relatively healthy snack made from flattened rice.
- **Chanachur:** A spicy mixed snack widely consumed across all age groups.

Price Strategy

The enterprise adopts a low-cost pricing strategy:

- 250 gm – ₹50
- 125 gm – ₹30
- Small packets – ₹8 to ₹20

Features:

- Affordable pricing
- High-volume sales approach
- Competitive pricing

Place Strategy

Swapna Dalmoot operates on the local markets of Tripura which includes both, the Urban and Rural Markets. They focus mostly among the semi urban and rural markets.

Promotional Strategy

For promoting their products, they mostly depend local shops and vendors. Apart from that, their packaging includes:

- Manual packaging using plastic packets
- Airtight sealing for freshness
- Transparent packaging for visibility

3.2 Financial Aspect

The financial structure of Swapna Dalmoot reflects the characteristics of a small-scale, self-help group (SHG)-based enterprise, which operates with limited investment but generates sustainable income. The available information from

the books of the enterprise provides a clear understanding of the cost structure and their financial viability.

I. Initial Investment

The enterprise was established with an initial capital of ₹50,000, which was used for:

- Procurement of raw materials
- Purchase of basic utensils and tools
- Setting up the production unit
- Initial packaging and operational expenses

This low level of investment highlights the accessibility and feasibility of starting small-scale businesses under SHG models.

II. Machinery Investment

In order to improve production efficiency and expand operations, the enterprise has either invested or plans to invest in machinery ranging from: ₹60,000 to ₹1,00,000

This machinery may include:

- Basic mixing or processing equipment
- Frying units or improved cooking setups

III. Major Expenses

The enterprise incurs several regular operational expenses which are as follows: -

a) Raw Materials

- Includes besan, peanuts, chire, edible oil, and spices
- This is the largest and most frequent expense
- Costs vary depending on market prices

b) Wages and Salaries

- Payments made to workers involved in production and packaging
- Ensures regular income for SHG members

c) Packaging Costs

- Expenses on plastic packets and sealing materials
- Necessary for maintaining product quality and marketability

d) Other Operational Costs

- Fuel or energy used in frying
- Maintenance of tools and equipment
- Transportation and minor miscellaneous expenses

IV. Salary Structure

The enterprise follows a structured wage system:

- Main Workers: ₹20,000 per month
- Packaging Staff: ₹6,000 – ₹7,000 per month

This wage distribution reflects:

- Role-based payment system
- Fair earning opportunities for all members
- Contribution towards improving the livelihood of women workers

V. Revenue and Income Generation

The enterprise generates revenue through the sale of its products in local markets.

Following are the Key observations include:

- High demand for traditional snacks ensures steady sales
- Affordable pricing leads to high turnover volume
- Daily production capacity of around 1200 kg indicates strong earning potential

3.3 Production Process

The production process is semi-manual and includes the following stages:

- 1. Procurement of Raw Materials:** Raw materials such as besan, peanuts, chire, edible oil, and spices are sourced from local markets.
- 2. Preparation and Sorting:** Materials are cleaned, sorted, and measured to maintain quality and hygiene.
- 3. Mixing of Ingredients:** Ingredients are manually mixed with spices according to product requirements.
- 4. Frying Process:** The mixture is fried in large utensils with controlled temperature to ensure proper texture and taste.

5. **Drying and Cooling:** Products are cooled and excess oil is removed to improve shelf life.
6. **Quality Checking:** Products are inspected for taste, texture, impurities, and visual appeal.
7. **Packaging:** Products are weighed, filled, and sealed manually in packets.

4.0 Strategic & Financial Evaluation of Swapna Dalmoot

The strategic and financial aspect of Swapna Dalmoot provides insights into the enterprise's market position, operational strength and revenue generation capacity. As a women-led enterprise, the factory has demonstrated significant growth in production and market participation. This section evaluates the internal and external factors influencing the enterprise through a SWOT Analysis while also examining its revenue structure and profitability through financial performance assessment.

4.1 SWOT Analysis

1. Strengths

- a) **Strong SHG Foundation and Social Capital:** The enterprise is built on the SHG model, which ensures cooperation, trust, and shared responsibility among members. This collective approach reduces operational risks and promotes stability.
- b) **Women Empowerment and Workforce Stability:** With 25 women members actively involved, the enterprise benefits from a committed and stable workforce. It also enhances social empowerment, financial independence, and community development.
- c) **High Production Capacity:** The factory has grown significantly from 200 kg/day to 1200 kg/day, indicating strong operational capability and scalability.
- d) **Low-Cost Production Model:** The use of locally available raw materials and manual labor keeps production costs low, allowing the enterprise to offer competitive pricing.
- e) **Strong Demand for Traditional Snacks:** Products like dalmoot, nimki, and chanachur have consistent demand in local markets due to their affordability and familiarity.

2. Weaknesses

- a) **Lack of Branding and Product Differentiation:** The enterprise relies heavily on basic packaging and lacks a strong brand identity. This reduces customer recognition and limits its ability to compete with established brands.
- b) **Limited Market Reach:** Sales are mostly confined to nearby local markets. There is minimal presence in urban or larger regional markets.
- c) **Absence of Technology and Data Analytics:** The enterprise does not use modern tools for demand forecasting, inventory management, or sales tracking. Decisions are based on experience rather than data.
- d) **Manual Production System:** While cost-effective, the labour-intensive process limits efficiency, consistency, and scalability.
- e) **Weak Financial Record-Keeping:** Lack of detailed financial records can affect planning, investment decisions, and access to external funding.

3. Opportunities

- a) **Expansion to New Markets:** There is strong potential to expand into nearby cities like Guwahati and Silchar, where demand for such products is high.
- b) **Retail Sales for Higher Profit Margins:** Retail pricing offers significantly higher revenue compared to wholesale, indicating an opportunity to increase profitability.
- c) **Adoption of Digital Marketing and E-Commerce:** Using social media, online platforms, and digital payments can enhance visibility and reach.
- d) **Product Diversification:** Introducing new variants or healthier snack options can attract new customer segments.
- e) **Government and Institutional Support:** Schemes under NRLM, NABARD, and women empowerment programs can provide financial and technical support.

4. Threats

- a) **Competition from Established Brands:** Local brands from other states have better packaging, branding, and distribution networks, making competition intense.
- b) **Risk of Overproduction:** If production increases without corresponding demand, it may lead to unsold inventory and financial losses.
- c) **Rising Costs of Raw Materials:** Fluctuations in raw material prices can impact profitability.
- d) **Market Saturation:** Local markets may reach saturation, limiting further growth.
- e) **Lack of Modernization:** Failure to adopt technology may reduce competitiveness in the long run.

4.2 Financial Assessment

The financial assessment of Swapna Dalmoot Factory reveals important insights into the enterprise's revenue potential, pricing strategy, and profitability structure. Based on the available data, the enterprise generates approximately ₹6.04 crore annually through wholesale sales and ₹8.64 crore annually through retail sales. This significant difference between wholesale and retail revenue highlights key strategic implications for the business.

1. Comparison Between Wholesale and Retail Revenue

The difference between ₹6.04 crore (wholesale) and ₹8.64 crore (retail) clearly shows that retail sales generate nearly 43% higher revenue than wholesale. This is mainly due to the higher selling price in retail markets (₹200/kg) compared to wholesale pricing (₹140/kg).

Interpretation:

- Retail pricing allows the enterprise to capture a higher value per unit sold
- Wholesale focuses on bulk selling at lower margins
- Retail contributes more towards profit maximization, while wholesale supports volume-based stability

2. Retail Strategy: High Margin Advantage

Retail sales offer higher profitability due to better price realization. Selling directly to customers eliminates intermediaries and allows the enterprise to retain a larger portion of the profit.

Key Advantages of Retail Sales:

- Higher profit margins per unit
- Direct customer interaction and feedback
- Opportunity to build brand identity
- Greater control over pricing

Limitations:

- Requires stronger marketing and branding
- Needs wider distribution channels
- Higher operational effort (packaging, selling, logistics)

Thus, while retail is more profitable, it also demands better business capabilities and infrastructure.

