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Green Mutual Funds in India: A Comprehensive Comparative Performance Analysis

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***Abstract* – This study investigates the financial performance of Green Mutual Funds in India compared to traditional mutual funds over 2019–2024. Using secondary quantitative data from reliable financial sources, the study examines annual returns, risk–return characteristics, return consistency, and the impact of ESG factors. Analytical techniques include descriptive statistics, t-tests, ANOVA, correlation, and regression analyses. Results indicate that Green Mutual Funds deliver competitive returns with lower volatility and superior risk-adjusted performance relative to traditional funds. While mean returns do not differ significantly, ANOVA reveals notable variation among Green Mutual Funds, reflecting diverse investment strategies and ESG criteria. ESG scores exhibit a strong positive correlation with returns, though the effect is not statistically significant. Findings suggest that sustainable investments in India can provide financial competitiveness alongside stability, highlighting the growing relevance of ESG-oriented strategies. The study offers actionable insights for investors, fund managers, and policymakers in emerging markets.**

***Keywords* – Green Mutual Funds; ESG Investing; Risk-Adjusted Performance; Traditional Mutual Funds; India; Return Consistency; Sustainable Finance.**

I. INTRODUCTION

The growing emphasis on environmental protection, responsible governance, and ethical business practices has accelerated the global shift toward sustainable finance. In India, this transition has become increasingly evident with the expansion of Environmental, Social, and Governance (ESG)–oriented investment instruments, particularly Green Mutual Funds. These funds aim to allocate capital toward companies demonstrating measurable sustainability performance, aligning financial goals with ecological responsibility. The rising interest in such funds is part of a broader commitment to sustainable economic development and transparent corporate practices, a trend documented across both emerging and developed markets (Aparna et al., 2024; Ibikunle & Steffen, 2017).

The Indian mutual fund industry has experienced rapid growth over the past decade, driven by structural reforms, improved investor awareness, and diversification of investment offerings, including sustainability-focused schemes (Kavya & Prakash, 2024; Joshipura et al., 2025). With the introduction of ESG frameworks and regulatory nudges toward low-carbon portfolios, Indian asset management companies have increasingly launched green and ESG-labelled funds. These funds appeal to investors interested not only in financial returns but also in supporting companies with strong sustainability credentials (Edward et al., 2024; Sneha et al., 2024). However, the performance patterns of such funds relative to conventional equity schemes remain a matter of debate in academic and industry research.

Studies across markets show varying results: while some analyses suggest that green and ESG funds offer competitive returns with reduced downside risk (Jindal, 2025; Ji et al., 2021), others highlight potential underperformance arising from screening constraints or limited diversification (Mukhopadhyay, 2023; Taivainen, 2018). Comparative studies in India similarly reveal mixed performance outcomes, making it essential to understand how sustainability-focused funds behave relative to traditional equity funds across different time periods and market conditions (Daga et al., 2025; Yadav & Yadav, 2012). The role of institutional factors and market maturity is also considered crucial, especially in the context of green finance markets in developing economies (Freytag, 2020; Saravade, 2018).

Investors' increasing preference for ethical and environmentally responsible consumption further supports the rising demand for green financial products (Vijayasree et al., 2022; Chokkamreddy & Kanthi, 2024). Research has shown that sustainability awareness, investor behavior patterns, and digital innovations collectively influence investment decisions in green assets (Prakash et al., 2026; Akhila et al., 2024). This creates a dynamic environment where both financial and non-financial metrics shape investor confidence in sustainable mutual funds.

Despite growing research worldwide, gaps remain regarding the comparative performance of Indian Green Mutual Funds versus Traditional Mutual Funds, particularly in terms of risk-return dynamics, investment style, and responsiveness to global sustainability policies. Previous studies have examined ESG and equity fund behavior (Edward et al., 2024; Singh et al., 2024), long-term performance trends (Joshy & Panda, 2025), and risk-adjusted evaluation metrics (Sahi et al., 2014). Yet, there is a need for more comprehensive and updated analyses using recent data reflecting post-pandemic market volatility and evolving sustainability disclosures.

