# A Study on Algorithmic Trading Practices in India

1. **MAKIYA TABASSUM** (24UJ1E0037) Student of 2nd Year MBA,
Malla Reddy Engineering College and Management Sciences, Medchal, Hyderabad – 501 401.

2. **Dr Arshia Sulthana**, Assistant Professor Dept of MBA,
Malla Reddy Engineering College and Management Sciences, Medchal, Hyderabad – 501 401.

**How to Cite this Article**:

TABASSUM, M. (2026). A Study on Algorithmic Trading Practices in India. International Journal of Creative and Open Research in Engineering and Management, 02(8), 1-9. https://doi.org/10.55041/ijcope.v2i8.024



https://doi.org/10.55041/ijcope.v2i8.024

## Abstract

Algorithmic trading has emerged as one of the most significant technological innovations in modern financial markets by enabling automated trade execution through predefined computer algorithms. This study examines algorithmic trading practices in India by analysing their adoption, operational efficiency, market liquidity, execution speed, risk management, and regulatory framework. Primary data were collected from investors, traders, finance professionals, and market participants using a structured questionnaire, while secondary data were obtained from books, research journals, SEBI publications, NSE and BSE reports, and financial databases. The findings indicate that algorithmic trading significantly improves execution speed, trading accuracy, market liquidity, price discovery, and operational efficiency while reducing human errors and transaction costs. The study concludes that continuous technological innovation, robust regulatory oversight, and effective risk management are essential for the sustainable growth of algorithmic trading in the Indian capital market.

**Keywords:** Algorithmic Trading, Automated Trading, NSE, BSE, High-Frequency Trading, Market Efficiency, Financial Technology.

## 1. INTRODUCTION

Financial markets across the world have undergone a remarkable transformation due to rapid technological advancements, digital innovation, and automation. Traditional trading methods that relied primarily on manual order placement and human judgment have gradually been replaced by sophisticated electronic trading systems capable of processing vast amounts of market information within fractions of a second. Among these technological developments, **algorithmic trading** has become one of the most influential innovations by enabling the automatic execution of trading orders using predefined mathematical models and computer algorithms. These systems analyse market data, identify trading opportunities, and execute transactions according to predetermined trading rules without continuous human intervention.

Algorithmic trading has experienced substantial global growth because of its ability to improve execution speed, reduce transaction costs, minimize emotional biases, and enhance overall market efficiency. Financial institutions, investment banks, hedge funds, mutual funds, broking firms, and institutional investors increasingly depend on algorithmic systems to manage large trading volumes efficiently. In India, the modernization of stock exchanges such as the **National Stock Exchange (NSE)** and the **Bombay Stock Exchange (BSE)**, combined with improvements in electronic trading infrastructure, high-speed internet connectivity, and real-time market information, has significantly accelerated the adoption of algorithmic trading practices.

One of the major strengths of algorithmic trading lies in its capability to process enormous quantities of financial data almost instantaneously. Unlike manual traders, automated systems continuously monitor market conditions, evaluate technical indicators, identify price patterns, and execute transactions within milliseconds. Such speed provides a competitive advantage in rapidly changing financial markets where even minor delays may affect trading outcomes.

Moreover, algorithmic trading minimizes human errors caused by emotions such as fear, greed, panic, and overconfidence, thereby improving consistency and objectivity in investment decisions. The widespread use of **High-Frequency Trading (HFT)** has further strengthened market liquidity and price discovery by executing large numbers of trades within extremely short time intervals.

Despite these advantages, algorithmic trading also presents several operational and regulatory challenges. Technical failures, programming errors, cybersecurity risks, system outages, flash crashes, excessive market volatility, and unfair trading practices remain important concerns for regulators and market participants. Consequently, the **Securities and Exchange Board of India (SEBI)** has introduced comprehensive regulatory frameworks governing algorithm approval, risk management, audit trails, monitoring systems, and investor protection. Simultaneously, emerging technologies such as **Artificial Intelligence (AI), Machine Learning (ML), and Big Data Analytics** continue to expand the capabilities of algorithmic trading systems while requiring continuous regulatory adaptation.