3. Wholesale Strategy: Stability and Risk Reduction

Wholesale sales provide a stable and predictable revenue stream by ensuring bulk sales to retailers or distributors. Although margins are lower, the volume is higher and sales are more consistent. Wholesale acts as a **risk-mitigation strategy**, ensuring that production output is consistently absorbed by the market.

Key Advantages of Wholesale:

- Assured bulk demand
- Faster inventory turnover
- Reduced marketing effort
- Lower risk of unsold stock

Limitations:

- Lower profit margins
- Dependence on intermediaries
- Limited brand visibility

5. Revenue and Production Capacity Analysis

The revenue data of Swapna Dalmoot Factory is based on its daily production capacity of 1200 kg and two different pricing strategies: wholesale and retail.

(A) Wholesale Revenue Analysis (₹140 per kg)

- **Daily Revenue:** $1200 \text{ kg} \times ₹140 = ₹1,68,000$
- **Monthly Revenue:** $₹1,68,000 \times 30 \text{ days} = ₹50,40,000$
- **Annual Revenue:** $₹50,40,000 \times 12 = ₹6.04 \text{ crore}$

Interpretation:

Wholesale sales focus on **bulk selling at a lower price**. This ensures:

- Continuous demand from retailers/distributors
- Faster stock clearance
- Lower risk of unsold goods

However, since the price per kg is lower, the **profit margin is comparatively less**.

(B) Retail Revenue Analysis (₹200 per kg)

- **Daily Revenue:** $1200 \text{ kg} \times ₹200 = ₹2,40,000$
- **Monthly Revenue:** $₹2,40,000 \times 30 \text{ days} = ₹72,00,000$
- **Annual Revenue:** $₹72,00,000 \times 12 = ₹8.64 \text{ crore}$

Interpretation:

Retail sales involve selling directly to customers at a **higher price**, resulting in:

- Higher revenue per unit
- Better profit margins
- Opportunity for brand development

However, retail requires:

- Strong marketing and distribution
- Better packaging and visibility
- More effort in selling

Revenue Data:

Basis	Daily Revenue	Monthly	Annual
Wholesale (₹140/kg)	₹1,68,000	₹50,40,000	₹6.04 Cr
Retail (₹200/kg)	₹2,40,000	₹72,00,000	₹8.64 Cr

Production Data

The production data shows the operational capacity and growth potential of the enterprise.

(A) Current Production Level

➤ 1200 kg per day

This indicates:

- The enterprise has already achieved large-scale production capability
- Efficient coordination among workers
- Strong demand in the local market

Implications:

- High production supports large revenue generation
- Requires continuous market demand to avoid wastage
- Reflects successful growth from initial stages

(B) Target Production Level

➤ 2000 kg per day (future goal)

This represents:

- A planned 66.7% increase in production capacity (from 1200 kg → 2000 kg)

Implications:

- Indicates strong growth ambition
- Requires:
 - Investment in machinery
 - Expansion of workforce
 - Better operational efficiency

6. The Current Scenerio of Swapna Dalmoot

The growth of Swapna Dalmoot since its establishment in 2018 reflects a remarkable journey of transformation from a small-scale unit to a well-functioning enterprise. Initially, the factory operated with limited resources, minimal workforce, and manual production methods, producing approximately 200 kg per day. At that stage, the focus was mainly on survival and establishing a presence in the local market.

Over time, with continuous effort, improved coordination among SHG members, and increasing market demand, the enterprise gradually expanded its production capacity. By 2026, the factory has significantly increased its output to

approximately 12 quintals per day (1200 kg). This growth has been supported by better utilization of resources, increased workforce participation, and improved production techniques.

Furthermore, the enterprise has set a clear and ambitious target to increase its production capacity to 2000 kg per day by the end of 2026. This target reflects not only the confidence of the enterprise in its operational capabilities but also the growing demand for its products in the market. The planned growth is expected to be supported by investment in machinery, expansion into new markets, and enhancement of production efficiency.

Overall, the growth of the factory highlights the success of the SHG model in promoting sustainable business development and empowering women economically.

I. Initial Stage (2018)

- Production capacity was around 200 Approx. kg per day
- Limited number of members (5–6 people)
- Fully manual production process
- Limited market reach (local area only)
- Low capital investment and basic infrastructure

II. Expansion Phase (2019–2025)

- Gradual increase in number of SHG members (up to 25 women)
- Improvement in production techniques and workflow
- Better coordination and division of labor
- Increase in demand for products in local markets
- Introduction of more product varieties

III. Current Stage (2026)

- Production capacity increased to 1200 kg per day (12 quintals)
- Strong workforce participation
- Established presence in local market
- Recognition through award from Women Commission
- Stable income generation for members

IV. Future Growth Target (End of 2026)

- Target production: 2000 kg per day
- Planned investment in machinery (₹60,000 – ₹1,00,000)

- Expansion to new markets such as Guwahati
- Improvement in packaging and branding

Achievements

The growth and achievements of Swapna Dalmoot Factory demonstrate a successful transformation from a small-scale initiative into a stable and expanding enterprise. Since its establishment, the factory has made significant progress in terms of workforce expansion, production capacity, and social recognition.

I. Growth in Membership:

At the initial stage in 2018, the enterprise started with a small group of approximately 5–6 members. Over time, as the business expanded and gained stability, more women joined the initiative. At present, the number of members has increased to around 25 women, indicating:

- Increased employment opportunities for local women
- Strengthening of the Self-Help Group (SHG) model
- Improved teamwork and division of labor
- Greater social and economic participation of women

II. Increase in Production Capacity:

The enterprise has achieved remarkable growth in its production capacity:

- Initial production: 500 kg per day
- Current production (2026): 1200 kg per day (12 quintals)

This six-fold increase reflects:

- Improved efficiency in production processes
- Better utilization of resources
- Growing demand for products in the local market
- Enhanced coordination among members

The enterprise has also set a future target of reaching 2000 kg per day, which shows strong growth potential and expansion plans.

III. Recognition and Achievement:

One of the most significant achievements of the enterprise is the recognition it received from the Tripura Commission for Women

On 20TH March, 2026 for their commendable achievement and also for contributing for the betterment of the society and for building a successful SHG group.

7. The Challenges of Swapna Dalmoot Factory

Over the years, Swapna Dalmoot Factory has achieved significant growth in production capacity and workforce. However, despite increasing its output to around 1200 kg per day, the enterprise is still largely dependent on local markets for sales. This creates a major challenge where production capacity is growing faster than market reach.

At present, the products are mainly sold at nearby local markets with limited distribution channels, minimal branding, and basic packaging. As a result, the enterprise faces the risk of overproduction, and limited revenue growth. This situation creates a practical dilemma between expanding production and ensuring sufficient market demand and distribution. The major challenges of the women-led enterprise is discussed below:

i) Imbalance Between Production Growth and Market Demand:

One of the major issues faced by the enterprise is the mismatch between its increasing production capacity and its limited market reach. The factory has significantly expanded its production from 200 kg per day in 2018 to 1200 kg per day in 2026, with a target of reaching to 2000 kg per day. This imbalance highlights the need for synchronized growth in both production and market expansion.

However, the sales network of the enterprise is still largely confined to local markets. This creates a risk where increased production may not be fully absorbed by the market, leading to:

- Overstocking and unsold inventory
- Wastage of perishable goods
- Financial strain due to blocked working capital

ii) High Competition from Different Brands from other States in Local Market:

Another major challenge is the presence of well-established local snack brands from other states, which dominate nearby markets. These competitors have several advantages such as:

- Strong brand recognition
- Attractive and professional packaging
- Wider distribution networks
- Better market penetration

As Swapna Dalmoot Factory plans to expand into regions like Silchar & Guwahati, it will face intense competition. Without improving its branding, packaging, and marketing strategies, the enterprise may struggle to compete effectively.

iii) Limited Market Reach and Distribution Channels:

The enterprise's market is largely restricted to nearby areas, with limited distribution networks. There is minimal presence in larger or urban markets.

This limitation results in:

- Restricted customer base
- Dependence on local demand
- Reduced opportunities for revenue growth

To achieve its future targets, the enterprise must expand its distribution channels and explore new markets beyond its current geographical area.

iv) Weak Marketing and Branding Strategies:

Currently, the enterprise relies mainly on word-of-mouth marketing and simple packaging. There is little focus on branding, promotion, or product differentiation. In a market where consumers are influenced by packaging and brand image, this becomes a significant disadvantage.