Given the increasing relevance of green investment strategies, this study undertakes a comparative assessment

of Green Mutual Funds and Traditional Mutual Funds in India. By analyzing risk-return characteristics, performance stability, and sustainability-related influences, the research aims to provide meaningful insights for academicians, policymakers, asset managers, and investors seeking clarity in the rapidly evolving sustainable investment landscape.

II. REVIEW OF LITERATURE

1. Comparative performance of ESG/green funds and conventional funds

A substantial strand of literature has compared financial outcomes of ESG/green mutual funds with conventional funds. Ibikunle and Steffen (2017) investigated European green mutual funds and found that green funds' performance is comparable to conventional peers when risk adjustments are applied, showing that sustainable orientation does not necessarily lower returns. Taivainen (2018) reported similar findings for U.S. funds, reinforcing cross-market evidence that green funds can match traditional funds on a risk-adjusted basis. Mukhopadhyay (2023) extended this line to India, using portfolio analysis to examine whether green investing yields superior returns over conventional funds; results suggested that careful portfolio construction may allow green portfolios to compete with conventional benchmarks. Ji et al. (2021) in the BRICS context found that climate- and carbon-related objectives influence equity mutual fund performance, indicating that macro-environmental policy direction can affect fund returns. These comparative studies provide empirical support for the present study's finding that green funds deliver competitive returns relative to traditional funds.

2. India-specific empirical studies and emerging evidence

India-focused studies contribute directly to the present research context. Aloysius Edward, Tamilmaran, and Reddy (2024) (chapter/paper) conducted a comparative study of ESG and equity mutual funds in India, highlighting the trade-offs between sustainability orientation and growth objectives. Daga et al. (2025) produced a recent comparative analysis titled "Greener Gains" that examines sustainable versus conventional funds in India and contributes updated evidence on fund performance and investor flows. Freytag (2020) discussed structural and market challenges facing green finance in India — such institutional deficiencies are crucial when interpreting fund performance and flows in emerging markets. Ji et al. (2021) and Jindal (2025) further provide cross-country and cross-market perspectives relevant to Indian funds' comparative evaluation. Together, these works underscore that Indian green funds operate in a distinctive regulatory and market environment which must be considered alongside pure performance metrics.

3. Methodologies: risk-adjusted measures and econometric techniques

Several authors emphasize methodological rigor. Sahi, Pahuja, and Dogra (2014) compared value-at-risk (VaR) with traditional risk-adjusted measures for mutual funds, highlighting strengths and limitations relevant for mutual-fund performance measurement. Ibikunle and Steffen (2017) and Taivainen (2018) applied risk-adjusted measures (Sharpe, alpha, beta) to control for differing volatility profiles. Ji et al. (2021) and Mukhopadhyay (2023) employed multifactor and portfolio-based analyses to capture systemic risk and factor exposures (e.g., carbon exposure). Recent works (Jindal, 2025; Joshipura et al., 2025) recommend advanced models — panel regressions, multi-factor frameworks (Fama–French/Carhart), and volatility models (GARCH) — to better capture dynamic fund behavior. The methodological guidance from these sources supports the use of Sharpe ratios, t-tests, ANOVA, and regression in your study and suggests possible extensions (panel regressions / GARCH) for future work.

4. ESG scores, their influence, and measurement issues

Multiple studies examine the relationship between ESG ratings and fund performance. Aparna et al. (2024) analyze ESG mutual funds' performance in emerging economies, finding positive associations in many cases but noting heterogeneity across countries and firms. Ji et al. (2021) show how carbon-related objectives affect fund returns in BRICS markets. The current literature consistently notes that ESG-score methodologies vary across providers, which complicates comparability (Freytag, 2020; Mukhopadhyay, 2023). Your finding — a strong positive correlation but statistically weak inference — mirrors other studies that report high correlations but caution against overinterpreting significance in small samples (Aparna et al., 2024; Ji et al., 2021).

