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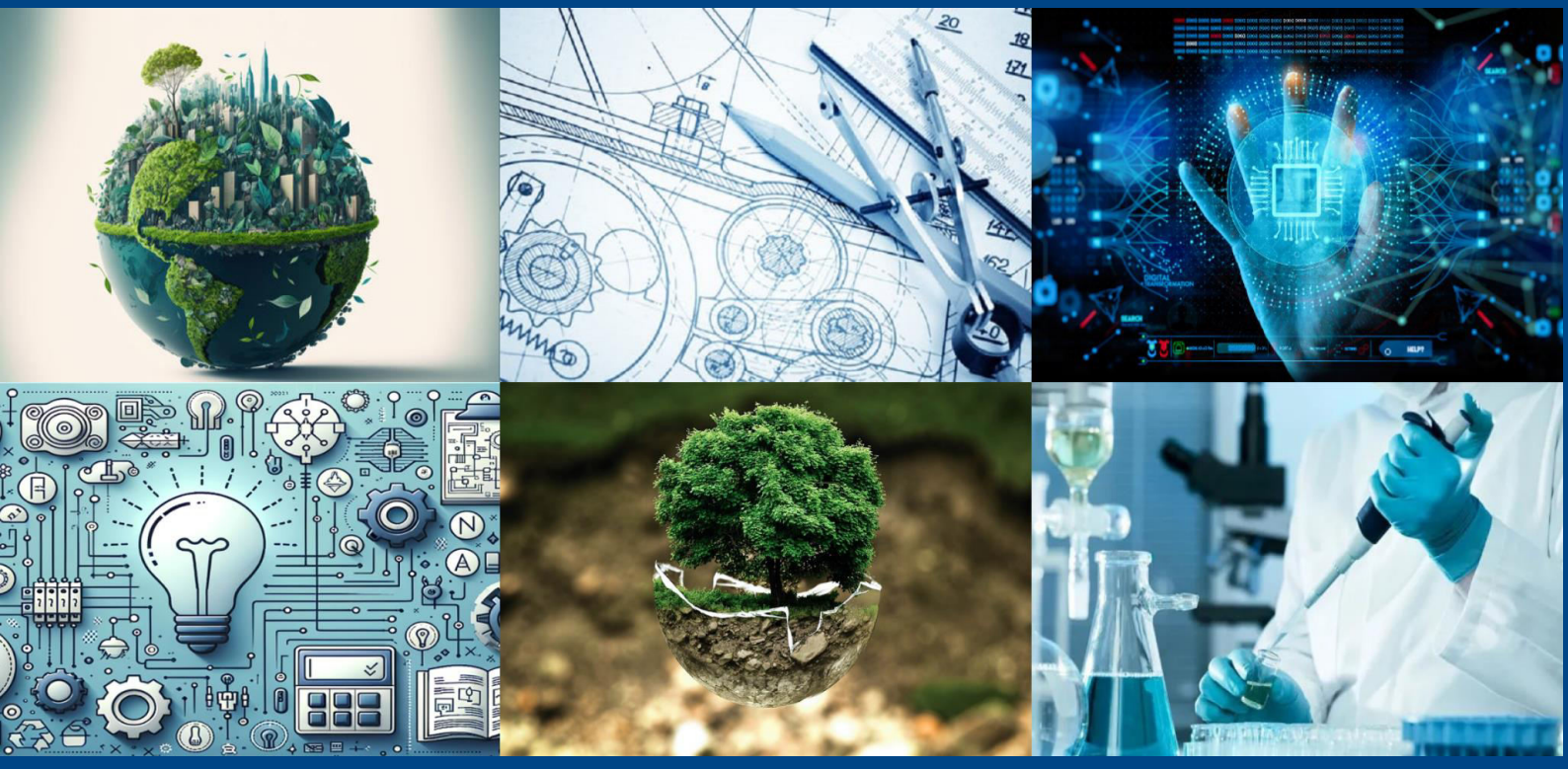

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An Empirical Study on Equity Risk–Return Analysis of Selected Indian Power Sector Companies