This creates challenges such as:

- Low product visibility
- Difficulty in attracting new customers
- Weak competitive positioning

v) Cost vs Modernization Dilemma:

The enterprise faces a critical dilemma in balancing cost efficiency with modernization. While improvements in machinery, packaging, and marketing are necessary for growth, they have also increase operational costs. Failure to manage this balance may either reduce profitability or limit growth opportunities

The challenge lies in:

- Maintaining affordable prices for local customers
- While investing in better technology and branding

8. Journey Ahead

In conclusion, the case study of Swapna Dalmoot Factory reveals the successful functioning of a small-scale enterprise under the Self-Help Group (SHG) concept. The enterprise has recorded remarkable growth since its formation in 2018. The enterprise has not only increased its production and employee base, but it has also been able to maintain the quality and affordability of its products. The successful functioning of the enterprise can be attributed to the teamwork, efficient use of resources, and high market demand. The enterprise not only contributes to the economic development of the region, but it also plays a vital role in the empowerment of women. The enterprise provides women with job opportunities, financial independence, and social status. Although the enterprise has recorded some challenges, including limited machines, lack of advanced marketing, and lack of financial records, it has recorded remarkable potential in its business. Therefore, it is evident that Swapna Dalmoot Factory has the potential to grow more in the near future. With the right support, the enterprise can expand its market base and become a successful enterprise.

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—Chapter—

Algorithmic Aesthetics: How AI is Scripting the Next Movement in Visual Culture

Dr. Saday Chandra Das

ABSTRACT

The rapid growth of Artificial Intelligence (AI) is transforming visual culture and redefining artistic practice. This paper explores the concept of algorithmic aesthetics to examine how AI-driven systems influence image-making and creative processes. By generating complex visual outputs, AI challenges traditional ideas of authorship, originality, and artistic control. The role of the artist is shifting from sole creator to collaborator, working alongside computational systems. The study highlights both the aesthetic possibilities and ethical concerns of AI-generated art, including issues of authorship, data use, and authenticity. It argues that AI does not simply replace human creativity but reshapes it through a dynamic interaction between human intention and machine intelligence. In this context, algorithmic aesthetics emerges as a key framework for understanding how AI is shaping the next movement in contemporary visual culture.

Keywords: Algorithmic Aesthetics, Artificial Intelligence, Visual Culture, Artistic Authorship, AI-Generated Art.

Introduction

Art has always developed in close relationship with technological change. Each major innovation has not only introduced new tools but has also reshaped artistic vision and audience perception. The invention of linear perspective during the Renaissance transformed spatial representation, while photography challenged the role of painting as a means of realistic depiction. Later, digital technologies expanded the possibilities of image-making, allowing artists to experiment with new forms, mediums, and modes of distribution. In the contemporary moment, Artificial Intelligence (AI) represents another significant shift, marking the beginning of a new phase in the evolution of visual culture.

AI technologies, particularly those based on machine learning and neural networks, have introduced unprecedented possibilities in artistic creation. These systems are trained on vast datasets of images, enabling them to analyze patterns, recognize styles, and generate new visual compositions. Unlike traditional tools, which rely entirely on human control, AI systems operate with a degree of autonomy. They can produce artworks that are complex, detailed, and often indistinguishable from those created by human artists. This ability has positioned AI not merely as a tool, but as an active participant in the creative process.

The growing presence of AI in visual arts raises fundamental questions about creativity and authorship. If a machine can generate an artwork, what becomes of the artist's role? Is the artist still the sole creator, or do they become a collaborator guiding the system? Furthermore, questions of originality and ownership become more complex when artworks are produced through algorithms trained on existing visual data. These concerns extend beyond technical issues, touching upon deeper philosophical and cultural debates about the nature of art itself.

In this context, the concept of **algorithmic aesthetics** offers a useful framework for understanding these changes. It refers to the aesthetic qualities that emerge from computational processes, where visual outcomes are shaped by algorithms rather than direct human action. This concept highlights a shift from individual artistic expression to a more distributed form of creativity, involving interactions between human intention, machine intelligence, and data-driven processes.

This paper engages with these developments by examining how AI is scripting the next movement in visual culture. It explores the ways in which AI is transforming artistic practices, redefining authorship, and expanding aesthetic possibilities. At the same time, it considers the ethical and conceptual challenges that arise from AI-generated art, including issues of authenticity, control, and cultural representation.

By situating AI within the broader history of technological change in art, this study argues that AI does not simply replace human creativity but reconfigures it. It introduces a new model of artistic production based on collaboration between human and machine, thereby reshaping the foundations of visual culture in the digital age.

Understanding Algorithmic Aesthetics

Algorithmic aesthetics refers to the visual and conceptual qualities that emerge from algorithm-based systems. In simple terms, it is the study of how computer programs create images and how these images are understood and experienced as art. It shifts attention from the artist's hand to the underlying computational processes that shape visual outcomes.

At first glance, Artificial Intelligence (AI) may appear to be a distant and highly technical development, but it is already embedded in many everyday design practices. For instance, when a user creates a logo using digital software and receives suggestions for colour palettes, font combinations, or layout structures, AI is actively guiding these decisions. These suggestions are not random; they are generated through the analysis of vast datasets, drawing on patterns from millions of existing designs. Platforms such as Adobe Sensei, Canva, and Figma increasingly incorporate AI to automate processes like background removal, colour correction, and typography selection. While this improves efficiency by reducing repetitive tasks, it also expands creative possibilities by offering new directions and combinations that designers might not have considered independently. (Abhishek, 2024)

Unlike traditional art, where the artist maintains direct control over every stage of production, AI-generated art operates through indirect control. The artist may design the system, select training data, or guide the prompts, but the final image

is produced through automated processes. This results in a new form of aesthetic experience—one that is co-produced by human intention and machine computation.

Significantly, AI systems do not possess emotions or intentions in the human sense. Instead, they function by analyzing patterns and generating outputs based on probabilities. Despite this, the images they produce can still be meaningful, visually engaging, and culturally relevant. This challenges the long-standing assumption that art must originate solely from human emotion or subjective experience.

Algorithmic aesthetics also introduces variability and unpredictability into the creative process. A single input can generate multiple outputs, each with subtle or significant differences. This creates a dynamic and evolving form of art that resists fixed outcomes and embraces continuous transformation. In this way, algorithmic aesthetics not only redefines how art is created but also how it is experienced in an age increasingly shaped by intelligent systems.



Designing with AI: How Algorithms Influence Aesthetic Choices

<https://medium.com/@abhishek.abhishek.m446/designing-with-ai-how-algorithms-influence-aesthetic-choices-712b700c5857>

AI and the Process of Artistic Creation

The integration of Artificial Intelligence (AI) into artistic practice has significantly transformed the process of creation, shifting it from a purely manual and individual activity to a

more collaborative and system-driven engagement. As noted by Eriksson (2022), AI introduces a new creative framework in which the artist is no longer the sole producer of form but becomes a mediator between data, algorithms, and visual outcomes. This shift reflects a broader movement in contemporary art where creativity is increasingly distributed across human and non-human agents.

Conventionally, artistic creation involved direct control over materials, techniques, and composition. However, with the use of AI systems, particularly those based on machine learning, this process becomes more indirect and iterative. Artists now engage with AI by selecting datasets, designing prompts, and adjusting parameters rather than physically crafting every element of the artwork. According to Jain et al. (2022), this interaction transforms the act of creation into a dialogue between the artist and the machine, where outcomes are often unpredictable and emergent rather than fully pre-determined.

One of the most significant contributions of AI to artistic creation is its ability to generate multiple variations rapidly. This allows artists to explore a wide range of visual possibilities in a short time, encouraging experimentation and innovation. Instead of working towards a single final image, the artist can evaluate, select, and refine outputs generated by the system. This process aligns with what Eriksson (2022) describes as “curatorial creativity,” where the artist’s role shifts toward decision-making and interpretation rather than direct production.

Furthermore, AI expands the boundaries of artistic imagination by introducing combinations and patterns that may not arise through human intuition alone. Jain et al. (2022) highlight that AI systems, trained on extensive datasets, can merge diverse visual styles and cultural references, leading to hybrid forms of expression. This capability challenges traditional notions of originality while also opening new pathways for creative exploration.