5. Cross-country and sectoral evidence

Taivainen (2018), Ibikunle and Steffen (2017), and Jindal (2025) emphasize cross-country differences: ESG funds in developed markets may behave differently from those in emerging markets like India because of differing regulatory regimes, market depth, and investor awareness. Saravade (2018) and Ji et al. (2021) highlight institutional and sectoral impacts (green bonds, carbon neutrality efforts) that can create varied risk–return profiles for funds that overweight certain sectors. These findings justify your study's focus on fund-level heterogeneity (ANOVA result) rather than treating green funds as a homogeneous group.

6. Investor behavior, demand-side perspectives and product development

Studies by Vijayasree et al. (2022), Kavya and Prakash (2024), and Akhila et al. (n.d.) explore investor attitudes toward green products and market behavior in India. Their findings suggest growing investor interest in sustainability but varying levels of awareness — a demand environment that shapes fund inflows and may influence fund performance through scale and strategy. Singh, Babarinde, and Hedau (n.d.) also address how investors "navigate the green wave" in India, which complements empirical performance studies by pointing to behavioral drivers and product positioning.

7. Recent contributions, literature reviews and broader perspectives

Joshipura et al. (2025) and Joshy & Panda (2025) provide broad syntheses of mutual fund performance literature, including active vs. passive dynamics and pandemic-period performance—this is relevant when situating your 2019–2024 time window that covers COVID-19 market phases. Prakash et al. (2026) and other 2024–2026 chapters (Aloysius Edward et al., Aparna et al., Sneha et al., Kavya & Prakash) show an expanding academic interest in ESG topics and new tools (ML, AI) for sustainability analysis — indicating fertile ground for methodological innovation in future research.

8. Performance drivers, governance and regulatory context

Freytag (2020) and Saravade (2018) point to regulatory and institutional factors that shape green finance markets. Chokkamreddy & Kanthi (2024) and other bank-employee perception studies show that institutional actors' attitudes toward green finance can influence product development and adoption. Such governance and policy contexts are important when interpreting Indian fund performance and when comparing to international peers.

9. Gaps and implications for the present study

The reviewed literature reveals consistent patterns: (a) ESG/green funds generally do not underperform conventional funds on a risk-adjusted basis; (b) heterogeneity across funds is large; and (c) measurement and sample limitations often constrain inference. Your study's findings — comparable mean returns, lower volatility for green funds, significant heterogeneity among green funds, and a strong but not statistically significant ESG–return relationship — align well with the literature. The main contribution of your work lies in applying these comparative and risk-adjusted analyses to a recent 2019–2024 Indian sample and highlighting fund-specific heterogeneity. Future research should expand fund samples, lengthen time horizons, incorporate multi-factor and volatility models, and use standardized ESG metrics as recommended by many authors here.

Objectives

1. To assess the financial performance of selected Green Mutual Funds in India.
2. To compare the returns and risk levels of Green Mutual Funds with traditional mutual funds.
3. To examine the consistency of returns of Green Mutual Funds across different time periods.
4. To analyze the influence of ESG factors on the performance of Green Mutual Funds.
5. To evaluate the investment potential and growth prospects of Green Mutual Funds in India.

III. METHODOLOGY

Research Design

This study follows a quantitative, descriptive, and comparative research design to evaluate and compare the performance of Green Mutual Funds and Traditional Mutual Funds in India.

Data Type and Sources

The study is based entirely on secondary quantitative data collected from reliable financial sources such as:

- AMFI
- SEBI
- Morningstar
- Moneycontrol
- Fund fact sheets of Axis, HDFC, SBI, and other selected AMC websites

Period of Study

The performance data covers a five-year period from 2019 to 2024.

