

Ticker Tape to Algorithms: Analysing the Digital Changeover in Stock Market Operations

Harjit Singh

Neighbourhood Campus Dehla Sehan, Punjabi University, Punjab, India

Abstract- Financial market made use of information technology to transform the market processes from manual to automation. It created opportunities as well as challenges. Numerous benefits are provided by this transformation such as faster trade execution more efficiency improved accessibility to financial markets. At the same time it increased liquidity and access to the trading platforms from anywhere in the world. Many risk such as volatility and systemic instability are also resulted to these Investments. The information technology will also affect the processes in the future of financial markets. New advancements such as Artificial Intelligence and blockchain will be used to make these markets more advanced. It will further re-shape the trading practices done by the investors to buy and sell securities. But it will also raise concerns about the transparency stability and fairness in the financial markets.

Keywords - Stock Market, Digitization, Ticker Tapes.

I. INTRODUCTION

The progress in Information and communication technology has impacted almost every field including entertainment, banking, businesses, government operations, education, hospitals and even agriculture. At the same time it impacted the operations of stock market to a large extent. The manual processes done in the stock market in the past are now converted to ICT based automated processes. It resulted in a very fast rate of transaction execution. The DMAT accounts provided digital storage of stocks purchased by the investors reduced the acquisition time from days to few seconds. Not only the stock market exchanges have adopted ICT advantages but also the traders and investors are also taking advantage of this fast growing technology. They can execute any buy or sell orders on their own even with a mobile phone. This resulted in a revolution like progress in the stock market operations.

II. THE BEGINNING WITH TELEGRAPHIC COMMUNICATION

In the beginning days of stock market the entire process was fully manual and in this way the process was very slow and time consuming. The very first stock market exchanges were dependent on manual transactions with face to face execution and ledgers made up of paper. Information related to the trade and stock prices was communicated with word to mouth physically and that process was very inefficient.

In the mid 19th century telegram was introduced which was a very faster technical step in those of stock market. Market transactions start communication over long distances in this way the information cost and time is reduced. Since the prices information started to transmit over other locations in real time it started expanding the market access. The first stock ticker was established in 1867 marked the next step in technical communication. This facility allowed the display of stock prices at major financial centers for easy access.

III. ELECTRONIC TRADING SYSTEMS

The process of manual to digital based stock market started in between 1960 and 1970. In the beginning days the use of computers was just to automate the manual task such as trade settlement and Record Keeping of trades and transactions. The New York stock exchange started to use the first computer system which they named NYSE automated system in 1960. It was the building block for digital processing of stock trades and it is a very first step towards making the stock exchanges fully digital by using computer systems.

The another big moment is the first fully electronics Stock Exchange where no physical trading floors were used, was started in 1971 called Nasdaq stock market. It was the first fully electronics Stock Exchange. It was the fully computerised environment that enabled the faster and efficient execution of transactions which resulted in the

extended investor base. It mark the milestone for the electronic stock markets in the world.

these algorithmic trading strategies was limited to institutional investors and hedge funds. They start to catch the small price moments in stocks and it result in the increase in liquidity of the stock market.

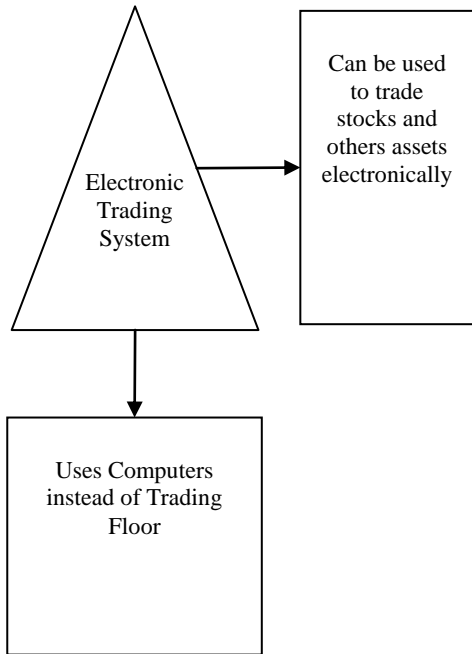


Figure 1. Electronic Trading System

IV. IT INFRASTRUCTURE ADVANCEMENTS

The use of information technology in the stock market increased at large extent in 1980 and 1990. The superdot system used in New York stock exchange was a major innovation in the development of electronic trading platforms. This system was able to send orders directly to the trading Floor by digital computer system with more speed in order execution and also reduced errors in the process.

Subsequently in 1990 internet was expanded and faster computers were developed to provide new ways for investors. New online brokerage platforms came in the way that allowed the investors to place orders and execute trades from anywhere such as E*TRADE, Charles Schwab Ameritrade etc. The invention of internet resulted in the increase of retail investors in the market at a huge extent.

