



Impact of Digitalisation on the Indian Stock Market

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Abstract:

Digitalisation is bringing a significant change in all domains. The onset of the Digitalization of the Indian Stock Market can be identified through NSE's NEAT (National Exchange for Automated Trading) system. In the year 1995, BSE moved from an open outcry method of trading to a Screen-based system. This made the transactions faster and reduced the transaction cost along with enhancing the transparency of the system. The increase in Internet and Mobile usage and Accessibility have accelerated retail participation in the stock market. Today we have AI which is almost nullifying human intervention in placing orders and post-trade settlements through its Machine Learning and ANN (Artificial Neural Networks) concepts. In this context, this study is undertaken to trace the path of digitalization of the Stock Market in India and analyse the applications of AI in stock market trading. The study finds that though the extended use of technology and applications makes trading convenient and faster it still has some flaws like a lack of robust technical infrastructure, data protection etc., which needs to be addressed by an efficient regulatory framework. We all are well aware of the NSE Co-location Scam which made the regulatory bodies rethink on the sufficiency of existing regulations for trading and information sharing and protecting investor interests. Hence, the adoption of advanced technology like blockchain, distributed ledger technologies etc., is rising the need for modification of the role of regulatory bodies. Also, the study finds that the number of dormant Demat accounts is more in Indian Stock Market and the stockbrokers have to take measures to convert these into active accounts so that they can meaningfully contribute to the development of the economy.

Keywords: AI, Behavioural Finance, Blockchain Technology, Digitalization, Smart Contracts, Stock Markets.

Introduction:

Technology has always been a change agent and it has led to the progressive transformation of the business and society. With the influx of the internet, the world is heading towards a digital transformation. As a result, we are in a digitalised era, and witnessing technological disruption. According to Gartner, "Digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities. It is the process of moving to a digital business." All the business areas are experiencing the effect of digitalisation and so is the financial markets and services industry in the form of Financial Technologies which is shortly known as FinTech. FinTech refers to the use

and application of software programmes and hardware tools to make financial services and processes more efficient in terms of time and cost and to enable finance managers to make better decisions. Technological advancements like Machine Learning, Deep Learning, Blockchain Technologies, Distributed Ledger Systems, Smart Contracts, Robo advisors, and Algo Trading are revolutionising how stock trading used to happen in the last few years. The depository participants are launching their own online trading platforms to serve their clients better and increase client engagement. This is one of the main reasons for an increase in retail investor participation in the Indian stock market. According to research conducted by 5paisa.com in July 2020, 2/3rd of the cash

market volumes was accounted for retail investor trades in the respective month. Retail shareholding in Indian markets has been raised to an early 15-year high in June 2022 (Ravi Kumar, 2023). In this light, this study is conducted to understand the impact of digitalization on the Indian financial markets.

a. Review of Literature:

Prateek Rani and Adithya Srinivasan (2015), conducted a study to analyse the impact and future of digitalization of financial markets. They studied different electronic trading platforms and the digitalization of the US Market. They found that US Markets are highly digitalised and algo-trading will be the future of electronic trading and the success of algo trading depends on the transparency of the system. Jiya Goel et al., (2020) conducted a study on concepts applications and limitations of AI in Stock Markets with the aim of understanding and evaluating the prospects of integrating AI in Stock Trading. They explored various ways in which stock trading can be done using AI. However, they recognised that TMA and SMA should be used as a part of Machine Learning AI models rather than MACD and RSI. They also found that lack of sufficient high-quality data to feed and train into the system would cause a problem for these models. Siddharth Nair and Dr. Garima Malik (2020), undertook a study on the application of AI to stock market prediction with the intention to understand the various software available for stock prediction while analysing its benefits to investors. They reached the conclusion that AI can be used for predicting the stock markets and sooner it will be the new way of trading in the stock market. Nevertheless, they stressed on the need to protect the investors' money and data privacy.

b. Research Gap:

The literature review shows that while there are many studies which are concerned towards the use of AI to predict share prices and technology, this study aims at making the common man aware of the digitalization of the stock market and the AI-based applications which can be used by the investor while trading to make informed trading decisions.

c. Objectives of the Study:

This study is undertaken with the following objectives:

1. To understand the purview of digitalization concerning Financial Markets.
2. To know the applications of AI in Indian Financial Markets.
3. To analyze the impact of digitalization on retail investor participation in Indian Stock Markets.