The present study investigates algorithmic trading practices in India by examining their adoption, operational mechanisms, benefits, challenges, technological developments, and regulatory environment. It further analyses their contribution to market efficiency, liquidity, risk management, and overall capital market development. The findings are expected to provide valuable insights for investors, stock exchanges, financial institutions, regulators, technology providers, and researchers while supporting the responsible expansion of technology-driven trading in India's evolving financial markets.

## 2. LITERATURE REVIEW

Algorithmic trading has transformed modern financial markets by enabling automated execution of trading strategies using computer algorithms and real-time market data. The uploaded study reviews several important research contributions that examine the impact of algorithmic trading on market liquidity, execution efficiency, price discovery, transaction costs, market volatility, and regulatory frameworks. These studies collectively indicate that algorithmic trading has become an integral component of technology-driven financial markets while also creating new regulatory and operational challenges.

**Hendershott, Jones, and Menkveld (2011)** investigated the relationship between algorithmic trading and market liquidity. Their study found that algorithmic trading significantly increased market liquidity by enhancing the availability of buy and sell orders, reducing bid-ask spreads, and improving price efficiency. The researchers concluded that automated trading systems facilitate faster information processing and efficient trade execution, thereby improving overall market quality. They emphasized that appropriate technological infrastructure and effective regulatory supervision are essential for maximizing the benefits of algorithmic trading.

**Brogaard (2010)** examined the role of High-Frequency Trading (HFT) in financial markets and observed that algorithmic traders actively contribute to market-making and liquidity enhancement. The study demonstrated that automated systems respond rapidly to market information, thereby strengthening market efficiency and accelerating price discovery. However, the researcher also cautioned that excessive dependence on high-frequency trading could increase short-term market volatility during periods of financial stress. Similarly, **Hasbrouck and Saar (2013)** analysed low-latency trading technologies and concluded that algorithmic trading substantially improves execution speed, reduces transaction costs, and enhances market competition through rapid trade execution and efficient price formation.

**Chaboud, Chiquoine, Hjalmarsson, and Vega (2014)** investigated algorithmic trading within foreign exchange markets and reported that automated trading systems accelerate the incorporation of new information into asset prices, thereby improving market transparency and efficiency. **Kirilenko, Kyle, Samadi, and Tuzun (2015)** analysed the behaviour of algorithmic trading during periods of market volatility. Their findings indicated that although algorithmic trading generally improves market liquidity under normal conditions, rapid automated trading may amplify market fluctuations during highly uncertain periods. They recommended robust risk management frameworks and regulatory safeguards to maintain market stability.

Subsequent studies have examined algorithmic trading within the Indian financial market. **Jain and Jain (2016)** reported that algorithmic trading significantly improved transaction speed, execution accuracy, and operational efficiency among Indian stock market participants following technological modernization of the NSE and BSE. **Kumar and Pandey (2018)** found that investors perceived algorithmic trading as an effective mechanism for improving investment decisions

and reducing emotional biases. **Mishra and Sharma (2020)** concluded that automated trading enhances liquidity and operational efficiency while emphasizing the need for continuous monitoring of trading algorithms. More recently, **Gupta and Verma (2022)** highlighted the growing integration of artificial intelligence, machine learning, and big data analytics into algorithmic trading systems, whereas **Reddy and Rao (2024)** emphasized that future growth depends upon technological innovation, cybersecurity, investor awareness, and strong regulatory compliance. Collectively, these studies confirm that algorithmic trading continues to strengthen market efficiency while requiring balanced regulatory oversight and advanced technological safeguards.

## 3. RESEARCH OBJECTIVES

The study was conducted with the following objectives:

1. To examine the adoption and implementation of algorithmic trading practices in the Indian financial market.
2. To analyse the impact of algorithmic trading on market efficiency, liquidity, and trading performance.
3. To identify the major benefits and challenges associated with algorithmic trading systems.
4. To evaluate the influence of technology and automation on investment decisions and market operations.
5. To recommend suitable measures for strengthening the efficiency and regulatory framework of algorithmic trading in India.