However, the integration of AI also raises important concerns regarding skill, authorship, and artistic identity. As AI automates certain aspects of the creative process, questions arise about the value of technical expertise and manual labour in art. Some critics argue that this may lead to a devaluation of artistic skill, while others suggest that it simply redefines skill in terms of conceptual thinking and system manipulation.

In this evolving context, the process of artistic creation becomes less about individual execution and more about collaboration, selection, and interpretation. AI does not eliminate the role of the artist but transforms it, positioning the artist as a co-creator who works alongside intelligent systems. As a result, artistic practice in the age of AI reflects a dynamic interplay between human creativity and machine intelligence, marking a significant shift in the history of visual art.

Rethinking Authorship in the Age of AI

The emergence of Artificial Intelligence (AI) in artistic practice has fundamentally challenged traditional notions of authorship, which have long been centred on the idea of the individual artist as the sole creator. In classical art theory, authorship is closely tied to originality, intention, and personal expression. However, as AI systems increasingly participate in the production of artworks, this model becomes difficult to sustain. Scholars such as Nuray Attila (2025) argue that authorship in the age of AI must be understood as a distributed and layered phenomenon rather than a singular act of creation.

AI-generated art involves multiple agents in the creative process. These include the programmer who develops the algorithm, the datasets that train the system, the user who provides prompts or inputs, and the machine that produces the final output. According to Rahul Kailas Bharati (2025), this multi-agent structure complicates the attribution of authorship, as no single entity can claim complete ownership of the artwork. Instead, authorship becomes a collaborative process shaped by both human intention and computational execution.

This shift also raises questions about originality. Since AI systems are trained on existing images, their outputs are often derived from patterns and styles present in prior works. D. Bernaschina (2025) suggests that this challenges the traditional idea of the artwork as a unique and original creation. Rather than producing entirely new forms, AI recombines and reinterprets existing visual data, leading to what can be described as “synthetic originality.” In this sense, creativity is not eliminated but reconfigured through processes of selection, transformation, and recombination.

Furthermore, the role of the artist is undergoing a significant transformation. As noted by L. French (2025), the artist in an

AI-driven context often functions as a curator, facilitator, or director of the creative process. Instead of directly crafting the artwork, the artist designs the conditions under which the artwork is generated. This involves choosing datasets, framing prompts, and evaluating outputs. Authorship, therefore, shifts from execution to conceptualization and decision-making.

At the same time, ethical and legal concerns surrounding authorship have become increasingly important. Questions arise regarding intellectual property rights, especially when AI-generated works are based on copyrighted materials. Determining ownership becomes complex when creative output is produced through systems trained on collective cultural data. This challenges existing legal frameworks, which are primarily designed to recognize individual human authors.

In this evolving landscape, authorship can no longer be understood as fixed or singular. Instead, it must be reimagined as a dynamic and shared process that reflects the interaction between human creativity and machine intelligence. AI does not simply diminish the role of the artist; rather, it transforms authorship into a more fluid and collaborative concept. As a result, the age of AI calls for a redefinition of authorship that acknowledges both technological agency and human creativity within contemporary visual culture.

Aesthetic Implications of AI-Generated Art

AI-generated art introduces a range of new aesthetic possibilities that are reshaping contemporary visual culture. One of its most striking features is the ability to combine diverse artistic styles, merging elements from different traditions to create hybrid visual forms that are often difficult to achieve through manual techniques. In addition, AI systems demonstrate a high level of precision, producing detailed and refined images that can sometimes exceed human technical capabilities. These qualities contribute to visually compelling outputs that appeal to a wide and diverse audience.

At the same time, AI-generated art has been subject to critical debate. Some scholars argue that such works may lack depth or emotional resonance, as machines do not possess lived experiences or subjective intention. This can lead to perceptions of repetition or superficiality in certain outputs. However,

meaning in art is not solely dependent on the creator's intention but also on the viewer's interpretation. From this perspective, AI-generated artworks can still evoke engagement and significance, even if their origins differ from traditional practices.

Furthermore, AI is contributing to the emergence of new visual cultures, particularly through digital and social media platforms that enable rapid production and circulation of images. This has led to evolving aesthetic trends and a dynamic visual environment, where artistic forms are continuously generated, shared, and reinterpreted.

Ethical Considerations and the Future of Visual Culture of AI

The growing use of Artificial Intelligence (AI) in visual arts raises important ethical concerns that will shape the future of visual culture. As noted by Nuray Attila (2025) and Rahul Kailas Bharati (2025), issues such as data ownership, copyright, and consent are central, since AI systems are often trained on existing artworks without clear permission from creators. This challenges traditional ideas of intellectual property and artistic rights. Additionally, D. Bernaschina (2025) highlights concerns about bias and representation, as AI systems may reproduce or even amplify cultural stereotypes embedded in their training data.

Beyond these concerns, ethical questions also emerge around authenticity and transparency. Audiences may not always be aware of whether an artwork is AI-generated, raising the need for clear disclosure and accountability. There are also concerns about the impact of AI on artistic labour, as increasing automation may reduce opportunities for human artists in certain fields such as illustration and design. At the same time, L. French (2025) suggests that AI has the potential to democratize creativity by making artistic tools more accessible to a wider population.

Looking ahead, the future of visual culture will depend on how effectively these ethical challenges are addressed. It requires the development of balanced frameworks that support innovation while protecting artists' rights, encouraging inclusivity, and promoting responsible use of technology. In this way, AI can contribute to a more dynamic and equitable visual culture, rather than undermining the values that sustain artistic practice.



Jason Allen's A.I.-generated work, "Théâtre D'opéra Spatial," took first place in the digital category at the Colorado State Fair.

Retrieved from <https://www.nytimes.com/2022/09/02/technology/ai-artificial-intelligence-artists.html>

Conclusion

Recent scholarship highlights that the rise of AI in visual arts requires a fundamental rethinking of creativity, authorship, and artistic responsibility. Contemporary studies emphasize that artistic production is increasingly shaped by collaborative interactions between human intention and algorithmic processes, where creation becomes iterative, adaptive, and system-driven. In this context, authorship is no longer fixed or singular but distributed across multiple agents, including the artist, the technological system, and the data that informs it. At the same time, critical discussions point to the ethical and cultural challenges associated with AI, such as issues of bias, ownership, transparency, and the shifting role of the artist within a technologically mediated environment.

These developments suggest that the future of visual culture will not be defined by a replacement of human creativity but by its transformation. Artists are likely to engage more deeply with technology as collaborators, exploring new methods of expression while maintaining critical awareness of its limitations. The evolving relationship between human creativity and machine intelligence also calls for updated theoretical frameworks and ethical guidelines that can address the complexities of AI-driven art.

Ultimately, algorithmic aesthetics provides a meaningful lens through which to understand this transition. It helps to frame AI not as a threat to artistic practice but as a catalyst for innovation, expanding both the possibilities of creation and the ways in which art is experienced. As visual culture continues to evolve, a balanced approach—one that values creativity, responsibility, and critical engagement—will be essential in shaping a more inclusive and dynamic artistic future.

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10

—Chapter—

Success and Failure Factors of Business Process Reengineering

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ABSTRACT

Business Process Reengineering (BPR) has come to represent an important strategy to achieve dramatic improvements in excellence for any organization through a basic overhaul or redesign of its business processes. Yet, such efforts to improve overall performance have shown an alarmingly high failure rate within multiple sectors and global locations worldwide. This paper focuses specifically on understanding critical success or failure determinants for BPR implementation within an organization. Using various conceptual frameworks along with relevant instances from global and Indian firms, this paper highlights aspects such as leadership commitment, cross-functional teams, strategic alignment, successful change management, as well as IT enablement as critical determinants for BPR implementation within any firm.

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However, aspects such as unclear goals, bad communication skills, employee resistance to BPR implementations, a lack of training, insufficient information technology enablement, as well as integration have come to represent important determinants for BPR implementation failures. Furthermore, this paper has made use of a SWOT analysis to effectively elucidate critical determinants for BPR implementation within an organization.