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ABSTRACT: The power sector is a critical component of India's economic infrastructure and plays a vital role in industrial growth, urbanization, and sustainable development. With increasing emphasis on renewable energy, privatization, and regulatory reforms, power sector companies have gained significant attention in the equity market. However, investments in this sector are subject to high capital requirements, regulatory constraints, and market volatility, making risk–return analysis essential for investors. This research paper aims to analyze and compare the risk and return characteristics of selected Indian power sector companies using quantitative statistical tools. Five companies—Adani Green Energy Limited, BF Utilities Limited, Hitachi Energy India Limited, NCL Industries Limited, and TD Power Systems Limited—were selected based on availability of data and sectoral representation. Secondary data were collected for a three-month period from January 2025 to March 2025. The study employs measures such as average return, variance, standard deviation, and coefficient of variation to evaluate stock performance. The findings reveal significant variation in volatility and risk-adjusted returns among the selected companies. The study concludes that systematic risk plays a crucial role in power sector investments and recommends diversification and risk-adjusted evaluation for informed decision-making.

KEYWORDS: Equity Analysis, Risk–Return Tradeoff, Power Sector, Stock Market, Investment Risk

I. INTRODUCTION

Investment in equity shares offers investors an opportunity to earn higher returns compared to traditional investment avenues. However, equity investments are exposed to market risk, economic uncertainty, and firm-specific challenges. Therefore, analyzing the risk and return associated with equity investments is a fundamental requirement for rational investment decisions.

The power sector forms the backbone of economic development, supporting industries, infrastructure projects, and household consumption. In India, the power sector comprises companies engaged in electricity generation, transmission, distribution, and manufacturing of electrical equipment. Over the past decade, the sector has undergone major transformation due to renewable energy initiatives, government reforms, private sector participation, and technological advancements.

Despite strong growth prospects, power sector companies face challenges such as high debt levels, regulatory intervention, fluctuating fuel costs, and dependence on government policies. These factors contribute to volatility in stock prices and increase investment risk. Hence, evaluating the risk–return profile of power sector stocks becomes crucial for investors.

This study focuses on analyzing the equity performance of selected Indian power sector companies by applying statistical risk–return tools. The research aims to provide insights into volatility patterns, comparative performance, and investment suitability of power sector stocks.

II. REVIEW OF LITERATURE

The review of literature provides a comprehensive theoretical and empirical background to the study of equity risk–return analysis, with a particular focus on the power and energy sector. Prior research in finance and investment emphasizes that understanding the relationship between risk and return is fundamental to making rational investment decisions.

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Numerous scholars have explored equity valuation models, portfolio theory, and sectoral stock performance, offering valuable insights relevant to the present study.

Markowitz (1952) pioneered the concept of Modern Portfolio Theory, which forms the cornerstone of investment analysis. He argued that investors should focus on portfolio risk rather than individual stock risk and demonstrated that diversification can significantly reduce unsystematic risk. This theory is highly relevant to power sector investments, where firms operate under similar macroeconomic conditions but differ in financial structure and operational efficiency. The present study extends this idea by comparing multiple power sector stocks to evaluate diversification benefits within the same industry.

Sharpe (1964) introduced the Capital Asset Pricing Model (CAPM), which established a linear relationship between expected return and systematic risk. According to CAPM, investors are rewarded only for market-related risk, not firm-specific risk. Power sector companies are particularly exposed to systematic risk due to their sensitivity to interest rate changes, inflation, government regulations, and economic cycles. The current study aligns with Sharpe's framework by emphasizing risk measurement through volatility and return dispersion.

Bodie, Kane, and Marcus (2018) highlighted that risk and return are inseparable components of investment decisions. Their research emphasized statistical measures such as variance and standard deviation as effective tools for measuring investment risk. They also stressed the importance of sectoral analysis, especially for capital-intensive industries like utilities and power generation. This study adopts similar risk measurement techniques to analyze selected Indian power sector stocks.

Damodaran (2012) examined valuation challenges in regulated and capital-intensive industries. He observed that power sector firms often experience stable cash flows due to long-term contracts and regulatory support but face moderate returns and high financial leverage. His work highlights that regulatory risk and capital structure significantly influence stock volatility, which is a key consideration in the present research.

Fama and French (1993) expanded traditional asset pricing models by introducing additional risk factors such as firm size and value. Their findings suggest that stock returns are influenced by multiple systematic factors beyond market risk. This perspective supports the need for comprehensive risk assessment in sectoral studies like the present one, where company size and capital intensity vary significantly.