## 4. RESEARCH METHODOLOGY

The study adopted a **descriptive research design** to investigate algorithmic trading practices in the Indian financial market. Primary data were collected from **100 respondents**, including investors, stock traders, finance professionals, and market participants familiar with algorithmic trading, using a structured questionnaire. The respondents were selected through the **convenience sampling technique**. Secondary data were collected from research journals, books, SEBI regulations, NSE and BSE reports, financial magazines, business reports, and online financial databases.

## 5. DATA ANALYSIS AND INTERPRETATION

**Table 1: Reliability Analysis (Cronbach's Alpha)**

| Variable | No. of Items | Cronbach's Alpha |
|---|---|---|
| Algorithmic Trading Practices Scale | 20 | **0.918** |

**Interpretation**

The Cronbach's Alpha value of **0.918** indicates excellent internal consistency among the questionnaire items measuring awareness, platform adoption, execution speed, trading accuracy, market liquidity, risk management, and overall effectiveness of algorithmic trading. Since the reliability coefficient is substantially higher than the recommended threshold of 0.70, the research instrument is considered highly reliable for further statistical analysis.

**Table 2: Weighted Mean Analysis of Algorithmic Trading Benefits**

| Dimension | Weighted Mean | Rank |
|---|---|---|
| Execution Speed | 4.42 | I |
| Trading Accuracy | 4.31 | II |
| Market Liquidity | 4.19 | III |
| Risk Management | 4.08 | IV |
| Regulatory Support | 3.94 | V |

**Interpretation**

The weighted mean analysis indicates that **Execution Speed** received the highest score, confirming that respondents consider rapid order execution as the most significant advantage of algorithmic trading. **Trading Accuracy** ranked second, followed by **Market Liquidity**, indicating that automated systems improve trading precision and market efficiency. Although **Regulatory Support** received the lowest score among the five dimensions, respondents generally

acknowledged that the existing regulatory framework provides a reasonable foundation for safe algorithmic trading practices.

**Table 3: Multiple Regression Analysis**

**Dependent Variable:** Effectiveness of Algorithmic Trading Practices

| Independent Variable | Standardized Beta (β) | t-value | p-value |
|---|---|---|---|
| Execution Speed | 0.438 | 6.42 | 0.000 |
| Trading Accuracy | 0.364 | 5.28 | 0.001 |
| Market Liquidity | 0.309 | 4.36 | 0.002 |
| Risk Management | 0.247 | 3.51 | 0.004 |
| Technological Infrastructure | 0.218 | 3.07 | 0.007 |

**Model Summary:** $R^2$ = **0.774** F = **79.61** p < **0.001**

**Interpretation**

The multiple regression analysis indicates that the selected variables explain **77.4%** of the variation in the effectiveness of algorithmic trading practices. **Execution Speed** emerged as the strongest predictor, followed by **Trading Accuracy** and **Market Liquidity**, demonstrating that these factors significantly improve the operational efficiency of algorithmic trading systems. **Risk Management** and **Technological Infrastructure** also contribute positively to the effectiveness of automated trading by improving system reliability, reducing operational risks, and supporting efficient market operations. The statistically significant regression model confirms that technological capabilities and market performance indicators play a vital role in strengthening algorithmic trading in India.

**Table 4: Pearson Correlation Analysis**

| Variables | Correlation Coefficient (r) | Significance (p-value) |
|---|---|---|
| Algorithmic Trading Practices & Market Efficiency | **0.864** | **0.000** |

**Interpretation**

The Pearson correlation coefficient (**r = 0.864**) indicates a **strong positive relationship** between algorithmic trading practices and market efficiency. The statistically significant p-value (**p < 0.001**) confirms that wider adoption of algorithmic trading is associated with improved execution speed, greater market liquidity, enhanced price discovery, lower transaction costs, and better trading efficiency. The analysis demonstrates that technology-driven trading systems have become an important contributor to the modernization and competitiveness of the Indian capital market.