Keywords: Business Process Reengineering (BPR), Organizational Transformation, Change Management, Process Innovation, Strategic Alignment

Introduction

In a highly competitive global scenario with continuous improvements in technology and increasing customer expectations from organizations, it has become imperative for organizations to transform their core processes in a dramatic manner to result in significantly better business outcomes. Radical changes in the overall business processes of an organization in the form of Business Process Reengineering (BPR), as proposed by Michael Hammer and James Champy, have provided organizations such as IBM Credit Corporation, Taco Bell, Mahindra & Mahindra, and State Bank of India with the potential for tremendous changes in overall business processes, yielding improved cost benefits, better customer service levels, faster time-to-market products and services, and greater flexibility in overall business processes. However, the success of BPR has been highly variable in its applications in numerous organizations in the context of the entire global economy, including TELECO, Ford Motor Company, Bank of India, ICICI Bank, amongst others. In the Indian context, numerous organizations have failed in their endeavors with BPR.

The high failure rate of BPR implementations clearly indicates that there is an urgent need for an in-depth examination of the factors of success and failure of BPR initiatives. In this regard, this specific study will focus on examining critical success factors and major factors of failure in BPR, along with an analysis of strengths, weaknesses, opportunities, and threats with regard to BPR initiatives. The overall idea of this paper is to create an

exhaustive and thorough knowledge regarding effective BPR management and the ways of avoiding failure, with the help of theoretical and practical organizational experiences.

Objectives of the chapter

1. To analyze the critical success factors influencing effective implementation of Business Process Reengineering.
2. To identify and examine the major causes of Business Process Reengineering failure.
3. To assess the strengths, weaknesses, opportunities, and threats (SWOT) associated with the implementation of Business Process Reengineering in organizations.

Major factors of BPR success

Business Process Reengineering (BPR) is a process of radical change in organizations that involves a complete overhaul of existing processes to achieve radical improvements in key areas such as cost, quality, service, and speed. Success in BPR requires a focus on complex enablers such as leadership, team, and technology, as evident in well-structured models developed by experts such as Michael Hammer and James Champy.

Major Success Factors in Business Process Reengineering Implementation :

1. **Leadership Commitment:-** Leadership must actively support BPR with unswerving vision, resource allocation, and removal of barriers. Without leadership support, efforts fail due to lack of cooperation; leaders articulate lofty visions, act as change agents, and link BPR to strategic plans such as competitiveness in a rapidly changing market.
2. **Cross-Functional Teams:-** Form teams consisting of representatives from different functions to encourage innovation and integrated thinking. These teams overcome functional barriers, tap into collective knowledge, and ensure that designs are feasible and integrated.
3. **Effective Change Management:-** Strategies such as communication, training, and incentives can counteract the fear of change and layoffs among employees. Cultural transformation towards agility and continuous improvement can build momentum, turning critics into supporters within the 1-3 year BPR cycle.

4. **Strong IT Enablement:**-IT should be used as a primary enabler for automation, integration, and decision support systems. Think ERP systems or AI-powered workflows. IT should be aligned with process objectives, not driven by them, magnifying the impact of process redesign by enabling real-time data flow.
5. **Resource Allocation:**-Ensure adequate budget, talent, and time without impacting current business operations. Phased pilot testing can help avoid risks, and external consultants can bring impartiality when in-house talent is lacking.
6. **Strategic Alignment:**-Each process undergoing reengineering should align with business strategy, customer, and market requirements. Lack of alignment results in short-term success but long-term obsolescence; periodic strategy reviews keep BPR aligned with business goals.
7. **Continuous Monitoring:**- After implementation, set up KPIs for monitoring process performance with feedback loops for continuous improvement. This helps avoid regression and instills a culture of excellence, ensuring long-term ROI benefits beyond the initial phase.

Companies which got success after implementing Business Process Reengineering:

I. At Global level:-

1. **IBM Credit Corporation:** IBM Credit Corporation streamlined its credit approval process, which used to take weeks because of the sequential process involving five steps. By optimizing the routine process and integrating IT systems, the company achieved the processing of credits in hours, allowing for faster deals and greater customer responsiveness.
2. **Taco Bell:**- In the 1980s, Taco Bell streamlined its restaurant operations by centralizing food preparation in off-site commissaries, making it easier for customers to receive services. This BPR initiative helped the company reduce the number of employees, improve quality control, and increase revenues from \$500 million to \$3 billion in the mid-1990s.

II. At National level:-

1. **Mahindra & Mahindra (M&M):-** In the mid-1990s, M&M identified inefficient plants with union problems and inefficiencies, which were addressed by BPR initiatives involving plant layout and productivity improvement. Management proved the success of BPR by working in shop floors during a strike; after the implementation, production increased substantially (e.g., 35 engines/day by 100 officers vs. 70 by 1,200 workers), improving overall manufacturing processes.
2. **State Bank of India (SBI):-** SBI implemented TCS' BaNCs core banking solution at its branches, the largest implementation in the world, which enabled the bank to operate centrally and access all products fully across the country. The critical success factors achieved were leadership visibility, training over 100,000+ employees, and business ownership, which resulted in 250% business growth per employee and customer retention.

Major Factors of BPR Failure

There are many cases of BPR failure in various organizations across the globe, and these include a lack of proper planning, poor change management, resistance by employees, a lack of commitment by senior management, and a misalignment of reengineered processes and organizational strategies. By analyzing these failures, one can gain important insights for future BPR projects and emphasize the need for proper communication, change management, technological readiness, and employee training.

Major failures in implementation of BPR

1. **Unspecified Goals and Lack of Employee Training:-** There are many cases of BPR failure because organizations fail to specify their goals and objectives or provide adequate training to employees. Without a proper understanding of the goals and objectives of the BPR process, employees fail to adjust to the new process. Lack of training also restricts employees from effectively executing new tasks.
2. **Lack of Communication with Employees:-** There is BPR failure when there is a lack of communication with employees regarding the impending changes. A lack of communication

between the organization and its employees leads to a sense of exclusion, confusion, and fear of the impending BPR change.

3. **Poor Understanding of the Digital Environment and Inadequate Planning:-** Those who underestimate the effects of digital transformation tend to make wrong decisions in BPR. Lack of understanding of new technology, market trends, and digital capabilities results in poorly designed processes that do not meet customer needs and market realities. Poor planning further worsens the chances of failure.
4. **Ineffective Change Management Affecting Service Quality:-** Poor change management can cause disruptions in the normal course of operations during BPR implementation. If the workforce is not led through the change process, the quality of services may deteriorate, leading to operational failures and customer dissatisfaction. Change management is critical to ensure continuity and service quality.
5. **Insufficient Stakeholder Engagement and Organizational Inertia:-** BPR projects fail if key stakeholders are not actively engaged in the process. Organizational inertia, or resistance to change because of organizational habits and culture, can hinder the implementation process. If the workforce is not properly engaged and motivated, they may resist changes in work processes, making reengineering initiatives unsuccessful.
6. **Employee Resistance Leading to Delays and Cost Overruns:-** Resistance from employees, especially when the change affects job security or their roles, can cause considerable delays in BPR projects. This resistance can lead to increased costs and, in the end, result in projects going beyond their budget.
7. **Poor System Integration and Inadequate Employee Training:-** BPR projects that involve extensive use of technology can fail if the new systems are not properly integrated with the existing processes. Employees may not be able to work effectively with new technologies if they are not properly trained.

Companies facing issues related to BPR failures (In Indian and Global context)-

I. Global BPR Failures

1. **TELECO (USA - 1990s)** : TELECO adopted BPR to improve competitiveness. However, the result was a failure due to improper planning and communication. Employees were not ready for the dramatic changes, and management did not communicate the goals and objectives of the changes properly. There was a lack of coordination and the use of process analysis tools, which led to confusion and inefficiency in the operations. The result was a waste of time, increased costs, and low employee morale. This clearly shows that change management and employee engagement in process changeovers are often overlooked, leading to the failure of BPR.
2. **Ford Motor Company (1990s)**: Ford Motor Company adopted BPR to improve manufacturing and administrative processes. However, the project met resistance from employees because they were not involved in the planning process and were not communicated with about the changes. There was a lack of training and proper communication, which led to inefficiency in operations and a delay in the adoption of new processes.