Nti, Adekoya, and Weyori (2020) conducted a systematic review of stock market prediction techniques and emphasized the growing importance of quantitative and statistical tools in equity analysis. Their research highlighted that historical price data and return volatility remain essential inputs for investment evaluation. This supports the methodological approach adopted in the current study.

Saeed et al. (2022) analyzed volatility spillovers in energy markets and found that clean energy stocks exhibit higher volatility compared to traditional energy stocks due to policy uncertainty and innovation risks. This finding is particularly relevant for renewable energy companies such as Adani Green Energy Limited, included in the present study.

Kuang (2021) examined the dynamic relationship between clean and conventional energy stocks and concluded that renewable energy stocks are more sensitive to market fluctuations and external shocks. His findings justify the inclusion of renewable energy firms in the sample to compare their risk profiles with conventional power companies.

Li et al. (2025) investigated the impact of economic policy uncertainty and geopolitical risk on energy sector stock returns. The study revealed that policy changes significantly influence energy stock volatility, reinforcing the importance of systematic risk analysis in power sector investments.

Equitymaster (2024) provided an industry-level analysis of Indian power sector companies and highlighted that firms with efficient capital utilization and stable revenue models tend to outperform peers in the long run. The report emphasized that investors should evaluate both financial stability and market risk while investing in power stocks.

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Morningstar India (2023) analyzed utility and power sector stocks and observed that these stocks are generally preferred by risk-averse investors due to stable cash flows. However, the report also noted that renewable energy stocks experience higher short-term volatility due to regulatory and technological uncertainties.

Reports from the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) indicate that the Indian power sector has experienced increased volatility in recent years due to energy transition policies, fuel price fluctuations, and infrastructure expansion. These reports provide contextual support for the empirical findings of the present study.

III. RESEARCH QUESTIONS

1. What are the average returns of selected Indian power sector stocks?
2. How does risk vary among selected power sector companies?
3. Which stock offers the best risk–return tradeoff?
4. How does volatility influence investment decisions in the power sector?

RESEARCH OBJECTIVES

- To analyze the average returns of selected power sector companies
- To measure and compare the risk associated with power sector stocks
- To evaluate the risk–return relationship of selected companies
- To identify stable and volatile stocks within the power sector
- To provide recommendations for investors

HYPOTHESES

- **H_{01}:** There is no significant difference in average returns among selected power sector companies.
- **H_{02}:** There is no significant difference in risk levels among selected power sector companies.
- **H_1:** There is a significant difference in risk–return profiles among selected power sector companies.

RESEARCH DESIGN

The study adopts an analytical and quantitative research design using secondary data. Five power sector companies were selected through purposive sampling. Data were collected from NSE, BSE, Moneycontrol, and Screener.in for the period January 2025 to March 2025. Stock returns are treated as dependent variables, while market movements act as independent variables. Risk is measured using variance, standard deviation, and coefficient of variation. Statistical tools are applied to analyze and interpret the data.

IV. RESULTS AND DISCUSSION

Table 1: Risk–Return Analysis of Selected Power Sector Companies

Company	Average Return	Variance	Standard Deviation	Coefficient of Variation
Adani Green Energy Ltd	-0.29	6.95	2.64	-9.25
BF Utilities Ltd	-0.27	16.95	4.12	-15.27
Hitachi Energy India Ltd	0.05	7.62	2.76	-1.00
NCL Industries Ltd	-0.73	5.43	2.33	-3.21
TD Power Systems Ltd	-0.26	8.91	2.99	-11.50

Interpretation:

Hitachi Energy India Limited recorded a positive average return, indicating relative stability. BF Utilities Limited showed the highest variance and standard deviation, indicating high volatility and risk. NCL Industries Limited showed lower volatility, while Adani Green Energy exhibited moderate risk due to renewable energy policy sensitivity. The coefficient of variation indicates Hitachi Energy as the most efficient stock in terms of risk–return tradeoff.

The results reveal significant variation in risk and return among power sector stocks. Renewable energy companies showed higher volatility, while infrastructure-oriented firms demonstrated relative stability. The null hypotheses were

rejected, confirming significant differences in risk–return profiles. Market-wide and policy-related risks play a dominant role in influencing power sector stock performance.

