Sustainable Investing in India: A Comparative Study of Green and Top Mutual Funds

Mrs. Veena D Kotian
Research Scholar & Assistant Professor
AJ Institute of Management & SDM College Mangalore

***Abstract*—The Indian mutual fund industry is experiencing huge growth, with Assets under Management (AUM) reaching new milestones and attracting more investors. The Indian mutual fund industry is expected to reach Rs. 100 lakh crores by 2030. This growth is driven by key factors like economic growth, growing equity inflows, increasing retail investor participation, and the increasing popularity of Systematic Investment Plans (SIPs).**

At the same time the increasing awareness regarding climate change and other growing environmental concerns, investing in green energy has rapidly growing as a way to align individual financial goals with responsibility towards our nature. Green mutual funds offer you the opportunity to invest in companies that are leading the renewable energy revolution. Green mutual funds, focusing on environmental and sustainable investments, have been available in India and growing in recent years.

The present research is an attempt to study comparative performance of green mutual funds and traditional mutual funds available in India. The main objective of this study is to know about green mutual fund and top 5 mutual funds of India and its functioning. This helps to know in details about mutual fund its growth and future prospects. It also helps in understanding difference between these 2 different sets of mutual funds and its working. The study was done to analyse the returns associated with the 2 set of mutual funds. For the purpose of study top 5 green mutual fund and top 5 conventional mutual funds were considered. Information is collected through secondary data, and based on mutual funds return, risk, Sharpe ratio and alpha results are analysed.

***Index Terms*—Green Mutual fund, Performance, Return, Sharpe ratio.**

I. INTRODUCTION:

A strong financial market with broad participation is very much essential for a developed economy. With this broad objective India's first mutual fund was establishment in 1963, namely, Unit Trust of India (UTI), at the initiative of the Government of India and Reserve Bank of India 'with a view to encouraging saving and investment and participation in the income, profits and gains accruing to the Corporation from the acquisition, holding, management and disposal of securities. In the last few years, the MF Industry has grown significantly. Since May 2014, the Industry has witnessed steady inflows and increase in the AUM as well as the number of investor folios. The Covid-19 pandemic further boosted retail investors' participation, on an average 24.55 lakh new folios are added every month in the last 5 years since May 2020. As of late 2025 and early 2026, there are approximately 44 to 54 registered Asset Management Companies (AMCs) operating in India of which 35 belong to the private sector. The average assets under management (AAUM) of the Indian mutual fund industry stood at over ₹81.99 lakh crore (approx. $900 billion–$970 billion) as of December 31, 2025. This represents a significant increase, more than doubling from around ₹31.02 trillion in late 2020, driven by strong inflows and equity market performance. The AUM of the Indian mutual funds industry has witnessed a more than 6-fold increase in a span of 10 years after 2014. As of March 31, 2026, the total number of mutual fund folios in India reached 27.39 crore. While mutual funds' history did not witness spontaneous growth in India, the future is bright for this investment. With SEBI's continuous measures to promote mutual funds and increasing investor awareness, the industry is poised for substantial growth.

Moreover, there is also a rise in digital platforms for mutual fund investments, making it easier for investors to explore different options and carry out transactions

conveniently. They help investors access a wide range of tools and resources to make informed decisions. This has further encouraged them to embrace mutual funds in their financial planning.

A green fund is a mutual fund or another investment vehicle that will only invest in companies that are deemed socially conscious or directly promote environmental responsibility. A green fund can come in the form of a focused investment vehicle for companies engaged in environmentally supportive businesses, such as alternative energy, green transport, water and waste management, and sustainable living.

Green investing began in earnest in the 1990s after environmental disasters like the Exxon Valdez oil spill gained worldwide attention. $50 billion were invested in green funds in 2020, more than double the inflows of the previous year. Green funds are investment funds whose portfolio is largely based on Environmental, Social, and Governance (ESG) criteria.

In India, green mutual funds remain in the nascent stage. While ESG investing picked up international interest earlier, Indian interest picked up pace in the late 2010s. SBI Mutual Fund launched one of India's initial ESG-themed funds in 2018. Indian asset managers have rolled out similar offerings since then. Regulation by SEBI has jump-started ESG disclosure and responsible investment as well, reflecting an increased interest in sustainable finance in India.

