



ALGORITHMIC TRADING IN INDIA: PROSPECTS AND CHALLENGES

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Abstract

Technology is rapidly changing the way we trade in the stock market. Especially in times of Covid-19 pandemic, technology has thrown open many opportunities. One such technology that has overhauled stock market trading is algorithmic trading. Algorithmic trading refers to the use of programs and computers to generate and execute orders in markets with electronic access. Algorithmic trading (Algo Trading) was introduced and allowed in India in 2008 by the Securities and Exchange Board of India (SEBI). It started with Direct Market Access (DMA) and was restricted to institutional investors only, but because of the cost advantage and better execution, the trading community started using it extensively. In 2010, Algo trading turned a new kind of trading in India by introducing Smart Order Routing. The Securities and Exchange Board of India is the regulator which brings out the measures to strengthen and regulate algorithmic trading in India. There are numerous strategies investors use to undertake Algorithmic Trading like index fund rebalancing, trend following, arbitrage, mean revision and mathematical model. Algo trading provides the benefits of high-volume trading activities at high speed with reduced costs and without human errors. This paper tries to analyze the regulation, strategies, prospects and challenges of Algorithmic Trading in India.

Keywords: Algorithmic Trading, Direct Market Access, SEBI, Smart Order Routing.

Introduction

Technology is rapidly changing the way we trade in the stock market. Especially in the trying times of Covid-19 pandemic, technology has thrown open many opportunities, including a new upcoming generation of traders who are considering trading as a full-time career. One such technology that has revamped stock market trading is algorithmic trading, which has accommodated traders with competitive edge to better their skills and stands poised to outstrip traditional trading methods in future.

Algorithmic trading refers to the use of programs and computers to generate and execute large orders in markets with electronic access. It generates speed and frequency that is impossible for a manual trader to achieve. Algorithmic trading strategies involve making trading decisions on the basis of pre-set rules that are programmed into a computer. The pre- set rules are generally based on timing, price, quantity, or any mathematical model. The basis of any computer application and its functions is algorithm. With the advent of advanced technologies, almost every sector is basing its effectiveness on this piece of logical coding. Algorithms leverage user data, past patterns and a designated set of pre-specified instructions to achieve the set goals. Today, financial institutions such as banks, broking houses and investment funds employ sophisticated and advanced algorithms to establish and liquidate positions at lightning speed.

Brief History of Algorithmic Trading in India

Algorithmic trading was introduced and allowed in India in 2008 by the Securities and Exchange Board of India (SEBI). It started with Direct Market Access (DMA) and was restricted to institutional investors only, but because of the cost advantage and better execution, the trading community started using it extensively. Exchanges has also played an important role in its adoption by offering co-location server 'racks' on lease to broking firms in June 2010, to improve trading speed and align.

Slowly, over a period of time the models based on the mechanism of arbitrage were built for Equities, Options and Futures on the National Stock Exchange as well as the Bombay Stock Exchange. Since 2011,



the turnover percentage, based on algorithmic trading, has increased by more than fifty percent on the segment of BSE's Equities.

In 2010, Algo trading turned a new kind of trading in India. In 2010, SEBI introduced 'Smart Order Routing' called SOR, it enabled investors to place orders for trades without bothering which exchange was facilitating better prices of securities. Boosting the overall stock market, participants could place their trades with new-found confidence. As a result, Across the BSE and the NSE, the volume of transactions and liquidity increased.

NSE began to launch services that based themselves on algorithms offering convenient trading tools to investors. Co-location was introduced to provide members the facility of placing their own servers in the premises of the exchange. This was offered for a fee. These were offered by the BSE by 2013. After this, both the BSE and NSE provided retail trading the opportunity of using algorithms in placing orders.

Zerodha (Kite Connect) and many other online brokers allow customers programmatic access via API to their own accounts. Tech-savvy customers can use these APIs to consume machine-readable data; for example, they can read their portfolios for analysis and place orders. Since APIs are meant for computer programmers primarily, unsurprisingly, less than 0.05% of our customers use APIs, and an even smaller fraction use them to place orders. API access to one's accounts has been standard practice in developed markets for decades, although it is a more recent phenomenon in India.

The Securities and Exchange Board of India is the regulator which brings out the measures to strengthen and regulate algorithmic trading in India.

Literature Review

Very less research has been carried on Algo trading. Breckenfelder (2013) analyzes the NASDAQ OMXS 30 index and finds that competition among HFT firms induces more liquidity consuming trades, as measured by liquidity ratio, thereby draining available liquidity in the market. Hagstromer and Norden (2013) find evidence that market-making HFT activities reduce short term volatility (measured by one-minute midpoint quote changes) using the data of 30 stocks from the NASDAQ-OMX Stockholm.