A. Discussion:

Gone are the days when trading used to happen by agents meeting face-to-face and using hand signals. In earlier days the transactions needed to be placed and get settled manually. There was no system where the investors could get real-time information about share prices. One should always be dependent on the broker for information as well as the execution of trades. Though the share price information can be seen in the newspaper that would be the previous day's price, the investors need real-time prices to make investment decisions. The physical transmission and execution had increased the share transaction cost, which would affect the final profits. Perhaps, this is the reason, common men did not prefer investments in the stock market.

The beginning of digitalization in Indian Financial Markets can be traced back to 1991-92 with National Stock Exchange. NSE is the first stock exchange to introduce an Electronic Trading System through NEAT (National Exchange for Automated Trading). NEAT is a fully automated electronic and screen-based trading system where members can enter into the computers the quantity and the price they want to trade and the transaction is automatically executed as soon as it finds a matching sale or buy order from the counter-party. This provided depth and liquidity to the market along with offering the convenience of trading for the investors. Under this system, the orders are matched based on time priority. Unmatched orders remain in the system until they are modified or a fresh order is placed for the same share. NEAT generates and maintains the audit trails of the orders that are executed by providing the unique order number to every order that has been placed on the NEAT system. This makes the tracking of the order and settlement more efficient. Order processing has picked up speed and become more transparent after the introduction of the Screen-Based Trading System. Then also the trades had to be

channelised through the stock brokers. As technology progressed the brokers started seeking digital methods to reach out to their clients. These digital methods involve company sites, web portals, social media, smartphone applications, SMS, e-mail. After the adoption of NEAT screen-based trading, another major milestone in the Digitalization of the Indian Stock Market was the dematerialization of securities. SEBI introduced the dematerialization of securities in the year 1996, under The Depositories Act, 1996. Dematerialization of securities is the process by which the physical share certificates are converted into digital form. The digitalized shares are held in the Demat account of the client. Just like we have bank accounts for holding cash our digital shares are held in the Demat account. Thus, having a Demat account is a must for every trader. These accounts are maintained by the depositories approved by the SEBI viz., NSDL and CDSL. It has reduced the transaction cost, fastened the settlement and made the transactions more reliable, contrary to physical share trading.

The rising competition in the field of financial markets has made brokerage companies introduce and offer innovative services to their clients. Companies are providing technical, fundamental, and market-related information related to the particular company that is required to make informed investment decisions through websites and mobile-based trading platforms. Interactive technical charts provide real-time access to the price changes and market depth of particular stocks and indices. Investors can analyze the stocks based on the combination of different technical tools to make investment decisions using interactive technical charts. With the advent of smartphones, companies are developing mobile-based applications which are making trading more convenient, effortless, and handy. The investors will be given a user id and password using which they can place orders by themselves directly through the broker's website. These platforms also notify the investors with all the favourable and unfavourable activities of a company which affect their interest. Investors can now have the details of their portfolios like sector-wise investment, profit or loss, order execution etc., readily available to them. The Stop-loss

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etc., Brokerage companies started using their websites to provide price information and market movements. Fig(1) indicates that Internet-based trading is increasing year on year.

strategy can be used by the investors to limit the potential losses that can be occurred on a share. The applications now have an extended feature called GTT (Good Till Triggered) which means the investors can place orders at a limit price and the order will be active even if the price does not hit by the end of the day unlike, the earlier system which used to get cancelled if the price does not reach the set limit price. Below given fig(1) indicates that mobile and internet-based trading is gradually increasing with the passing years.

The stock market is known for its vulnerability and unpredictability. This can be attributed to the involvement of the human emotional quotient. As a major field of behavioural finance, it is highly dependent on the greed and fear of investors and these are the driving forces behind the price changes. This opened a wide scope for studies on market prediction. Researchers and investment practitioners have also found many technical tools which can work better for predicting the market. However, technological advancement has led to the employment of AI for more accurate stock predictions and faster trade executions. Concepts of Machine learning and Artificial Neural Networks are being used to simulate the human brain to understand and mark human behaviour in a particular situation and thus try to make the markets more predictable. These systems are capable of handling huge volumes of data and use historical price data and event information to make predictions. Investors can prepare their own models or a committee of models (combinations of different models) by adjusting specific parameters to seek trend-related information. Algorithmic trading which is popularly known as algo trading is trending now because of its data processing ability and executing trades at high speed. It is an automated trading system which uses a pre-defined set of rules for trading. Investors have to feed the trading instructions regarding the price, quantity, technical tools etc., The computer follows these instructions and executes the trade without any human

intervention as soon as the instructions are made good. For example, if an investor sets an instruction to buy 100 shares of ABC company if the Daily and Weekly RSI crosses above 70, the computer will automatically buy 100 shares of ABC company as soon as the daily and weekly RSI crosses 70. Algo trading can be understood just as an extension of limit orders. But the difference between these two is limit order uses only quantity and price parameters whereas the algo trading algorithms use combinations of technical tools along with the price and quantity. This is being adopted at a faster