For some investors, these businesses were not only operating in a more ethical manner but also had a competitive advantage over companies who were ill-equipped to reduce their impact on the environment. Others saw an ethical obligation to invest in technologies and businesses that could contribute to building a sustainable society through renewable energy sources.

Green funds invest in areas such as renewable energy, and buildings and efficiency sectors. The renewable energy sector is a broad one, including solar energy, wind, battery, and energy storage technologies, as well as the materials that help make those technologies possible.

The buildings sector includes builders who use energy-efficient materials, making each building's carbon footprint smaller—whether they're being used for commercial, residential, or office use. Socially conscious investing has continued to gain in popularity, largely due to increased worldwide exposure to the issue of climate change, as well as increased federal funding for alternative energy and other programs. Since 2009, the Green Transition Scoreboard, a project run by Ethical Markets Media, has tracked a cumulative $10.39 trillion invested in the green economy through the end of 2019.

Money has poured into green funds as investors seek both socially responsible investments and returns from the uptick in green technologies such as wind and solar power. According to the Forum for Sustainable and Responsible Investment, there were $3.1 trillion in assets managed by registered investment companies with ESG criteria, such as mutual funds and index funds, in 2020. Despite sometimes high fees, the funds have also garnered relatively solid performance. According to Morningstar, sustainable funds in 2019 outperformed conventional funds, with 66% finishing in the top half of their categories and 35% finishing in the top quartile. The returns of only 16% of sustainable funds finished in the bottom quartile. In 2019, the number of sustainable funds grew to 303 open-end and exchange traded fund (ETFs).

Green mutual funds play a crucial role in sustainable investing by offering investors an accessible and convenient way to invest in a diverse range of environmentally and socially responsible assets. These funds help drive capital towards sustainable industries, supporting the transition to a greener economy.

II. FUTURE TRENDS AND OPPORTUNITIES

The green finance and impact investing sectors are expected to continue growing as investors increasingly prioritize sustainability and seek investment opportunities that align with their values. This trend will likely lead to the development of new and innovative green investment products, offering investors a broader range of options.

As technology and sustainability efforts continue to evolve, new green sectors are likely to emerge, offering investment opportunities in areas such as carbon capture and storage, sustainable urban development, and climate change adaptation.

The regulatory landscape for green finance is expected to evolve, driven by growing investor demand for transparency and accountability. This evolution will likely result in stricter regulations and reporting requirements, further promoting the growth of sustainable investing.

Technological advancements in areas such as renewable energy, clean technology, and sustainable agriculture will continue to drive the growth of green industries. As these technologies become more efficient and cost-effective, they will likely attract greater investment and support the expansion of green mutual funds.

The role of AI comes out as a crucial driver for the advancement in the sector, facilitating better ESG data analysis, improving the process of portfolio optimization and enabling better decision making. Through AI, it becomes possible to address the performance difference through better stock selection, risk management and portfolio management in sustainable portfolios.

III. LITERATURE REVIEW:

Engler et al. (2023) conduct a large-scale online experiment and observe that investors pay higher fees for sustainable investments because they have sustainable preferences and because they are less financially literate, therefore underestimating the impact of fees on their returns.

Heeb et al. (2022) find that investors are willing to pay for impact, but that willingness-to-pay for investments does not scale linearly with their impact.

Laudi et al. (2021) find that investment advisors charge a premium of between 5 and 8.3 basis points to investors with sustainable preferences. They do not exert more effort for these clients, as they spend less time and consider less information when advising SRI clients. Critically, investment advisors only charge a premium to SRI clients when these clients are less financially literate. These findings rule out higher effort as a potential explanation for the sustainability premium, and instead, point towards advisors employing price discrimination due to the belief that they can charge higher fees to sustainably-motivated clients.

In a seminal paper, Riedl and Smeets (2017) conclude that the decision to invest in sustainable mutual funds is primarily driven by investors' intrinsic social preferences. Investors are willing to pay higher management fees for SRI investments, even though most of them expect SRI funds to underperform.