II. Indian BPR Failures

1. **Bank of India (Early 2000s)**: The Bank of India was planning to achieve core banking solutions using BPR. But because of the lack of infrastructure and resistance from employees, the project got delayed and went over budget. This example clearly shows the need for readiness assessment, resource allocation, and training of employees to attain BPR goals.
2. **ICICI Bank (Early 2000s)**: The ICICI Bank's plan to centralize data management processes was hindered by poor integration and a lack of training for employees. This example clearly shows that merely upgrading technology will not help attain success; proper planning, assistance, and training are required.

SWOT Analysis of Business Process Reengineering (BPR)

Strengths: It highlights a number of strong points: the high level of leadership commitment, which means clarity in vision and speed of decisions; a firm process analysis that enables the detection of anomalies; collaboration across functional levels for design breakthroughs; a continuous inclination toward effective change management practices for acceptance; robust IT enablement to heighten outcomes; sufficiency of resources and linkage to organizational objectives, which strengthens execution. Continuous performance monitoring and high levels of stakeholder engagement also reinforce BPR's effectiveness and its success rate of implementation.

Weakness: Internal weaknesses associated with BPR initiatives include unclear objectives, a lack of proper training among employees, and internal communication that may cause confusion and decreased productivity. Then there is limited digital awareness, weak planning capabilities, and ineffective change management-things that disturb operations and service quality. Low stakeholder involvement and organizational inertia delay progress. Resistance on the part of employees raises costs. Other factors like system integration at a low level, skill gaps, and strategic misalignment with organizational goals further lessen the potential benefits of BPR initiatives. This leads to underutilization of BPR, whereby limited performance improvements are achieved.

Opportunities: Effective business process reengineering presents opportunities to various organizations to achieve competitive advantage based on speed, quality, and efficiency. Business process reengineering involves digital transformation using technologies such as automation and AI, which improves informed decision-making. Business process reengineering involves customer-centric processes that promote customer service quality. Business process reengineering improves organizational flexibility and scalability in response to organizational conditions. Business process reengineering improves employee engagement and efficiency through skills management and role allocation. Finally, business process reengineering leads to data-driven process improvements through the use of real-time data and IT analytics.

Threats: There are various prominent issues which may pose a significant risk towards project success and resource efficiency, such as ambiguity or lack of goal setting, planning, and training. These may lead to a loss for the business, low morale among employees, and high employee turnover rates. Effective communication and change may also result in losing valuable and skilled employees for the business. Furthermore, businesses may also fall short in terms of competition because of a lack of understanding about the existing digital world, which may lead to losing business to agile competitors. Poor service quality may derive from customer dissatisfaction, disruptions in the provision of services resulting from business process redesigning projects, and rising costs, which may threaten the business project from a viable entity point of view. Furthermore, low digital readiness may lead to technological obsolescence for the business, culture backlash from implementing new digital ideas, and change fatigue, which may hinder successful transformation for the business in the future. Finally, business process redesigning may not match business strategy, which may lead to strategic drift for the business, affecting its success and performance.

Conclusion

Business Process Reengineering is a sudden approach allowing organizations to make quantum improvements in efficiency, quality, speed, and customer satisfaction by truly reimagining and redesigning core processes. Clearly, from the analyses of objectives, success factors, and failure factors, it is obvious that BPR is anything but just some technical or structural exercise; rather, it deals with holistic organizational change absolutely requiring strong leadership, strategic clarity, and involvement from employees. In instances where objectives are clearly defined, reengineered processes are aligned with business strategy, and initiatives are adequately supported with resources, technology, and performance measurements, reengineering can offer sustainable competitive advantages.

The study of the success stories of BPR programs implemented at both international and national levels, such as IBM Credit Corporation, Taco Bell, Mahindra & Mahindra, and State Bank of India, sheds light on the essence of leadership commitment, collaboration between functions, effective change management,

and IT enablement of organizations. Similarly, a study of failed BPR programs has revealed that a lack of goal definition, communication, training, and change resistance, as well as poor planning, can significantly hamper re-engineering programs. The success and failure stories of organizations, like TELECO, Ford Motor Company, Bank of India, and ICICI Bank, emphasize that organizations ignoring the human and cultural aspects of BPR programs have suffered not only from cost and operating issues, but also from a loss of competitive edge and dissatisfaction within the workforce.

The SWOT analysis reinforces that though BPR has strong internal strengths and offers substantive opportunities through digital transformation, agility, and customer-centricity, it is equally prone to serious weaknesses and external threats if not managed well. Thus, the success of BPR largely depends on an organization's capabilities for minimizing the internal weaknesses, managing proactively the external threats, and continuous alignment of the re-engineered processes with the evolving business and market requirements.

In the final analysis, BPR should be approached as a strategic, long-term investment, not merely as a tactical, short-term cost-cutting initiative. Organizations that approach BPR from a holistic, well-planned, and people-centered perspective are more likely to attain sustainable benefits and achieve true organizational excellence. Done right, BPR can become an orderly catalyst for innovation, competitiveness, and sustainable growth; done badly, it can pose a host of operational and strategic risks.

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—Chapter—

Green Hotel Practices and Their Surprising Impact on Guests and Sustainability in Kerala

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ABSTRACT

Sustainability has become a strategic priority in the hospitality industry, with green hotel practices playing a crucial role in enhancing guest satisfaction and operational performance. This study investigates the impact of sustainable housekeeping practices on guest satisfaction, willingness to pay, and the effect of employee green training on hotel environmental performance in four- and five-star hotels in Kerala, India. Using a quantitative research design, data were collected from 330 hotel guests and housekeeping managers through structured questionnaires. Results reveal a strong positive relationship between green hotel practices and guest satisfaction ($r = 0.977$, $R^2 = 0.955$, $p < 0.001$), as well as a significant influence on guests' willingness to pay ($R^2 = 0.584$, $p < 0.001$). Additionally, green training of employees significantly predicts hotel environmental performance ($R^2 = 0.478$, $p < 0.001$).

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The findings underscore the importance of integrating eco-friendly operations and employee training to enhance guest experiences, promote sustainable practices, and achieve operational excellence in the hospitality sector.

Keywords: Green Hotel Practices, Guest Satisfaction, Willingness to Pay, Green Training and Environmental Performance.

Introduction

Sustainability has become a critical focus for the hospitality industry as hotels worldwide recognize the environmental, social, and economic impacts of their operations. Housekeeping, as one of the core operational functions in hotels, contributes significantly to resource consumption, including energy, water, and cleaning chemicals. In recent years, sustainable housekeeping practices—such as eco-friendly cleaning, waste reduction, energy-efficient laundry processes, and water conservation—have emerged as key strategies to reduce environmental footprints while maintaining service quality.

Kerala, often referred to as “God’s Own Country,” is a leading tourism destination in India, attracting both domestic and international travelers due to its natural landscapes, cultural heritage, and wellness offerings. With the growing awareness of environmental issues among tourists, sustainable practices have become increasingly important for hotels in Kerala to enhance guest satisfaction, loyalty, and overall brand image. Studies have shown that green practices in hotels can positively influence guest perceptions, including their trust, satisfaction, and willingness to pay premiums for eco-friendly services (Moise et al., 2021; Kang et al., 2012).

Despite the growing emphasis on sustainability, most research has focused on environmental initiatives at a general level, with limited attention to housekeeping-specific interventions and their impact on guest perceptions. Understanding how sustainable housekeeping practices affect guests’ experiences is critical for hotels aiming to integrate environmental responsibility with operational efficiency and customer satisfaction. Therefore, this study explores the relationship between sustainable housekeeping practices and guest perceptions in hotels in Kerala, aiming to provide insights for hotel managers to design eco-friendly operational strategies that align with evolving tourist expectations.

Reviews of Literature

Ahmed, Abdou, Hassan, and El Dief (2020)¹ examined the role of green hotel practices in contributing to environment-related Sustainable Development Goals (SDGs) in Egypt's hospitality sector. Using a convenience sample of 48 environmental management representatives from certified four- and five-star Green Star hotels, the study employed a structured questionnaire to assess perceptions. Results showed that green hotel practices significantly supported the achievement of SDG 6 (clean water and sanitation), SDG 12 (responsible consumption and production), SDG 7 (affordable and clean energy), and SDG 13 (climate action), with notable differences between four- and five-star hotels in their contributions. The primary motivation for adopting Green Star criteria was hotels' commitment to environmental sustainability. The study underscores the need for hotel operators to systematically integrate green practices into their operational strategies to maximize contributions toward SDGs.

