The advanced trading methods in the Financial Markets.
طرق التداول المتقدمة في الأسواق المالية

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Abstract

The technological development in trading carries a long history of achievements and inventions that contribute to emerge innovative methods. In this paper, we propose to describe in depth the advanced trading methods used in the Financial Market known now as *Algorithmic trading (AT)* and *High Frequency Trading (HFT)*. Our finding, is nowadays the financial markets have reached a high level in the way of trading by adopting the latest methods based on algorithms and the power of the computers, their main advantage is the trading at high speed and executing orders in millisecond. Moreover, the scope of the adoption of these methods was larger and faster. Again with a variety characteristics and features the advanced trading methods attract more traders and given them the topnotch strategies execution. These characteristics has led to promote the financial markets with more fairness and security.

Keywords: Advanced trading methods, electronic trading, algorithmic trading, high frequency trading.

ملخص

شهد التطور التكنولوجي في مجال التداول عدة محطات تاريخية توجت بمكاسب لم يسبق لها، والتي أدت إلى ظهور طرق وأساليب تتسم بالإبداع والحداثة. من خلال هذا المقال سيتم تقديم وصف دقيق لأحدث الطرق المعتمدة في التداول كالتداول عالي التردد. وقد تم التوصل إلى أن الأسواق المالية في الوقت الراهن ارتقت إلى مستوى أعلى في مجال التداول باعتمادها لأحدث الطرق كالاعتماد على الخوارزميات وقوة الحواسيب في تنفيذ مختلف الاستراتيجيات، وكسبها لسرعة عالية في تنفيذ الأوامر. علاوة على هذا فإن هذه الطرق كان لها قبول واسع وسريع ضمن جل المتداولين وهذا راجع أساسا إلى تملكها أرقى الميزات من حيث تنفيذ الاستراتيجيات داخل الأسواق المالية. هذه التشكيلة في النهاية ساهمة بشكل كبير في ترقية طابع العدل والأمان لمجال التداول عبر جميع الأسواق المالية العالمية.

الكلمات الدالة: طرق التداول المتقدمة، التنفيذ الالكتروني للأوامر، التداول الخوارزمي عالي التردد.

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Introduction.

"*Technology has revolutionized the way financial markets function and the way financial assets are traded*" (Hendershott, Riordan. 2009. P01).

The modern way of trading in financial market is the use of computer algorithms to analyze and detect market opportunities. After that, the traders execute their strategies electronically involving extremely fast order submissions, cancellations, and executions. The fastest traders now measure their latencies in microseconds. In recent years, High Frequency Trading (HFT) and Algorithmic Trading (AT) have been known as the most advanced trading methods used in the financial markets. In the beginning, they achieved a large spread in equity markets before they were adopted by the Foreign Exchange Market (FX market). In addition to their use by the broker-dealer markets, the advanced trading methods were also used at the customer level in the Financial Markets. Therefore, it is vital to understand clearly the essence of (HFT) and (AT), their modus operandi, their characteristics and the historical events that contributed to their expansion and adoption. Accordingly, we aims in this paper to describe the phenomenal of High Frequency Trading as the latest trading methods in financial markets and later on in this study, we will highlight the latest strategies used by High Frequency Traders and rating it performance. Moreover, we will expose the most important reasons of using algorithms in trading in financial markets.

We conduct our research by adopting the describing approach therefore; we propose this study the following main question:

What are the advanced trading methods used in Financial Markets?

To answer the main question, the following hypotheses were put forward:

1. The evolution of trading methods in financial markets is mainly due to the rapid technological development in its environment.

2. The use of computers and algorithms has contributed significantly to the emergence of new and effective trading methods in financial markets.

3. Algorithmic trading and High Frequency Trading are the advanced trading methods used actually in the financial markets.

The importance of this study resides in the fact that it attempts to enrich the theoretical understanding of the trading methods in Financial Markets in the Algerian university library by describing the latest and the most advanced

trading methods. Which uses the up to date technologies and merges the human strategies with the executing machines.

Literature Review.

Many studies and research have adopted the theme of trading in financial markets, which is due to the rapid technological development and the continuous pursuit by the traders in the markets behind the maximization of profits and the reduction of risks. Hendershott, Jones and Menkveld analyzed the impact of (HFT) on market quality. The results of their findings are, for large stocks in particular, (HFT) narrows spreads and reduces adverse selection. They concluded that (HFT) improves liquidity and enhances the informativeness of quotes. (Hendershott, Jones, Menkveld. 2011). Fabozzi, Focardi and Jonas discussed the state of the art of High-Frequency Trading, by using data generated by high-frequency traders (HFTers) and their impact on financial markets. According to the results of their studies, the high-frequency forecasting opportunities are different from those present at low frequency, so a new generation of trading algorithms have taken place within the financial markets. (Fabozzi, Focardi, & Jonas. 2011). Menkveld identified the trading strategy of a large (HFTers). He found that (HFTers) incurs a loss on its inventory but earns a profit on the bid-ask spread. Moreover, he showed that performance is very sensitive to cost of capital assumptions. (Menkveld. 2013). Brogaard, Hendershott & Riordan studied the role of (HFT) in price discovery. They found that (HFT) plays a positive role in price efficiency by trading in the direction of permanent price changes and in the opposite direction of transitory pricing errors (on average days and the highest volatility days). (Brogaard, Hendershott & Riordan. 2014). Chaboud, Chiquoine, Hjalmarsson and Vega, studied the impact of algorithmic trading (AT) in the FX market using a long time series of high-frequency data (HFD). They found that (AT) causes an improvement in two measures of price efficiency and the strategies of algorithmic traders being highly correlated. This correlation, however, does not appear to cause a degradation in market quality. (Chaboud, Chiquoine, Hjalmarsson & Vega. 2014). Goldstein, Kumar and Graves affirmed that the use of computers to execute trades, often with very low latency, has increased over time, resulting in a variety of computer algorithms executing electronically targeted trading strategies at high speed.