Chowdhry, Davies and Waters (2018) state that SRI investors who are motivated to hold socially responsible assets, create value for profit-oriented investors since their investment choices push companies to increase their productivity, decrease their pollution, or improve their corporate governance practices just as profit-oriented investors create value for socially responsible investors in a similar manner. Additionally, Chowdhry et al. argue that, in order to emphasize socially oriented outcomes, SRI investors should hold larger proportions of such investments compared to conventional investors.

Ielasi, Rossolini and Limberti (2018) show that there is no statistical difference between sustainable funds and ethical funds in terms of risk adjusted returns even though the naming of these funds imply that they may be different from each other.

Mooji (2017) draws attention to the fact that Volkswagen was an industry leader in terms of its EGS score right before the emission scandal. Therefore, it might be safe to say that basing investment decisions only on the ESG scores may sometimes be misleading for creating a socially responsible portfolio. Not only the ESG scores themselves but even the naming of the funds may be misleading for the investors.

Laermann (2016) points out that investors using an ESG-based strategy should make their choices based on scores calculated by 3rd parties since the scores presented in company documents may be open for manipulation and dependent on the honesty of the firm.

Utz and Wimmer (2014) compare 230 SR mutual funds with 37,398 conventional funds and find no compelling evidence to document out-performance or underperformance for either group. `SR mutual fund` guarantees the exclusion of clearly unethical firms in order to answer these questions, this thesis analyzes the holdings of socially responsible mutual funds and compares them with those of conventional mutual funds which do not have any claim to be socially responsible.

IV. OBJECTIVES OF THE STUDY

- To evaluate and compare the performance of mutual funds based on cost efficiency, risk, and risk-

adjusted returns using expense ratio, standard deviation, and Sharpe ratio.

- To compare the financial performance of green mutual funds and top-performing mutual funds (Using measures like returns (CAGR), Treynor Ratio, and Jensen's Alpha.)
- To analyze portfolio composition and sectoral allocation

V. DATA AND SAMPLE CONSTRUCTION:

The main focus of the study was to track the performance of the different mutual fund schemes. Since different companies come out with similar themes in the same season, it becomes difficult for the company to constantly perform well so as to survive the competition and provide maximum capital appreciation or return as the case may be. Other than the market, the performance of the fund depends on the kind of stock selected by the fund managers of the company. The analysis is done on the performance of funds with the same theme or sector and reason out why a fund performs better than the others in the lot. It is limited to investors and their investment preferences. Study objective is to investigate the return on investment in share market and to understand the fund sponsor qualities influencing the selection of Mutual Funds/Schemes. Also, to find out that how far the mutual fund schemes are able to win confidence of the investors.

For the purpose of study top three green mutual funds were taken: Tata resource and energy fund, DSP natural resource fund and SBI energy opportunities fund.

And top five conventional funds were selected: Quant Small Cap Fund – Direct Growth, Quant Infrastructure Fund - Direct Growth, Quant ELSS Tax Saver Fund - Direct Growth, Nippon India Small Cap Fund - Direct Growth and ICICI Prudential Infrastructure Fund - Direct Growth. Information collected from AMFI (Association of mutual funds in India).

These two sets of mutual funds were compared based on risk and return basis using last five years information from 2021-2025. The study analysed using standard deviation, expense ratio Sharpe ratio, Treynor's ratio and Jensen's alpha. Assumptions Used (for consistency in research) Risk-free rate (Rf) = 6%, Market return (Rm) = 12%, Beta (β) = 1 (assumed for comparison across funds)