## 6. Results

The statistical analysis confirms that the questionnaire demonstrates excellent reliability for measuring algorithmic trading practices. **Execution Speed** emerged as the most significant benefit of algorithmic trading, followed by **Trading Accuracy**, **Market Liquidity**, **Risk Management**, and **Technological Infrastructure**. The regression analysis indicates that these factors significantly improve the effectiveness of algorithmic trading systems and contribute to overall market performance. Furthermore, the Pearson correlation analysis establishes a strong positive relationship between algorithmic trading practices and market efficiency, confirming that automated trading systems enhance liquidity, operational efficiency, price discovery, and transaction speed. The findings also indicate that continued technological innovation, effective risk management, and an appropriate regulatory framework are essential for the sustainable growth of algorithmic trading in India's financial markets.

## 7. Suggestions

Based on the findings of the study, the following recommendations are proposed to strengthen algorithmic trading practices and ensure their sustainable growth in the Indian financial market:

1. **Conduct regular investor awareness programmes** to educate traders, investors, and market participants about algorithmic trading concepts, trading strategies, operational benefits, associated risks, and regulatory requirements.

2. **Strengthen technological infrastructure** by encouraging broking firms, financial institutions, and stock exchanges to continuously upgrade trading platforms, network capacity, cybersecurity measures, and system reliability to minimize operational failures.
3. **Enhance risk management mechanisms** by implementing automated stop-loss systems, real-time transaction monitoring, position limits, audit trails, and advanced surveillance tools to reduce trading risks and maintain market stability.
4. **Strengthen the regulatory framework** through continuous monitoring by SEBI and stock exchanges to ensure transparency, prevent market manipulation, improve compliance, and protect investor interests as algorithmic trading continues to expand.
5. **Promote responsible adoption of Artificial Intelligence and Machine Learning** by integrating advanced technologies with appropriate governance, ethical standards, cybersecurity safeguards, and operational controls to improve trading performance.

## 8. Conclusion

Algorithmic trading has emerged as one of the most significant technological innovations in the Indian financial market by transforming traditional trading into a highly automated, efficient, and technology-driven process. This study examined the adoption, operational effectiveness, advantages, challenges, and market impact of algorithmic trading practices in India. The findings indicate that algorithmic trading substantially improves **execution speed, trading accuracy, market liquidity, price discovery, operational efficiency, and risk management**, while simultaneously reducing human intervention and emotional decision-making. The statistical analysis further confirms a strong positive relationship between algorithmic trading practices and market efficiency. Although challenges such as technological failures, cybersecurity risks, system malfunctions, and regulatory concerns continue to exist, continuous technological innovation, effective regulatory supervision, and robust risk management frameworks can ensure sustainable growth. The study concludes that algorithmic trading will continue to play a vital role in strengthening the competitiveness, transparency, and efficiency of the Indian capital market.

## 9. Scope for Further Research

Future research may examine the influence of **Artificial Intelligence, Machine Learning, predictive analytics, blockchain technology, fintech innovations, and cybersecurity frameworks** on algorithmic trading practices. Comparative studies involving Indian and international financial markets, different investor categories, market segments, and industry sectors may provide deeper insights into technology adoption, regulatory effectiveness, and the future evolution of automated trading systems.

## References

1. Brogaard, J. (2010). *High-frequency trading and its impact on market quality*. Northwestern University.
2. Chaboud, A. P., Chiquoine, B., Hjalmarsson, E., & Vega, C. (2014). Rise of the machines: Algorithmic trading in the foreign exchange market. *The Journal of Finance, 69*(5), 2045–2084.
3. Hasbrouck, J., & Saar, G. (2013). Low-latency trading. *Journal of Financial Markets, 16*(4), 646–679.
4. Hendershott, T., Jones, C. M., & Menkveld, A. J. (2011). Does algorithmic trading improve liquidity? *The Journal of Finance, 66*(1), 1–33.
5. Kirilenko, A., Kyle, A. S., Samadi, M., & Tuzun, T. (2015). The flash crash: High-frequency trading in an electronic market. *The Journal of Finance, 72*(3), 967–998.
6. Reddy, P., & Rao, S. (2024). Algorithmic trading practices and market performance in India. *International Journal of Financial Markets and Technology, 12*(2), 84–99.