Moise, Gil-Saura, and Ruiz Molina (2021)⁷ investigated the impact of green hotel practices on guest perceptions, focusing on hotel image, trust, and satisfaction, while also analyzing the moderating role of gender. Drawing on survey data from 302 guests staying in three- and four-star hotels in Bogotá, the study found a positive relationship between the implementation of sustainable practices and improved guest perceptions, with variations based on gender differences. The findings emphasize that in developing countries, adopting environmentally friendly practices not only addresses consumer concerns about sustainability but also enhances hotel reputation, fosters guest trust, and increases satisfaction, thereby supporting long-term customer relationships.

Robinot and Giannelloni (2010)⁸ explored the role of "green" attributes in shaping hotel customers' overall satisfaction using the Tetraclass model, which categorizes service attributes based on their contribution to satisfaction. While the first hypothesis—that service attributes could be divided into four types—was rejected, findings supported the second hypothesis, revealing that environmental initiatives were considered "basic" attributes, perceived as essential elements of the service rather than differentiating factors. Based on a limited sample, the study

suggests that hotels must maintain high performance in green practices, though promoting them explicitly may risk negative evaluations. The research highlights that pro-environmental initiatives, even when not heavily marketed, remain valuable investments both for sustainability and economic benefits.

Berezan, Millar, and Raab (2014)² examined guest satisfaction with sustainable hotel practices, motivations for participation, and willingness to pay a premium for eco-friendly accommodations, using data from a tourist destination in Mexico. Findings indicated that satisfaction with sustainable practices showed minimal demographic differences, suggesting broad appeal beyond niche markets. However, cultural differences emerged: American guests prioritized functional sustainability aspects, while Mexican guests emphasized emotional connections to conservation. The study concludes that hotel managers should account for sociocultural backgrounds when implementing green practices and consider guest education to balance environmental responsibility with service expectations, thereby enhancing acceptance and satisfaction.

Han, Hsu, and Sheu (2010)⁵ applied Ajzen's Theory of Planned Behavior (TPB) to examine hotel customers' intentions to stay at green hotels, comparing its predictive power with the Theory of Reasoned Action. Using structural equation modeling, the study confirmed that the TPB model provided a better fit and stronger predictive validity, with attitude, subjective norms, and perceived behavioral control significantly influencing intention. Interestingly, the influence of these factors did not differ between environmentally active consumers and those less engaged in eco-friendly behaviors. The study highlights TPB's robustness in predicting green hotel choices and suggests further refinement and exploration of additional factors to enhance understanding of customer decision-making in sustainable hospitality.

Kang, Stein, Heo, and Lee (2012)⁶ explored U.S. hotel guests' willingness to pay (WTP) a premium for environmentally friendly practices, examining the role of environmental concern measured by the New Ecological Paradigm (NEP) scale. The study found that guests with stronger environmental concerns demonstrated higher WTP for green initiatives, aligning with social identity theory and means-end theory. Additionally, hotel type influenced WTP, with luxury and mid-priced hotel guests showing greater willingness to pay premiums compared to

economy hotel guests. These findings underscore the importance of targeting environmentally conscious travelers and tailoring sustainability strategies to different market segments within the U.S. hotel industry.

Goldstein, Cialdini, and Griskevicius (2008)⁴ conducted two field experiments to evaluate the effectiveness of persuasive messages encouraging hotel guests' participation in environmental conservation programs, particularly towel reuse. The study found that appeals based on descriptive norms—highlighting that the majority of guests engage in the behavior—were more effective than traditional appeals emphasizing environmental protection. Furthermore, messages employing “provincial norms,” which referenced the behavior of guests in the same room, proved especially persuasive. These findings demonstrate the power of social norms in promoting pro-environmental behavior and provide practical insights for hotels to design more effective sustainability communication strategies.

Rohit (2019)⁹ highlighted the growing ecological challenges such as climate change, ozone depletion, pollution, resource exploitation, and increasing solid waste, emphasizing the urgent need for the hospitality sector to adopt sustainable practices. The study noted that leading hotels in India are progressively embracing eco-friendly measures to balance guest satisfaction with environmental responsibility. These initiatives include the use of renewable energy, efficient water management, and energy reduction strategies, with particular focus on “green cleaning” as an innovative approach in hotel housekeeping. The paper positions green cleaning as a forward-looking solution to enhance resource efficiency and sustainability in hotel operations.

Cabral and Jabbour (2019)³ examined the role of green training in driving environmental performance within India's hospitality industry, focusing on the human resource management dimension of sustainability. Through survey-based empirical analysis, the study revealed that green training positively and significantly enhances environmental performance, with green competencies and proactive environmental management maturity serving as key mediators in this relationship. Additionally, environmental commitment was found to moderate the impact, strengthening the link between training and performance outcomes. The study underscores the importance of investing in employee training

and competency development as part of sustainable hospitality management, highlighting the human side of environmental responsibility in the sector.

Research Gap

Although existing studies provide valuable insights into green hotel practices from their contributions to achieving SDGs (Ahmed et al., 2020) and improving guest perceptions (Moise et al., 2021) to their role in customer satisfaction (Robinot & Giannelloni, 2010; Berezan et al., 2014), behavioural intentions (Han et al., 2010), willingness to pay (Kang et al., 2012), and the influence of social norms (Goldstein et al., 2008), several research gaps remain. Much of the literature is context-specific, focusing on particular regions (e.g., Egypt, Mexico, India, U.S.), which limits generalizability across diverse hospitality markets. Moreover, while guest perceptions and behavioural models are well-studied, fewer works examine the organizational and employee-level drivers of sustainable practices, with Cabral and Jabbour (2019) being a rare exception, emphasizing green training. Additionally, most studies focus on individual practices (e.g., towel reuse, green cleaning) rather than a holistic integration of environmental, social, and governance (ESG) dimensions in hospitality strategy. Finally, limited attention has been paid to the long-term performance outcomes, financial, competitive, and reputational of adopting green hotel practices, signalling a need for multi-dimensional, cross-cultural, and longitudinal research in sustainable hospitality management.

Hypotheses

H₀: Green hotel practices do not affect guest satisfaction.

H₀: There is no impact of Green hotel practices on guests' willingness to pay

H₀: Green training of employees does not influence the environmental performance of the hotel.

Research Methodology

This study adopts a quantitative research design to examine the relationship between sustainable housekeeping practices and guest satisfaction in hotels in Kerala. Primary data will be collected through structured questionnaires administered to hotel guests and housekeeping staff, including managers

from a purposive sample of four-star and five-star hotels across key tourist destinations (Kochi, Munnar, Thekkady, Alleppey, Kovalam, Trivandrum and Varkala) in Kerala. The guest survey will measure satisfaction with eco-friendly housekeeping practices, overall satisfaction, and willingness to pay a premium for green services. The management survey will assess the extent of employee green training and environmental performance metrics. Data analysis will involve the use of descriptive statistics, correlation and linear regression. Reliability and validity of the survey instruments will be ensured through pilot testing and Cronbach's alpha .894 (36 questions), and all hypotheses will be tested at a 5% significance level ($\alpha = 0.05$).

Result

Table 1: Reliability Statistics of the Instrument (Cronbach's Alpha = 0.894, N = 36 Items)

Reliability Statistics	
Cronbach's Alpha	N of Items
.894	36

The Cronbach's Alpha 0.894 (reliability) of 36 instruments indicates a high level of internal consistency. This suggests that the items are closely related and consistently measure the underlying construct, making the instrument reliable for data collection.

Table 2: Correlation between Green Hotel Practices and Guest Satisfaction

Correlations			
		Green hotel practices	Guest Satisfaction
Green hotel practices	Pearson Correlation	1	.977**
	Sig. (2-tailed)		.000
	N	330	330

Guest Satisfaction	Pearson Correlation	.977**	1
	Sig. (2-tailed)	.000	
	N	330	330
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 2 reveals a very strong positive and statistically significant correlation ($r = 0.977$, $p < 0.01$) between green hotel practices and guest satisfaction, indicating that greater adoption of environmentally friendly practices by hotels is strongly associated with higher levels of guest satisfaction.

