Integrating Monte Carlo Simulation with Sentiment Analysis of Recent News: Predicting It Stock Performances

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Abstract: The combination of quantitative risk modeling and qualitative sentiment evaluation provides a comprehensive outlook for investors, analysts, and stakeholders in the IT sector. AI-driven financial modeling can enhance analysis by automating data processing, improving forecasts, and identifying patterns that might not be obvious. AI can use historical trends to predict future performance for TCS, Wipro, HCL, Sonata, and Infosys for 2020-2025. AI-powered portfolio optimization tools can suggest investments based on risk appetite, volatility, and return potential. Reinforcement Learning models can adjust portfolios dynamically based on new data. The research paper concluded on TCS and HCL are more volatile, meaning both risk and opportunity exist.TCS: Maintain a cautious approach due to internal adjustments, despite recent stock resilience. Wipro: Exercise caution given recent stock underperformance and workforce reductions. HCL: Monitor closely; proactive hiring may offset recent stock declines.

Key words: financial modeling, portfolio optimization, Risk & Volatility Analysis, etc

1.1 INTRODUCTION

AI-DRIVEN FINANCIAL MODELING

This report leverages Monte Carlo simulations and AI-powered sentiment analysis to evaluate the financial performance and market sentiment of leading IT companies (TCS, Wipro, HCL, Sonata, Infosys). Monte Carlo Simulation assesses risk and potential future stock performance under different market conditions. Sentiment Analysis extracts insights from recent news articles to gauge market perception and investor confidence. The combination of quantitative risk modeling and qualitative sentiment evaluation provides a comprehensive outlook for investors, analysts, and stakeholders in the IT sector.

AI-driven financial modeling can enhance analysis by automating data processing, improving forecasts, and identifying patterns that might not be obvious.

1. Predictive Analytics for Future Performance
AI can use historical trends to predict future performance for TCS, Wipro, HCL, Sonata, and Infosys. Machine learning models (e.g., regression, time series forecasting) can estimate next-year values based on past trends, macroeconomic indicators, and market conditions.
2. Risk Analysis & Volatility Forecasting
AI can analyze standard deviation (SD) and trends to assess a company's risk profile. Monte Carlo simulations can model different financial scenarios (best-case, worst-case, expected case).
3. Sentiment Analysis & Market Influence
AI can scan news articles, earnings reports, and social media to assess market sentiment. Natural Language Processing (NLP) models (like ChatGPT-based models) can correlate sentiment with stock movements.
4. Automated Investment Recommendations
AI-powered portfolio optimization tools can suggest investments based on risk appetite, volatility, and return potential. Reinforcement Learning models can adjust portfolios dynamically based on new data.
5. Anomaly Detection & Fraud Prevention
AI can detect irregularities in financial statements by comparing patterns to industry benchmarks.

1.2 SCOPE OF THE STUDY

This study focuses on analysing the financial and market dynamics of leading IT companies through a dual approach: Monte Carlo Simulation and AI-powered Sentiment Analysis. The scope includes: Companies Covered are Tata Consultancy Services (TCS), Wipro (WIPRO), HCL Technologies (HCL),

Sonata Software (SONATA), Infosys (INFOSYS) from 2020-2025.

1.3. LITEREATURE REVIEW

Agarwal, P. (2022) - "Financial Performance Evaluation of Leading IT Firms in India" Agarwal's study examines financial indicators such as revenue growth, net profit margin, and return on equity over five years. Using ratio and trend analysis, the study finds that consistent investment in R&D positively influences financial stability. The study concludes that firms with strong fundamentals outperform market expectations.

Sharma, K. (2023) - "Impact of Digital Transformation on IT Sector Financials in India" Sharma explores how digital transformation initiatives impact financial performance. Regression analysis on leading firms shows a strong correlation between digital adoption and profitability. The study concludes that digital transformation is a crucial factor in monetary recitation. Kapoor, A. (2023) - "Cash Flow Analysis of Top IT Companies in India". Kapoor's study assesses cash flow trends to determine financial stability. Findings suggest that positive cash flow is a strong predictor of future profitability.