Later in 1990 personal computers were wide spread used and internet speed was also increased which provided a way for algorithmic trading. More Complex algorithms with the help of mathematical models were developed. But the use of

V. HIGH FREQUENCY TRADING

Later in 2000 the stock market start a wave of high frequency trading with interaction of IT and automation systems. This high frequency trading made use of powerful computer algorithms so that large number of orders could be executed in part of second. It provided more liquidity in the market and hence reduction in the bid-ask spreads. The efficiency of the market increased, however market manipulation was also there. In 2010 flash crash occurred where the market crashed due to the fact of destabilizing of a fast trades.

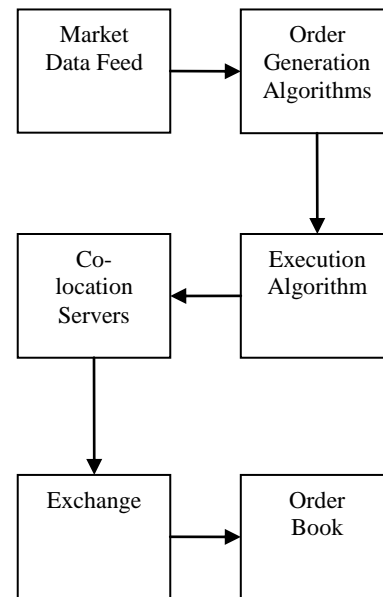


Figure 2. High Frequency Trading

VI. MARKET REGULATION

Since the financial markets became so complex the regulatory bodies start to introduce strict rules for monitoring the electronic trading systems. The commodity futures trading Commission and US Securities and Exchange Commission laid strict regulations to control the manipulation of trading and provide transparency in the stock market. In 2010 Dodd-

Frank Act was passed to regulate derivatives market and control high risk trading practices.

VII. STOCK MARKET BEHAVIOUR AND IT

The interaction of market participants and their behaviour is basically impacted by the information technology at the most. This behaviour includes the increase in the volume and speed of trading. The investors become able to buy and sell stocks much quickly and efficiently with the use of automatic automation in trading with high liquidity.

Market participants behaviour is much affected by the high frequency trading and algorithmic trading practices. These practices increased the market efficiency, reduced the trading costs. But at the same time raised new risks. For example the high frequency trading make use of market inefficiencies to take advantages. These practices increased the systemic risk with the use of trading algorithms because large scale trading and high speed execution could suddenly result in the price fluctuations and hence market crashes.

VIII. CONCLUSION

The introduction of Information Technology in the financial markets transforms all the processes which resulted in both the opportunities and challenges. Beginning from the manual trading systems to the atomic trading systems information technology provided so many advantages such as speed, efficiency, accessibility to the financial markets. This Technology and digitization provided large increase in liquidity and easy access to trading but also provided volatility and systemic instability risk to the financial market.

The information technology will continue to provide better services to the financial market and this process will continue to evolve. More robust Technology such as Artificial Intelligence and blockchain will further re-shape the share markets and trading practices. At the same time more strict rules and regulations will we needed to maintain that transparency stability and fairness in the financial environment.

- [1] Kumar, S., & Pathak, B. (2009). Impact of Information Technology on Financial Markets. *International Journal of Business and Management*, 4(8), 67-74.
- [2] Lee, C. M. C., & Ready, J. (2007). Inferring Trade Direction from Intraday Data. *Journal of Financial Economics*, 39(3), 413-441.
- [3] Biais, B., Foucault, T., & Moinas, S. (2012). Equilibrium Fast Trading. *Journal of Financial Economics*, 104(3), 444-464.
- [4] Warren, J. B. (2005). The Role of IT in the Evolution of Stock Markets. *Journal of Financial Services Research*, 28(1), 35-55.
- [5] Grossman, S. J., & Stiglitz, J. E. (1980). On the Impossibility of Informationally Efficient Markets. *American Economic Review*, 70(3), 393-408.
- [6] Chakrabarti, R., & Shah, M. (2005). The Role of Information Technology in the Evolution of Indian Stock Markets. *Economic and Political Weekly*, 40(25), 2499-2505.
- [7] Schwartz, R. A. (2000). The Evolving Role of Information Technology in Financial Markets. *Journal of Financial Markets*, 3(3), 147-170.
- [8] Hasbrouck, J. (2007). Empirical Market Microstructure: The Institutions, Economics, and Econometrics of Securities Trading. *Oxford University Press*.
- [9] Madhavan, A. (2000). Market Microstructure: A Survey. *Journal of Financial Markets*, 3(3), 205-258.