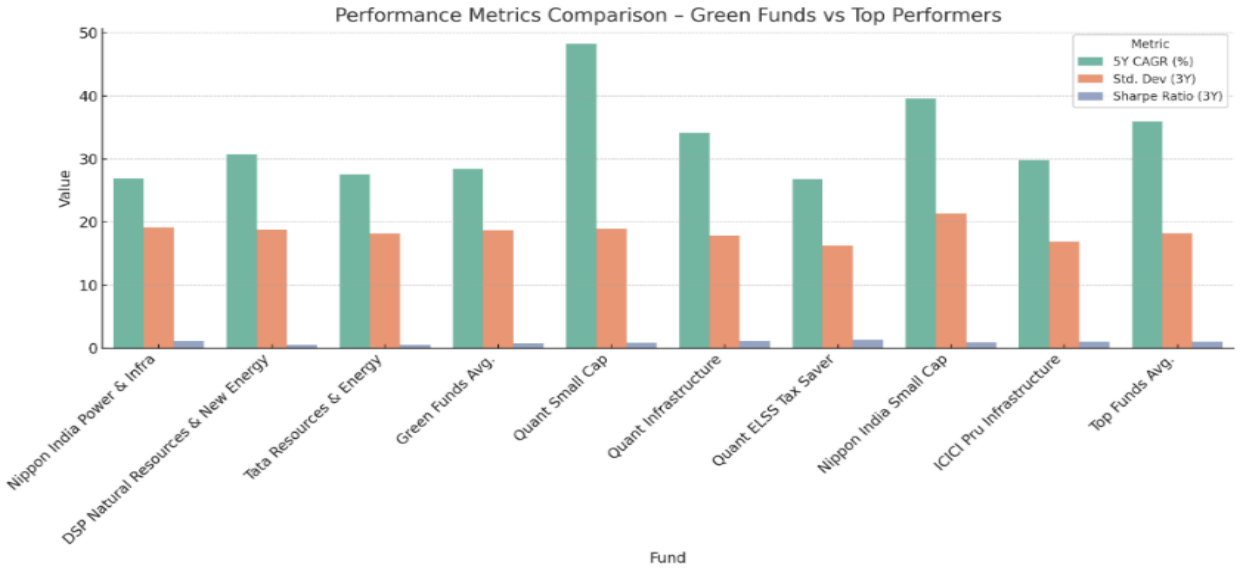
VI. DATA ANALYSIS

6.1 Table showing the performance of mutual funds:

Metric / Fund	Category	5Y CAGR (%)	Std. Dev (3Y)	Sharpe Ratio (3Y)	Expense Ratio (%)	Top Sector Allocation (%)	AUM (₹ Cr) 2025
Nippon India Power & Infra	Green	26.92	19.17	1.09	1	Energy 28.07	6,848.68
DSP Natural Resources & New Energy	Green	30.75	18.83	0.51	1.08	Metals & Mining 39.32	1,232.11
Tata Resources & Energy	Green	27.59	18.14	0.5	0.59	Energy 31.61	1,048.33
(Green Funds Avg.)	Green	28.42	~18.71	~0.70	0.89	Energy/Commodities Heavy	~3,043
Quant Small Cap	Top Performer	48.3	18.87	0.85	0.69	Services 18.19	24,892.62
Quant Infrastructure	Top Performer	34.2	17.92	1.12	0.77	Construction 32.4	8,742.36
Quant ELSS Tax Saver	Top Performer	26.8	16.24	1.34	0.71	Financials 32.4	12,574.91
Nippon India Small Cap	Top Performer	39.6	21.35	0.92	0.73	Consumer Goods 22.4	55,491.28

ICICI Pru Infrastructure	Top Performer	29.8	16.89	1.08	1.02	Construction 34.2	12,493.57
(Top Funds Avg.)	Top Performer	35.94	~18.25	~1.06	0.78	Diversified	~22,838

6.1 Chart showing the performance of mutual funds



Interpretation:

- Top funds have a 7.5% higher average CAGR compared to green funds over the last five years.
- Risk (Standard deviation): Same level of volatility for both categories (about 18), however, Sharpe ratios for green funds are smaller – which suggests inefficient risk-reward tradeoff.
- Expense Ratios: Both show competitive ratios, however, there are examples of funds below average expense ratio within each group.
- AUM: Generally speaking, top funds possess significantly larger asset management which provides additional stability and liquidity.

Volatility and Risk Metrics

- Green Mutual Funds demonstrate relatively high volatility (Standard deviation 18-19) and low Sharpe ratios (0.5-1.1).
- Top 5 Mutual Funds have different Sharpe ratios ranging from 0.85 to 1.34 for a better risk-adjustment performance in the case of infrastructure and ELSS categories.