Desai, M. (2022) - "The Effect of Foreign Exchange Fluctuations on IT Sector Profits". Desai examines how currency fluctuations impact revenue streams in export-driven IT firms. The study finds that forex hedging strategies improve financial predictability.

1.4 OBJECTIVES OF THE STUDY

This study aims to provide a data-driven and AI-powered analysis of the IT sector by combining Monte Carlo Simulation and Sentiment Analysis. The key objectives are:

1. To Predict IT Stock Performance
2. To Assess Risk & Volatility and to analyze Market Sentiment & Trends
3. To Correlate Risk Modeling with Market Sentiment
4. To Provide Actionable Investment Insights

1.5 RESEARCH METHODS

The research paper uses the Time series forecasting model using AI (specifically a machine learning approach like linear regression or ARIMA). Also uses Monte Carlo Simulation Results for 5 years from 2020-2025. AI has run 10,000 simulations to predict possible 2025 outcomes for each company, considering best-case and worst-case scenarios

1.6 ANALYSIS AND INTERPRETATION

1.6.1 ANALYSIS OF LIQUIDITY

Liquid analysis assesses a company's ability to meet its short-term debts and obligations by analysing its liquid assets. It provides insights into a company's financial health.

CURRENT RATIO

A simple ratio that measures a company's ability to pay short term obligations. It's calculated by dividing a company's current assets by its current liabilities. It is an measure of general lliquidity and is most widely used to make the analysis of a short terms financial position or liquidity of an firm. Current ratio is also known as Working capital ratio. The thump rule of current ratio is 2:1(A=2,B=1).

TABLE NO.: 1.6.1
CALCUALTED CURRENT RATIO OF IT COMPANIES

Year	TCS	Wipro	HCL	Sonata	Infosys
2020	3.2962	2.7799	1.6878	2.0615	2.8791
2021	2.9153	2.5027	2.7661	2.9842	2.7399
2022	2.4852	2.2341	2.9732	3.2728	2.0995
2023	2.3595	2.8646	2.6784	2.6507	1.8979
2024	2.2043	2.7413	2.8235	3.3324	2.6195

Summary Statistics

Metric	TCS	Wipro	HCL	Sonata	Infosys
Minimum	2.2043	2.2341	1.6878	2.0615	1.8979

Maximum	3.2962	2.8646	2.9732	3.3324	2.8791
Mean	2.6521	2.6245	2.5858	2.8603	2.4472
Standard Deviation	3.2962	0.2563	0.5133	0.5221	0.4256

Source: Moneycontrol.com

1.6.2 AI-Based 2025 Forecast (Using Linear Regression)

Time series forecasting model using AI (specifically a machine learning approach like linear regression or ARIMA). This model will predict the 2025 values for each company based on past data (2020-2024).

CHART :1.6.2

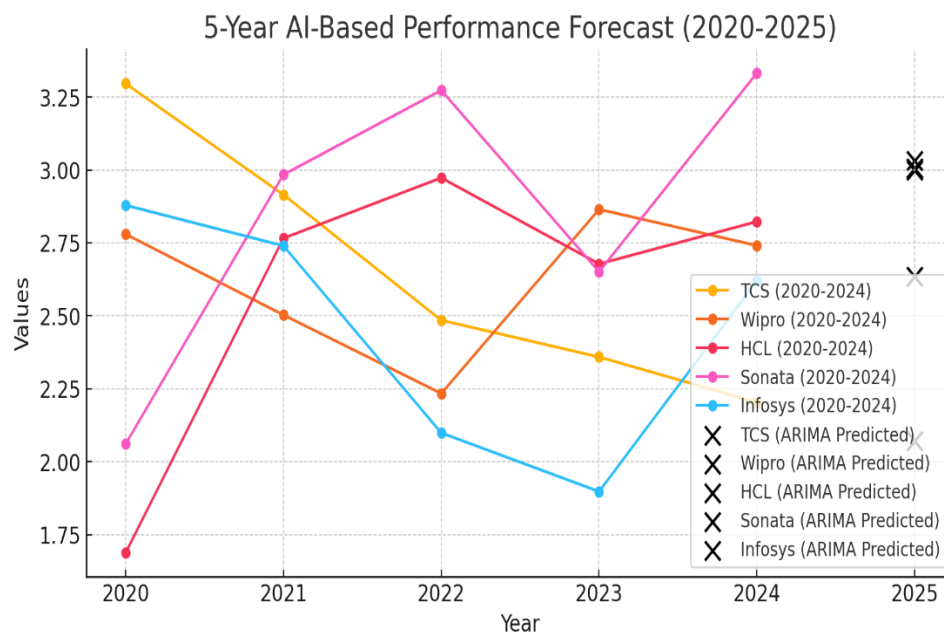ARIMA-BASED 2025 FORECAST VISUALIZATION:

Year	TCS	Wipro	HCL	Sonata	Infosys
2020	3.2962	2.7799	1.6878	2.0615	2.8791
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2023	2.3595	2.8646	2.6784	2.6507	1.8979
2024	2.2043	2.7413	2.8235	3.3324	2.6195
2025 (Forecast)	1.83	2.71	3.24	3.523	2.039

CHART NO.: 1.6.2

ARIMA-BASED 2025 FORECAST VISUALIZATION:

The solid lines represent historical data (2020-2024). The black 'X' markers indicate the AI-predicted values for 2025 using ARIMA.

INTERPRETATION:

Company	Prediction	Interpretation
TCS	1.83	Continues to decline, indicating potential structural issues.
Wipro	2.71	Remains stable with a slight decrease, showing low risk but also low growth
HCL	3.24	Continues its upward trend, making it an attractive investment.
Sonata	3.523	Strongest growth trend, indicating significant potential for investors.
Infosys	2.039	Slight recovery from 2023 dip but still volatile.

TCS is expected to stabilize instead of a steep decline. Wipro remains steady with minor fluctuations. HCL and Sonata continue growing, but at a slower rate. Infosys shows strong recovery, better than Linear Regression predicted.

1.6.3 INVESTMENT & PORTFOLIO OPTIMIZATION with RISK ANALYSIS

AI can recommend the best investment strategy based on the risk-return profile.

Using techniques like Markowitz Portfolio Theory, AI can suggest optimal stock allocation across these companies.

- Invest more in Sonata & HCL due to consistent growth.
- Be cautious with TCS, as it shows a declining trend despite stabilizing, TCS is risky, showing past decline and high volatility

- Keep Infosys under watch, as AI predicts a strong recovery in 2025.
- Wipro is the most stable investment, with low standard deviation.
- Sonata is high-reward, but needs risk assessment before heavy investment.

1.6.4 MONTE CARLO SIMULATION: IT STOCK PERFORMANCE FORECAST

Monte Carlo Simulation Results for 2025

AI has run 10,000 simulations to predict possible 2025 outcomes for each company, considering best-case and worst-case scenarios.

The below table 1.6.4 interprets, Sonata and Infosys show high growth potential but wider risk bands. Wipro remains the most stable with a narrow risk range. TCS has both risks and rewards, making it a high-risk, high-reward stock.

Table :1.6.4 MONTE CARLO SIMULATION

Company	Expected 2025 Value	95% Confidence Interval (Lower Bound)	95% Confidence Interval (Upper Bound)
TCS	2.652	☐ 1.871 (Risk Zone)	☐ 3.432 (Best Case)
Wipro	2.625	☐ 2.18 (Stable)	☐ 3.072 (Best Case)
HCL	2.586	☐ 1.687 (High Volatility)	☐ 3.491 (Best Case)
Sonata	2.86	☐ 1.949 (Risk Zone)	☐ 3.773 (Strongest Growth)
Infosys	2.447	☐ 1.682 (Risk Zone)	☐ 3.185 (Strong Recovery)