The invention of DLT (Distributed Ledger Technology), Smart contracts and Blockchain technology is changing the way of trade execution out and out. Smart Contracts are self-executing programmes which will enforce the contracts on fulfilment of the terms and conditions mentioned thereof. They are used in the clearing and settlement of transactions in the stock market. Also, with the use of DLT transactions can be made more secure and cost-effective. DLT is a digital system which records the transactions along with their details at multiple places at the same time. This validates, secures and updates the transactions on a real-time basis. This is the reason the SEBI could adopt a T+1-day settlement cycle and now, it is planning to use blockchain for

automating pre-trading and post-trading activities in Indian Stock Market. In fact, SEBI has formed an advisory Committee on Financial and Regulatory Technologies (CFRT) to research the blockchain platform and other technologies that are used in fundraising, asset management and post-trade settlement. Blockchain technology can be used to make stock exchanges efficient through automation and decentralisation and

pace because of two reasons. One is, because the computer executes the trades automatically when the predefined criteria are met, there will be no room for human greed for “*some more profits*” or fear of “*What if the price goes still down?*”. The algorithms will stick to the trading rules set by the investors. Another important reason is, the processing speed of computers is more than human beings. So, they can execute the trades at a faster speed and can crack the deals at better prices than manual trades.

mitigate the need for a third-party regulator to an extent. The rules and regulations would be built within the smart contracts and can be automatically enforced and the post-trade transactions and transfer of legal ownership can be performed through the use of DLT.

The Robo Advisors are being developed for customising investment plans. “It is a digital platform that provides automated, algorithm-driven financial planning and investment services with little or no human intervention.” (Jake Frankenfield, 2023). These advisors work based on the information collected by the registered investor regarding the investment profile and risk tolerance ability of the investor and investment goals. The necessary information is collected through the questionnaires and then the robo advisors will prepare a customised investment schedule accordingly. These are programmed to work on a Modern Portfolio Theory where the portfolios are rebalanced in line with the set benchmark index. According to an article by Ashish Rukhaiyar in Business Today, there were nearly 80 Robo advisory Firms in India in 2021. In India, this industry is still in the gestation stage.

Figure 1: Graph showing the percentage of trades through different modes of trading in BSE



Source: BSE. (Compiled by the researcher)

B. Findings and Suggestions:

The concept of trading started in the 18th century in India. what was started by mere 22 stock brokers under a Banyan tree, is now a market worth of INR 2,61,81,064 crores. The establishment of SEBI as a regulatory body and its investor protection norms, rising financial literacy, technological innovation and emergence of technical tools have accelerated the market participation of individual investors in the Indian Stock Market. Further, these technological improvements have made the market more accessible and brought down transaction costs along with faster settlement cycles leading to the enhanced liquidity of the market. As a result, the share of individual investors has become 41.6% by the end of FY 2022 from 33% in FY 2016 (NSE Pulse). The study finds that the trades using Co-location services, Mobile platforms and Internet Based Trading are increasing year on year [fig(1)]. Also, the number of Demat accounts in August 2022 crossed 10 Crores, which is a 5x increase from the year 2018. NSDL and CDSL collectively added 22 Lakh new Demat Accounts in a single month of August 2022. Nevertheless, there is a wide gap between the number of Demat accounts and the active traders in the market. The ease of accessibility and simplified account opening process due to digitalization is another major reason for this increase. It is a good sign for the economy as it promotes capital formation.

Conclusion:

From the open outcry method to Algo trading, the Indian stock market and trading have come a long way. However, in a digitalised ecosystem, there is always a jeopardy of data infiltration, data stealing, data misutilization and technological glitches like connectivity and run-time issues. This will wake the need for the regulatory bodies to bring stringent regulations towards safeguarding investor interests in cyberspace as well. However, digitalisation has started just now and with the increasing number of internet users, individual investors are getting added day by day, this indicates the wider scope for growth of the stock markets. The adoption of the Blockchain, Smart Contracts and Distributed Ledger Technologies to their fullest extent would automate the trading and settlement procedures. This will modify the role of

regulatory bodies to some extent. Overall, digitalization has a positive impact on Indian Stock Market. Asset digitalization is the emerging concept in the stock market which is aimed at providing for fractional ownership and improved cross-border share transactions and security of the shares. This will lead to the metamorphosis of the stock market.

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