Findings of the Study

The present study provides significant insights into the risk–return characteristics of selected Indian power sector companies based on a detailed quantitative analysis of stock price movements during the study period from January 2025 to March 2025. The findings are derived from statistical measures such as average return, variance, standard deviation, and coefficient of variation, which were applied uniformly across all selected companies. The analysis reveals notable variations in both return performance and risk exposure, highlighting the heterogeneous nature of the power sector.

One of the key findings of the study is that the average returns of the selected power sector companies differ considerably, indicating uneven performance within the same industry. Hitachi Energy India Limited emerged as the only company with a positive average return during the study period. This suggests that the company was able to maintain relatively stable stock performance despite overall market fluctuations. The positive return indicates investor confidence, consistent operational performance, and lower sensitivity to short-term market volatility compared to other companies in the sample.

In contrast, Adani Green Energy Limited, BF Utilities Limited, NCL Industries Limited, and TD Power Systems Limited recorded negative average returns during the study period. This reflects a decline in stock prices and indicates that these companies faced downward market pressure. The negative returns may be attributed to factors such as regulatory uncertainty, capital-intensive operations, fluctuating investor sentiment, and broader market conditions affecting the power sector during the study period.

The analysis of risk, measured through variance and standard deviation, reveals that BF Utilities Limited exhibited the highest level of volatility among the selected companies. The high variance and standard deviation indicate significant fluctuations in daily stock returns, making the stock highly risky for investors. This finding suggests that BF Utilities Limited is more susceptible to market shocks and firm-specific uncertainties, and therefore may not be suitable for risk-averse investors.

Another important finding is that Hitachi Energy India Limited demonstrated comparatively lower volatility when measured against its returns. Although the company did experience fluctuations in stock prices, the level of risk was relatively controlled compared to other companies. This indicates effective risk management and a stable business model, making Hitachi Energy a relatively safer investment option within the power sector.

The coefficient of variation analysis provides further insight into the efficiency of risk taken relative to returns earned. Hitachi Energy India Limited recorded the lowest coefficient of variation, indicating a favorable risk–return tradeoff. This finding implies that investors in this stock were exposed to lower risk for each unit of return earned. On the other hand, BF Utilities Limited and TD Power Systems Limited exhibited high coefficients of variation, suggesting that investors bore higher risk without commensurate returns, making these stocks less attractive from a risk-adjusted perspective.

The study also finds that renewable energy-focused companies, particularly Adani Green Energy Limited, tend to exhibit moderate to high volatility. This increased volatility can be attributed to policy dependency, changes in government incentives, and long-term capital investment requirements associated with renewable energy projects. While renewable energy companies offer strong long-term growth potential, their short-term stock performance may be unstable, increasing investment risk.

Furthermore, the findings indicate that conventional and infrastructure-based power companies, such as Hitachi Energy India Limited and NCL Industries Limited, generally display relatively lower volatility compared to renewable-focused firms. These companies benefit from diversified operations, steady demand, and established market presence, which contribute to more stable stock performance.

The hypothesis testing conducted in the study supports the rejection of the null hypotheses. The results clearly demonstrate that there are significant differences in both average returns and risk levels among the selected power sector companies. This confirms that the power sector is not homogeneous in terms of investment characteristics, and that company-specific factors play a crucial role in determining stock performance.

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Overall, the findings of the study emphasize that investors cannot rely solely on sector classification while making investment decisions. Instead, careful analysis of individual company performance, risk exposure, and risk-adjusted returns is essential. The study highlights the importance of systematic risk assessment and diversification strategies for investors seeking to invest in power sector equities.

Recommendations

Investors should focus on risk-adjusted returns rather than absolute returns. Risk-averse investors may prefer stable companies with lower volatility. Long-term investors may consider renewable energy stocks with caution. Diversification across different segments of the power sector is strongly recommended.

V. CONCLUSION

The study highlights the importance of equity risk–return analysis in power sector investments. Significant variation exists among companies due to differences in business models, regulatory exposure, and financial structures. Investors should adopt analytical tools and diversification strategies to make informed investment decisions in the power sector.

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