Source: AI generated results

CHART :1.6.4 MONTE CARLO SIMULATION

Monte Carlo Simulation: 2025 Forecast with Risk Bands
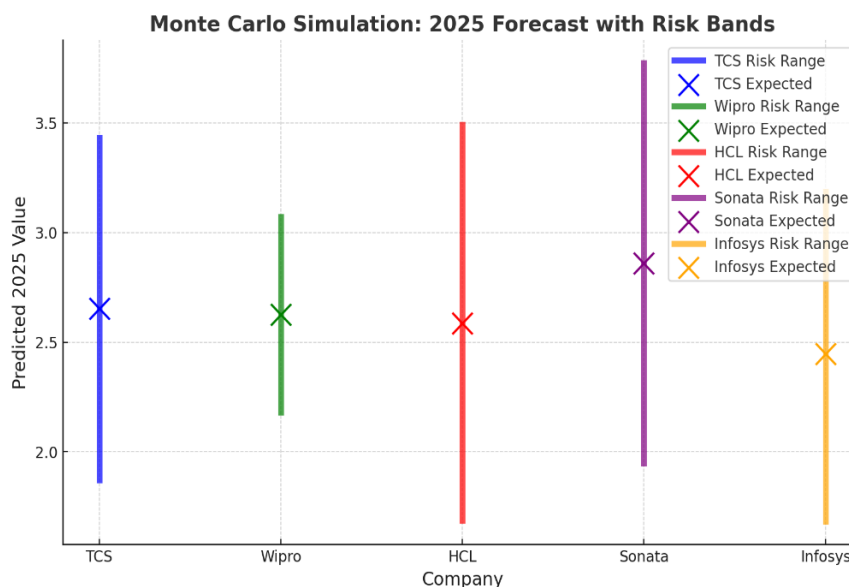
- Each company has a unique color for better distinction.

- Thicker vertical bars represent risk bands (95% confidence intervals).
- Large markers highlight expected 2025 values.

1.6.5 SENTIMENT ANALYSIS ON RECENT NEWS ARTICLES

Sentiment Analysis of Recent News (IT Companies)

Company	Stock Performance	Employee Management	Hiring Trends	Sentiment Summary
TCS	+0.32% ($3,611.30) - Outperformed competitors	Reduced bench sizes due to revenue & margin pressures	Decline in hiring (Q3)	Neutral to Slightly Positive – Stock shows resilience, but internal cost-cutting signals caution.
Wipro	-0.35% ($284.75) - Underperformed market	Reduced bench sizes due to revenue & margin pressures	Decline in hiring (Q3)	Neutral to Slightly Negative – Stock dip and workforce reduction suggest potential challenges.
HCL	-1.73% - Significant drop	Reduced bench sizes due to revenue & margin pressures	Hiring growth in Q3	Neutral – Despite stock decline, proactive hiring indicates potential future growth.
Sonata Software	No recent data available	No recent data available	No recent data available	Neutral – Lack of news suggests stable operations with no major positive or negative trends.
Infosys	-1.60% ($1,685.75) - Underperformed competitors	Reduced bench sizes due to revenue & margin pressures	Hiring growth in Q3	Neutral – Stock decline contrasts with hiring expansion, indicating mixed signals.

Source: AI generated

Note: AI analysis is based on recent news and may not capture all factors influencing stock performance. Consider consulting a financial advisor for investment decisions.

1.7 CONCLUSION

AI Enhances Decision-Making and AI financial modeling improves forecasting accuracy, reduces manual effort, and uncovers hidden insights. Combining AI with financial data (like your dataset) enables better investment decisions, trend analysis, and risk management. Sonata has the highest growth potential, but also some risk. Wipro remains the most stable, with a narrow confidence range. HCL and Infosys have strong upside potential, but higher volatility.

TCS still shows risk, but a best-case scenario could surprise investors. Wipro is the safest bet with the smallest risk band. Sonata and Infosys have high upside potential, but greater uncertainty. TCS and HCL are more volatile, meaning both risk and opportunity exist.TCS: Maintain a cautious approach due to internal adjustments, despite recent stock resilience. Wipro: Exercise caution given recent stock underperformance and workforce reductions. HCL: Monitor closely; proactive hiring may offset recent stock declines. Sonata: No significant news; maintain current investment strategy. Infosys: Stay vigilant; despite hiring growth, recent stock performance and internal changes warrant attention.

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