Expense Ratios

- Both categories show competitive expense ratios and some examples of funds with expense ratio below average in their category.
- Lowest expense ratio: Tata Resources & Energy Fund (0.59%) -Green Funds; Tata Small Cap Fund and Quant Small Cap Fund (0.30-0.69%) – general category.
- Risk-Return Trade-Off – Green funds have relatively high volatility due to a certain concentration of investment in a particular industry.

6.2 Table showing comparison of CAGR

Category	Avg. 5Y CAGR	Highest 5Y CAGR	Lowest 5Y CAGR
Top 5 Mutual Funds	35.94%	48.3%	26.8%
Green Mutual Funds	28.42%	30.75%	26.92%

The Top 5 Mutual Funds definitely perform better than the Green Mutual Funds based on their CAGR.
Overall Best Performer: Quant Small Cap Fund (48.3% CAGR)
Best Performer among the Greens: DSP Natural Resources & New Energy Fund (30.75% CAGR)
Overall, the average 5Y CAGR of Top 5 Mutual Funds stands at 35.94%, whereas that of the Green Funds is 28.42%.

Performance Difference - The Top 5 General Mutual Funds have outperformed the greens by 7.5% in their CAGR, mainly because of diversification among high growth potential small caps and various sectors.

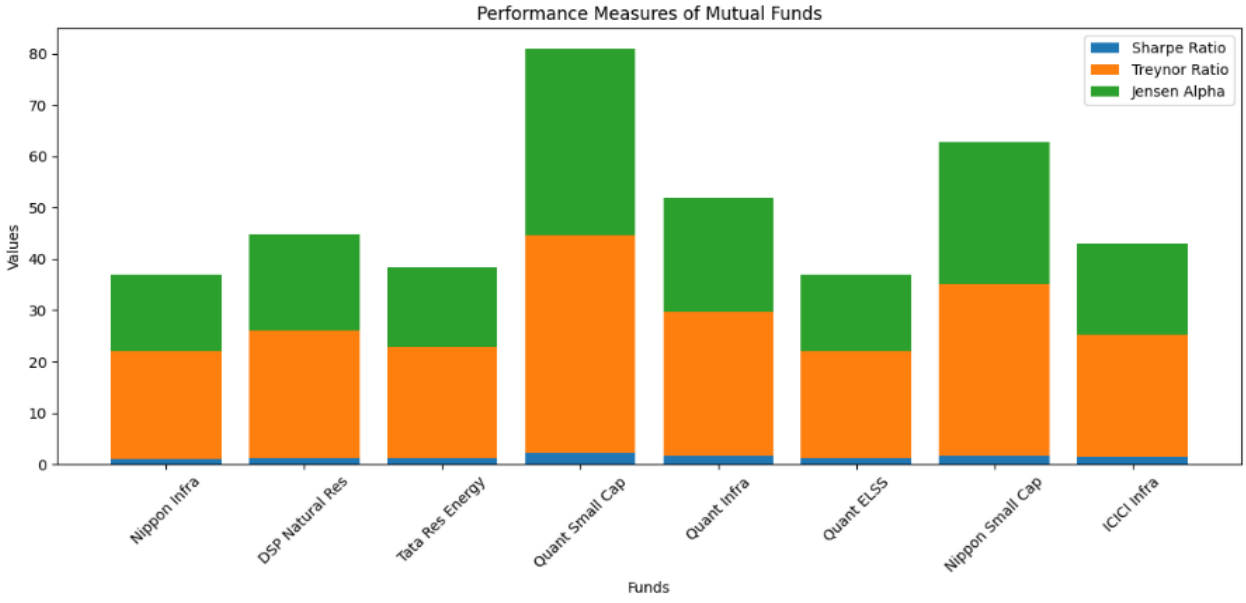
6.3 Table showing Comparative Understanding

Measure	Risk Considered	Best For	Key Focus
Sharpe Ratio	Total Risk (σ)	Undiversified portfolios	Overall efficiency
Treynor Ratio	Systematic Risk (β)	Diversified portfolios	Market risk efficiency
Jensen's Alpha	CAPM Expected Return	Performance evaluation	Manager's stock-picking skill