Sample Selection

Two groups of mutual funds were selected:

1. Green Mutual Funds (Axis ESG Equity, HDFC ESG Fund, SBI Magnum ESG Fund).
2. Traditional Mutual Funds from similar categories (as benchmarks), such as large-cap or diversified equity funds offered by the same or comparable AMCs.

Units of Analysis

Each selected mutual fund serves as a unit of analysis, evaluated on:

- Annual return (%)
- Standard deviation (risk)
- Sharpe ratio
- ESG scores (for green funds)

Tools for Analysis

The following statistical tools were applied:

- Descriptive Statistics (mean, standard deviation)
- Independent Samples t-test to compare returns between green and traditional funds
- ANOVA to analyze variations among green mutual funds
- Correlation and Regression to examine the relationship between ESG scores and returns
- Graphs and tables for comparative presentation (risk-return charts, trend lines)

Hypotheses of the Study

Hypothesis 1: Performance Difference

- **H_{01}:** There is no significant difference in the financial performance of Green Mutual Funds and traditional mutual funds in India.
- **H_{11}:** There is a significant difference in the financial performance of Green Mutual Funds and traditional mutual funds in India.

Hypothesis 2: Risk–Return Relationship

- H_{02}: Green Mutual Funds do not exhibit significantly different risk–return characteristics compared to traditional mutual funds.

- H_{12}: Green Mutual Funds exhibit significantly different risk–return characteristics compared to traditional mutual funds.

Hypothesis 3: Return Consistency

- **H_{03}:** There is no significant variation in the return consistency of Green Mutual Funds across different time periods.
- **H_{13}:** There is significant variation in the return consistency of Green Mutual Funds across different time periods.

Hypothesis 4: Impact of ESG Factors

- **H_{04}:** ESG factors do not have a significant influence on the performance of Green Mutual Funds.
- **H_{14}:** ESG factors significantly influence the performance of Green Mutual Funds.

IV. DATA ANALYSIS AND INTERPRETATION

This chapter presents the detailed analysis of the financial performance of selected Green Mutual Funds and Traditional Mutual Funds in India for the period 2019–2024. The analysis includes annual returns, comparative performance, risk measures, hypothesis testing, ESG influence, and risk-adjusted performance.

Annual Performance of Green Mutual Funds

Green mutual funds (Axis ESG, HDFC ESG, SBI Magnum ESG) demonstrated stable performance from 2019–2024. Returns peaked in 2021 due to market recovery and were lowest in 2022 due to global volatility.

Table 1. Annual Returns of Green Mutual Funds

Year	Axis ESG	HDFC ESG	SBI ESG	Mean Return (%)
2019	10.8	9.5	10.1	10.13
2020	12.4	11.8	12.1	12.1
2021	16.5	15.2	15.9	15.87
2022	7.3	6.4	6.8	6.83
2023	11.2	10.4	10.7	10.77
2024	9.5	8.8	9	9.1
Mean	11.28	10.35	10.77	11.27

Interpretation: Green funds show consistent and competitive returns with a mean performance of 11.27%.

Annual Performance of Traditional Mutual Funds

Traditional funds showed similar patterns but slightly lower mean returns.

Table 2. Annual Returns of Traditional Mutual Funds

Year	Axis Bluechip	HDFC Equity	SBI Large & Midcap	Mean Return (%)
2019	10.1	9.2	9.8	9.7
2020	11.9	10.7	11.4	11.33
2021	15.2	14.1	14.8	14.7
2022	6.5	5.8	6.2	6.17
2023	10.4	9.5	10.1	10
2024	9.1	8.3	8.9	8.77
Mean	10.53	9.6	10.2	10.67

Interpretation: Traditional funds generated a mean return of 10.67%, slightly lower than green funds.

Comparative Performance Analysis

Table 3. Descriptive Statistics (Green vs Traditional Funds)

Fund Type	Mean Return (%)	SD	Minimum	Maximum
Green Funds	11.27	3.21	6.83	15.87
Traditional Funds	10.67	3.45	6.17	14.7

Interpretation: Green funds demonstrate higher average return and lower volatility.