Brogaard, Hendershott, and Riordan (2014) find that aggressive high-frequency traders tend to trade towards the direction of permanent changes and opposite of the direction of transitory movements, thereby improving overall price efficiency. According to Chaboud et al. (2014) algorithmic trading is associated with higher price efficiency, as measured by the frequency of triangular arbitrage opportunities and the autocorrelation of high frequency returns, in three foreign exchange markets: euro-dollar, dollar-yen, and euro-yen.

The international analysis of 42 equity 11 markets by Boehmer, Fong, and Wu (2015) shows that short-term volatility increases when the intensity of algorithmic trading rises. Furthermore, the authors note that the increase in volatility cannot be attributed to faster price discovery or to the penchant of algorithmic traders for entire volatile market. Peter Gomber and Kai Zimmermann (2018), *The Oxford Handbook of computational economics and finance*) in their article titled *Algorithmic Trading in Practice* has discussed the use of computer algorithms in securities trading, or algorithmic trading. Over a period of time, Algo trading has become a central factor in modern financial markets. The desire for cost and time savings within the trading industry spurred buy side as well as sell side institutions to implement algorithmic services along the entire securities trading value chain.

Research Methodology

Design: Exploratory and Descriptive Research is adopted because of the nature of the study on the topic "Algorithmic trading in India: prospects and challenges"



Data Collection: Data for the study is gathered from secondary sources such as website of the companies, books, journals, articles, business magazines available in online and offline modes.

Objectives

- To understand the concept and strategies of Algorithmic trading.
- To study the benefits of algorithmic trading for stock market.
- To identify the challenges in adopting algorithmic trading in India.

Strategies of Algo Trading

There are numerous strategies investors use to undertake Algorithmic Trading.

- **Index Fund Rebalancing:** Index Funds continuously rebalance their portfolio to match the underlying asset's current market price. In this way, they create opportunities for Algo traders to capitalize on the expected trades and make profits from the difference of 20-80 basis points. These trades triggered by the index fund rebalancing are majorly undertaken through the use of algorithmic trading.
- **Trend Following:** This type of algorithmic trading is the most common among Algo traders. In the process, they use moving averages, price movements, channel breakouts, etc., to prepare a set of instructions for the algorithmic trading software. Once the set trend is achieved, the software executes the order for the investor.
- **Arbitrage:** Arbitrage is when you buy a lower-priced stock from one market and sell it simultaneously in another market where the stock price is high, making a profit from the price difference. Investors leverage data to identify such stocks that are trading with different prices and then use algorithmic trading to implement buy and sell orders in both markets.
- **Mathematical Model:** Investor's use proven mathematical models to simultaneously trade on the same underlying asset's stock and derivative. Since it can be a complex set of transactions, they use algorithmic trading to identify such assets and execute orders among various asset classes based on price fluctuations.
- **Mean Reversion:** This strategy promotes the temporary highs and lows of an asset, and if given needed time, the asset price will always revert to the mean value (average price). The investors use Algo trading to define the asset's price range and ensure they buy/sell the asset automatically if it breaks in or out of the defined range.
- **Volume Weighted Average Price:** Investors aim to execute their orders as close as possible to the volume-weighted average price. Algorithmic trading allows the investors to break up big order volumes into dynamically smaller chunks and ensure the closing price goals are achieved.
- **Time Weighted Average Price:** This type of strategy also breaks up big order volumes into dynamically smaller chunks. However, investors use divided time slots between the start and end time to execute the strategy through algorithmic trading. The aim is to minimize the market impact by executing an order as close as possible to the average price between the start and the end time.

Benefits of algo trading:

- **Lower Costs:** Algorithms are more cost effective for low-maintenance trades and that has meant head-count shifts and reductions on sales desks. The ability to submit orders electronically to exchanges directly rather than through brokers has been an important innovation in lowering the cost of trading.
- **Enables improved liquidity and pricing on shares:** Algorithms are used extensively by broker-dealers to match buy and sell orders without publishing quotes. By controlling information leakage and taking both the bid and offer sides of a trade, broker Algorithms are in a way enabling improved liquidity, pricing on shares for client, and higher commissions to brokers.



- It can analyze and react to the news faster before a human trader: Each news item is ‘meta tagged’ electronically to identify sectors, individual companies, stories or specific items of data to assist automated trading.
- To monitor and respond to risk conditions on real-time basis: Using real-time analytics, algorithms can continuously re-calculate metrics like Value-at-Risk (VaR) and automatically hedge a position if VaR is exceeded.
- Address Regulatory Compliance Issues Compliance with law is of utmost importance and it is becoming burdensome with ever increasing stringent regulations. Firms going forward will increasingly harness the latest in algorithmic trading technology to address regulatory compliance issues.
- Automate Surveillance Regulators could automate surveillance to monitor Algo- trading operations for patterns of abuse. However, limited availability of automated surveillance tools for Algo trades and lack of skilled staff and sufficient IT resources makes supervision technically challenging.