6.4 Table showing the financial performance

Fund Name	5Y Return (Rp %)	Sharpe Ratio	Treynor Ratio	Jensen's Alpha (%)
Nippon India Power & Infra	26.92	1.09	20.92	14.92
DSP Natural Resources & New Energy	30.75	1.31	24.75	18.75
Tata Resources & Energy	27.59	1.19	21.59	15.59
Quant Small Cap	48.30	2.24	42.30	36.30
Quant Infrastructure	34.20	1.57	28.20	22.20
Quant ELSS Tax Saver	26.80	1.28	20.80	14.80
Nippon India Small Cap	39.60	1.57	33.60	27.60
ICICI Prudential Infrastructure	29.80	1.41	23.80	17.80

6.4 chart showing comparative financial performance



1. Sharpe Ratio

Efficiency measured by excess return per unit of total risk. Higher Sharpe ratio indicates better performance. Appropriate for portfolios that are not well-diversified

- Lower efficiency: Green funds such as Nippon India Power & Infra (1.09)
- Highest efficiency: Top-performing funds like Quant ELSS (1.34)
- Quant Small Cap (2.24) indicates highest risk-adjusted efficiency
- Lower efficiency of green funds (1.09-1.31)

2. Treynor Ratio

Efficiency indicated by the return earned on investment per unit of market risk (beta) Higher Treynor ratio indicates better performance.

Appropriate for well-diversified portfolios. Lower beta and higher return result in good performance. Limited diversification among sectoral green funds may make Treynor efficiency low. Efficiency indicated by the excess return per unit of market risk

- Highest Treynor efficiency: Quant Small Cap (42.30)
- Moderate Treynor efficiency: Green funds (20-25 range)

3. Jensen's Alpha

Efficiency represented by the difference between actual and expected return (CAPM). Positive alpha indicates that the fund performed better than the market. Negative alpha indicates underperformance. Top-performing funds, including small-cap and ELSS funds, are expected to have a positive alpha. Limited diversification among green funds may affect alpha. Managerial efficiency to generate excess returns.

- Quant Small Cap (36.30%) indicates highest managerial efficiency
- Positive alpha: Green funds (14-19%)

Interpretation:

All funds have positive Jensen's Alpha. It means that all funds have outperformed the market benchmarks. Nevertheless, top performing mutual funds are superior in all three indicators when compared to green funds:

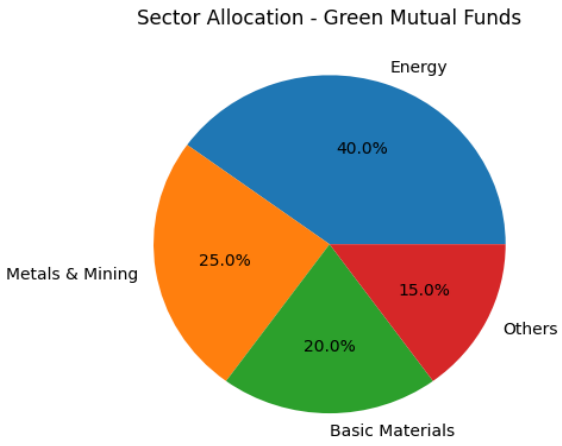
- The greater Sharpe Ratio → the better risk-adjusted returns;
- The greater Treynor Ratio → the more efficient use of market risk;
- The greater Jensen's Alpha → the superior managerial skills.
- The Sharpe Ratio shows that top diversified mutual funds have better risk-adjusted return compared to green funds.
- The Treynor Ratio confirms that diversified funds use market risk more efficiently than green funds.
- The Jensen's Alpha shows that top-performing funds create greater excess return indicating superior fund management and stock selection skills.