Table 3: Model Summary of Regression Analysis of Green Hotel Practices on Guest Satisfaction

Model Summaryb				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.977 ^a	.955	.955	1.187
a. Predictors: (Constant), Green hotel practices				
b. Dependent Variable: Guest Satisfaction				

Table 3 presents the regression model summary, showing a very strong positive relationship between green hotel practices and guest satisfaction ($R = 0.977$). The R Square value of 0.955 indicates that 95.5% of the variation in guest satisfaction is explained by green hotel practices, demonstrating high explanatory power. The adjusted R Square remains the same (0.955), confirming the model's robustness. Additionally, the relatively low standard error of estimate (1.187) suggests high prediction accuracy. Overall, the findings reveal that green hotel practices are a highly significant predictor of guest satisfaction.

Table 4: ANOVA Results for the Effect of Green Hotel Practices on Guest Satisfaction

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9819.834	1	9819.834	6967.824	.000 ^b
	Residual	462.254	328	1.409		
	Total	10282.088	329			
a. Dependent Variable: Guest Satisfaction						
b. Predictors: (Constant), Green hotel practices						

The ANOVA results in Table 4 show that green hotel practices significantly predict guest satisfaction ($F(1, 328) = 6967.824, p < .001$). The regression model explains a statistically significant portion of the variance in guest satisfaction, indicating that green hotel practices have a strong and positive influence on guests' overall satisfaction.

Table 5: Regression Coefficients Showing the Influence of Green Hotel Practices on Guest Satisfaction

Coefficients ^a						
Model B		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		Std. Error	Beta			
1	(Constant)	2.656	.651		4.082	.000
	Green hotel practices	1.187	.014	.977	83.473	.000
a. Dependent Variable: Guest Satisfaction						

Table 5 presents the regression results, showing that green hotel practices have a strong and significant positive effect on guest satisfaction. The unstandardized coefficient ($B = 1.187, p < .001$) indicates that for each one-unit increase in green hotel practices, guest satisfaction rises by 1.187 units. The standardized coefficient ($Beta = 0.977$) demonstrates that green hotel practices are the primary predictor of guest satisfaction in this model.

The intercept ($B = 2.656$, $p < .001$) reflects the baseline guest satisfaction when no green practices are implemented. Overall, these findings confirm that the adoption of green hotel practices substantially enhances guest satisfaction.

Table 6: Model Summary of Regression Analysis between Green Hotel Practices and Willingness to Pay

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.764 ^a	.584	.583	.960
a. Predictors: (Constant), Green hotel practices				

Table 6 indicates a strong positive relationship ($R = 0.764$) between green hotel practices and willingness to pay, with green practices explaining 58.4% of the variance in willingness to pay ($R^2 = 0.584$, Adjusted $R^2 = 0.583$), suggesting that environmentally friendly initiatives significantly influence guests' payment intentions.

Table 7: ANOVA Results of Regression between Green Hotel Practices and Willingness to Pay

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	424.136	1	424.136	460.046	.000 ^b
	Residual	302.397	328	.922		
	Total	726.533	329			
a. Dependent Variable: Willingness to Pay						
b. Predictors: (Constant), Green hotel practices						

Table 7 shows that the regression model is statistically significant ($F = 460.046$, $p < 0.001$), indicating that green hotel practices significantly predict willingness to pay. This suggests that improvements in green initiatives are strongly associated with higher guest willingness to pay.

Table 8: Regression Coefficients of Green Hotel Practices Predicting Willingness to Pay

Coefficients ^a						
Model B		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		Std. Error	Beta			
1	(Constant)	.836	.526		1.589	.113
	Green hotel practices	.247	.012	.764	21.449	.000
a. Dependent Variable: Willingness to Pay						

Table 8 shows that green hotel practices have a significant positive effect on willingness to pay ($\beta = 0.247$, $t = 21.449$, $p < 0.001$), indicating that for every unit increase in green practices, willingness to pay increases, while the constant is not statistically significant ($p = 0.113$).

Table 9: Model Summary of Regression Analysis between Green Training and Environmental Performance

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.691 ^a	.478	.477	1.375
a. Predictors: (Constant), Green Training				

Table 9 shows a moderate positive relationship ($R = 0.691$) between green training and environmental performance, with green training explaining 47.8% of the variance in environmental performance ($R^2 = 0.478$, Adjusted $R^2 = 0.477$), suggesting that employee green training has a meaningful, though not complete, impact on hotel environmental performance.

Table 10: ANOVA Results of Regression between Green Training and Environmental Performance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	568.449	1	568.449	300.558	.000 ^b
	Residual	620.351	328	1.891		
	Total	1188.800	329			
a. Dependent Variable: Environmental Performance						
b. Predictors: (Constant), Green Training						

Table 10 shows that the regression model is statistically significant ($F = 300.558$, $p < 0.001$), indicating that green training of employees significantly predicts the environmental performance of the hotel.

Table 11: Regression Coefficients of Green Training Predicting Environmental Performance

Coefficients ^a						
Model B		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		Std. Error	Beta			
1	(Constant)	4.694	.668		7.027	.000
	Green Training	.947	.055	.691	17.337	.000
a. Dependent Variable: Environmental Performance						

Table 11 shows that green training has a significant positive effect on environmental performance ($\beta = 0.947$, $t = 17.337$, $p < 0.001$), indicating that an increase in green training for employees strongly improves the hotel's environmental performance, while the constant is also statistically significant ($p < 0.001$).

Conclusion: The study empirically confirms that green hotel practices and employee green training have substantial and quantifiable impacts on hotel outcomes in Kerala. Green hotel practices exhibit an extremely strong positive correlation with guest satisfaction ($r = 0.977$, $p < 0.01$), explaining 95.5% of the variance ($R^2 = 0.955$) and indicating that even marginal improvements in eco-friendly housekeeping directly elevate guest satisfaction. Regression results show that for each one-

unit increase in green practices, guest satisfaction rises by 1.187 units ($B = 1.187$, $p < 0.001$), with green practices being the dominant predictor ($Beta = 0.977$). Similarly, green practices significantly enhance guests' willingness to pay, explaining 58.4% of its variance ($R^2 = 0.584$), with each unit increase in green initiatives raising willingness to pay by 0.247 units ($B = 0.247$, $p < 0.001$). Employee green training is also a significant predictor of environmental performance, accounting for 47.8% of variance ($R^2 = 0.478$) and increasing performance by 0.947 units per unit increase in training ($B = 0.947$, $p < 0.001$). These results provide concrete evidence that implementing systematic green practices and targeted employee training yields measurable improvements in both guest satisfaction and environmental performance, emphasizing operational and managerial priorities for sustainable hotel management.

Suggestion: Hotels should prioritize the systematic implementation of green housekeeping practices, including energy-efficient laundry, water-saving protocols, and eco-friendly cleaning products, as the results indicate that each incremental improvement in green practices can increase guest satisfaction by 1.187 units ($B = 1.187$, $p < 0.001$) and significantly raise willingness to pay ($B = 0.247$, $p < 0.001$). Furthermore, hotel management should invest in structured green training programs for housekeeping and operational staff, focusing on practical sustainability skills and environmental awareness, since a one-unit increase in training translates into a 0.947-unit improvement in overall environmental performance ($B = 0.947$, $p < 0.001$). Integrating these measures will not only optimize operational sustainability but also enhance guest loyalty, increase revenue potential through higher willingness to pay, and position the hotel as a credible eco-conscious destination in Kerala's competitive hospitality market.

Implication

Based on the study's findings, hotels should implement a structured program of sustainable housekeeping practices, such as energy-efficient laundry, water-saving initiatives, use of eco-friendly cleaning agents, and systematic waste reduction, because these measures directly and strongly increase guest satisfaction ($B = 1.187$, $p < 0.001$) and willingness to pay for services ($B = 0.247$, $p < 0.001$). Additionally, management should provide targeted green training to housekeeping and operational staff,

as each unit increase in green training significantly enhances the hotel's environmental performance ($B = 0.947$, $p < 0.001$). By combining operational eco-initiatives with employee capacity building, hotels can simultaneously improve resource efficiency, reduce environmental impact, strengthen guests' perception of sustainability, and secure a competitive advantage in Kerala's tourism market.

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