Areas of Concern

- Technical sufficiency and resources required: One of the biggest disadvantages of Algo trading is the technical sufficiency and resources required for Algo trading. Algo trading requires knowing how to program in specific program languages, which can take quite a while to learn. This facility may not be accessible to retail investors and small traders.
- Lack of Control: Since trades are automated, if the program runs in a way that one doesn't want it to, one will be unable to control losses. Programs need to be tested thoroughly in order to avoid these mistakes that might be made.
- Lead to systemic risk: Interconnections between markets, which may be amplified by algorithms programmed to operate on a cross-market basis, may allow for a shock to pass rapidly from one market to another, potentially increasing the speed at which a systemic crisis could develop.
- Lack of Visibility: We know what a specific algorithm is supposed to do, measure its pre-trade analytics and see how the post trade results match up to that expectation. But if the trader didn't select the most optimal algorithm for that trade little can be done. This problem is caused by a lack of visibility and transparency into the algorithm while it is executing orders.
- Algorithms acting on other Algorithms: If fund managers' trading pattern is spotted and tracked with the use of algorithms, then these algorithms are liable to be Reverse Engineered. This implies that their buy and sell orders are pre-empted and used to the maximum effect by their competitors. Here, algorithms are acting on other algorithms.
- Lack of standard benchmark: With brokers offering many algorithmic strategies, one concern is that buy-side institutions lack the tools to understand which algorithm to use for a particular stock. The lack of a standard benchmark has made it almost impossible to assess the quality of algorithms.
- Algorithmic trading requires careful real-time performance monitoring as well as pre- and post-trade analysis.
- Low touch venues such as algorithmic trading lend themselves best to easier types of orders such as low-urgency and small orders for large cap stocks. But urgent orders for a large volume of small cap stocks would require a higher-touch approach to ensure best execution and cost efficiency.

Findings

Technological advancements are rapidly contributing in the way stock trading happens in an automated way. It opens new doors of opportunities at the same time strict regulations are required for the smooth and effective functioning of the market.



- During the times of Covid, a lot of new investors who are technologically updated have started trading in stock market. Algo Trading is one such area which has lot of room for further growth.
- Cost advantage and better execution are the important driving factors for the growth of Algo Trading.
- It generates high speed and frequency compared to manual trading.
- It provides for extensive data mining and explorations.
- Algo trading reduces the need for human intervention and reduces human errors.
- Risk management in algorithmic trading allows setting limits at multiple levels.

Conclusion

Algorithmic trading is one of the emerging trading strategies in the stock market. It proves to be a better trading strategy and a profitable one for the investors dealing in large trade volume. However, retail investors are more concerned about algorithm trading, it might deprive them of profits from the market. SEBI has also regulated such trading and sufficient steps should be taken to ensure it benefits all class of investors are benefitted out of it and also ensure that trading can be carried out simultaneously at the same time wherever the investors are, to avoid inequalities.

References

1. Edward A Leshik & Jane Cralle, (2011), “An Introduction to Algorithmic Trading, Basic to Advanced Strategies”, John Wiley & Sons Ltd.
2. Chan, Ernest P., (2013), “Algorithmic Trading, Winning Strategies and their rationale”, John Wiley & Sons Ltd.
3. Nidhi Aggarwal and Susan Thomas, (2014), “The causal impact of algorithmic trading on market quality”, Indira Gandhi Institute of Development Research, Mumbai. <http://www.igidr.ac.in/pdf/publication/WP-2014-023.pdf>
4. Vikram Bajaj A and Jagannath Aghav, (2016), “Validating Algorithmic Trading Strategies to Predict Trends in Indian Index Option”, 0000-0000/16/\$00.00 c 2016 – IOS Press and the authors.
5. Gowtham Ramkumar, (2018), “A study on the significance of algorithms trading in Indian stock market”, International Journal of Research and Analytical Reviews (IJRAR), Volume 5, Issue 4, Pp 66-75.
6. Peter Gomber & Kai Zimmermann, (2018), “Algorithmic trading in Practice”, The Oxford Handbook of Computational Economics and Finance.
7. National Institute of Financial Management Report on Algorithmic trading (An Institute of Ministry of Finance, Government of India).
8. “Measures for strengthening Algorithmic Trading framework, SEBI”, https://www.sebi.gov.in/sebi_data/meeting_files/apr-2018/1524113320566_1.pdf
9. Shah, Kamlesh (2021, August 22), How Algorithms are going to change the way you buy and sell stocks, The Economic Times,
10. Aggarwal, D.K., (2021, October 02), How Algo trading makes it easier to grow and protect wealth in stock market, The Economic Times,
11. Shenoy, Deepak, (2020, January 13), Algos are changing India’s stock markets, Livemint.com, <https://www.livemint.com/market/stock-market-news/algos-are-changing-india-s-stock-markets-11578840300963.html>