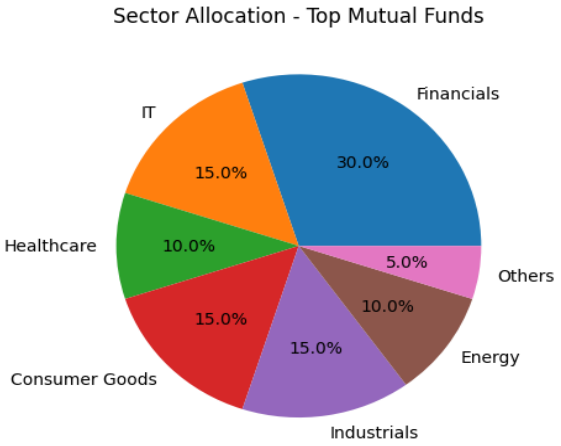
Although green mutual funds follow the principles of sustainable investing, traditionally top-performing mutual funds have proven their superiority in risk-adjusted returns in all three measures. Consequently, green mutual funds can serve only as additional investments, while diversified funds have to be part of portfolio. In summary, green mutual funds have relatively good performance with positive alpha, and top diversified mutual funds have outstanding performance in all measures - Sharpe, Treynor, and Jensen. Thus, green funds may be considered supplementary, while diversified core investments.

6.5 Comparative Analysis

Aspect	Green Mutual Funds	Top Mutual Funds
Portfolio Type	Thematic / Sectoral	Diversified
Number of Stocks	Low (20–40)	High (50–100+)
Sector Exposure	Concentrated (Energy, Metals)	Multi-sector
Market Cap Mix	Large + Mid focused	Balanced across all caps
Risk Level	High (sector risk)	Moderate
Diversification	Low	High
Stability	Cyclical	Relatively stable

6.5 chart showing comparative sector allocation of funds





Green Funds: Very much sector specific to energy, commodities, and infrastructure, making them highly cyclical in nature. They would be best fit for investors who wish to make tactical investment in energy, commodities, and infrastructure sectors. The main characteristics of green funds would be Limited diversification and High sector-specific risk depending upon economic cycles and government policies.

The green funds would need tactical allocation of 10%-15% of the total portfolio. Green funds are high concentration portfolio with lesser number of stocks. DSP Natural Resources Fund consists of only 23 stocks. Green funds contribute to sustainability but due to their limited diversification, green funds carry higher risk. Even though green funds have performed poorly in terms of absolute returns, they can attract investors focused on ESG criteria.

Top 5 Funds: Diversified to some extent in small cap, infrastructural, financials, technology, consumer goods, less reliance on single sector. Suitable for both core and satellite allocations due to more diversification potential and high alpha generation. Better performance in all market cycles. Very concentrated in top stocks (Top 10 > 50%) Focused on energy, metals, and natural resource sectors. Green funds are Highly diversified, Low sector risk, Stable performance across market cycles. Diversified funds offer better stability and growth leading to their better performance in Sharpe ratio, Treynor ratio, and Jensen's Alpha.

The analysis suggests that the green funds, although aligned with ESG criteria and sustainability, have underperformed the top funds by a wide margin in the last five years in terms of return and risk-adjusted efficiency. In terms of pure return seeking, top diversified funds outperform the green funds; however, those with a sustainability orientation will still consider green funds as an important component of a diversified portfolio without replacing equity portfolio holdings.

VII. CONCLUSION

The study reveals that there is an increase in the development of sustainable (green) mutual funds recent years, which concentrate more on environmental awareness, regulatory support, and the integration of advanced technologies such as Artificial Intelligence in investment decision-making. The rising AUM, increasing number of ESG schemes, and growing investor participation indicate that sustainable investing is gradually transitioning from a niche concept to a mainstream investment approach in India.

However, the comparative performance metrics analysis involving CAGR, Sharpe Ratio, Treynor Ratio, Jensen's Alpha, and Standard Deviation reveals the fact that top-performing diversified mutual funds perform better than green mutual funds regarding both absolute return and risk efficiency. The high Sharpe Ratio and Treynor Ratio alongside a higher Jensen's Alpha show more efficient fund management and effective risk usage for return generation.

A detailed portfolio composition analysis allows pointing to one of the essential differences between the categories of investments. It is known that green mutual funds are sector-focused investments as they mostly include stocks from the energy, metals, and infrastructure sectors, thus being more exposed to economic and political risks. On the other hand, the higher diversification among the top-performing mutual funds is seen to contribute to their better performance.

Although green mutual funds have comparable expense ratios, the volatility, and low diversification make them less attractive in comparison with top-performing mutual funds purely in terms of investment efficiency. Still, they have some non-monetary advantages associated with the compliance with the ESG objectives.

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