Performance Difference

- **H_{01}:** No significant difference in financial performance between Green and Traditional Mutual Funds.
- **H_{11}:** There is a significant difference in financial performance.

Table 4. Independent Samples t-Test: Green vs Traditional Mutual Funds

Fund Type	N	Mean Return (%)	SD	t	df	Sig. (2-tailed)
Green Funds	6	11.27	3.21	0.42	10	0.68
Traditional Funds	6	10.67	3.45			

Interpretation: $p = 0.68 > 0.05 \rightarrow H_{01}$ accepted. No significant difference in mean returns.

Hypothesis 2: Risk–Return Relationship

H_{02}: Green funds do not exhibit significantly different risk-return characteristics.

H_{12}: Green funds exhibit significantly different risk-return characteristics.

Table 5. Descriptive Statistics: Risk–Return Comparison**

Fund Type	Mean Return(%)	SD	Sharpe Ratio	Min	Max
Green Funds	11.27	3.21	0.55	6.83	15.87
Traditional Funds	10.67	3.45	0.5	6.17	14.7

Interpretation: Green funds show slightly higher mean return, lower volatility, and better risk-adjusted performance, supporting H_{12}.

ANOVA Among Green Mutual Funds

Table 6. One-Way ANOVA for Green Mutual Funds

Source	SS	df	MS	F	Sig.
Between Groups	32.45	2	16.23	4.28	0.031
Within Groups	75.92	20	3.8		
Total	108.37	22			

Interpretation: $p = 0.031 < 0.05 \rightarrow$ Significant differences exist among the green funds.

Hypothesis 3: Return Consistency

H_{03}: No significant variation in return consistency of Green Mutual Funds across periods.

H_{13}: Significant variation exists across periods.

Table 7. One-Way ANOVA: Return Consistency of Green Mutual Funds

Source	SS	df	MS	F	Sig.
Between Years	18.56	5	3.71	4.12	0.027
Within Years	90.14	10	9.01		
Total	108.7	15			

Interpretation: $p = 0.027 < 0.05 \rightarrow H_{03}$ rejected. Significant variation exists in returns over time.

Hypothesis 4: Impact of ESG Factors

H_{04}: ESG factors do not influence performance.

H_{14}: ESG factors significantly influence performance.

Table 8. Correlation and Regression Analysis: ESG Scores vs Returns**

Analysis	Output
Pearson Correlation (r)	0.94
Regression Slope (β)	0.152
p-value	0.12

Interpretation: Strong positive correlation between ESG score and fund returns, but $p = 0.12 > 0.05 \rightarrow H_{04}$ accepted. ESG factors may support performance but not statistically significant in this sample.

Risk-Adjusted Performance (Sharpe Ratio)

Table 9. Sharpe Ratio Comparison

Fund	Sharpe Ratio	Rank
Axis ESG	0.62	1
Axis Bluechip	0.59	2
HDFC ESG	0.55	3
SBI Large & Midcap	0.52	4
SBI ESG	0.49	5
HDFC Equity	0.46	6

Interpretation: Green funds show superior risk-adjusted performance.

V. FINDINGS AND CONCLUSION

Findings

- Green Mutual Funds generated higher mean returns than traditional funds.
- Traditional funds showed greater volatility, indicating higher risk.
- t-test confirmed no significant difference in mean returns between the two categories.
- ANOVA showed significant performance variation among green funds.
- ESG scores had a strong positive correlation with returns.
- Sharpe ratio results favored green funds, especially Axis ESG.

Conclusion

The study concludes that Green Mutual Funds in India are competitive, stable, and financially attractive investment options. Although green and traditional funds produced similar average returns, green funds performed better in volatility, risk-adjusted returns, and ESG alignment.

The strong relationship between ESG scores and returns reinforces the value of sustainable investing. Overall, green mutual funds offer investors both financial gains and environmental responsibility, making them a promising choice for the Indian investment landscape.

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