They described the evolution of increasingly fast automated trading over the past decade and some key features of its associated practices, strategies and apparent profitability. (Goldstein, Kumar & Graves.2014).

Methodology.

In order to describe the advanced methods of trading in Financial Markets, and the technological and economic environment that has promoted their development and expansion on a global scale, also define their characteristics, performance and attractive reasons for their uses, the following axes have been adopted:

1. The evolution of financial markets' business environment;
2. The advanced trading methods in financial markets;
3. High frequency trading strategies and types of execution algorithms;
4. Evaluation of High Frequency Trading in financial markets.

1. The evolution of financial markets' business environment.

The business environment of the financial markets has changed considerably over time. Since the mid-18th century, Methods of trading have seen amazing progress. Until the 1960's, the Trading was applied entirely manually (Agarwal. 2012). In this section, we aim to illustrate the evolution of the technology that was influenced the business environment of trading in financial markets at the ending of the 20th century and the first decade of this century.

1.1. The first evolution (1970-1980).

It was on February 8, 1971, the National Association of Securities Dealers (NASD) started its computer-assisted market making system for automated quotation (AQ) in the U.S., forming what is nowadays known as (NASDAQ). In Europe, the first computer-assisted equities exchanges launched their trading services in the 1980s, but not until the 1990s securities trading was organized in fully automated exchanges (Gomber, Arndt, Lutat, & Tim.2011). A few years later (in 1976), the New York Stock Market (NYSE) adopted the Designated Order Turnaround (DOT) system which permitted the electronic transmission of orders to buy and sell securities.

The 1980's witnessed the appearance of electronic trading (a computerized kind of securities trading involving variety of various portfolio trading ways). The traders who were using the electronic methods

were generally attracted to trade in S&P 500 equity shares and the futures exchange; this attraction gained a huge popularity.

1.2 The second evolution (1990-2000).

With the introduction of Electronic Communications Networks (ECNs) in the 1990's, electronic trading received a giant boost. An (ECN) allows people to trade and enter orders electronically of financial securities outside of regular exchanges. Thanks to this innovation, the Direct Access Marek (DMA) was created. (DMA) is the direct connection to financial market exchanges that makes completion of a financial market transaction final (Investopedia. 2018). Therefore since the 1990's, trading companies have progressively created investments into (ECNs), enjoying all the advantages they provide over ancient exchanges together with larger speed, potency, lower costs, and fewer manual errors. In 1998, in order to limit the monopoly enjoyed by NYSE and (NASDAQ) the (SEC) commission passed the Regulation Different Trading Systems, leading to the emergence of variety of other electronic trading platforms (Agarwal, Op. cit.). Electronic trading started to take flight after 1998, when the U.S. Securities and Exchange Commission (SEC) introduced regulations for Alternative Trading Systems (ATS), including electronic exchanges (Goldstein, Kumar, & Graves. Op. cit.). In the 2000s, faster hardware and the creation of high-level algorithms allowed computers to decide the pricing, timing and quantity of trades, and then execute orders electronically, which paved the way for Algorithmic trading (AT), and High-Frequency Trading (HFT). In September 3 2000, a merger of the stock exchanges of Brussels (Brussels Exchanges or BXS), Paris (Paris Bourse) and Amsterdam (Amsterdam Exchanges or AEX) founded *Euronext*. Where its first goal was to create scale, to enhance liquidity, transparency and price discovery resulting from the creation of a single order book and to realize cost savings, especially from investments in information technology (Geerings, Bollen & Hassink. 2003).

1.3 The third evolution (2001-2010).

On January 29, 2001, Both the New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX) switched to the decimal pricing system (The move to a decimal system in quoting bid and ask prices at \$0.01

increments) (Chou, Chung. 2006). In 2001, The Chicago Board Options Exchange (CBOE, is the largest U.S. options exchange, created in 1973) launches *Cboedirect*, a state-of-the-art electronic trading platform (cboe. 2018). In 2004, The MiFID (The markets in financial instruments directive) causes a profound upheaval within existing market structures, especially in trade execution and reporting market structures. MiFID supported an integrated, competitive and transparent European financial market. To care cross-border activities across European countries, MiFID provides a common, harmonized set of rules for the provision of investment services in each of the European Union (EU) member states (Petrella. 2010). In addition, the most important impact of MiFID in financial markets was the enhancing of trading methods, where traders will rely more on smart order-routing systems to provide best execution. (MiFID) has been in effect in November 1, 2007 (Casey, Lannoo. 2006). One year later, in June 2005 the (SEC) adopted the Regulation National Market System (Petrella. Op. cit.). This regulation looks to improve the U.S. exchanges through improved fairness in price execution as well as improve the displaying of quotes and amount and access to market data. (Investopedia. 2018). On December 6, 2005. The NYSE merge with Archipelago (is the first ECN's, created in 1996), It began trading under the name NYSE Group on March 8, 2006. A little over one year later, on April 4, 2007, the NYSE Group completed its merger with Euronext, the European combined stock market, thus forming NYSE Euronext, the first transatlantic stock exchange. In January 24, 2007, all NYSE stocks can be traded via its electronic hybrid market (except for a small group of very high-priced stocks). Customers can now send orders for immediate electronic execution. In the first three months of 2007, in excess of 82% of all order volume was delivered to the floor electronically (Wikipedia. 2018). In the same year 2007, The Chicago Board Options Exchange (CBOE) introduces *CFLEX*, an Internet-based trading system for *FLEX* options, and *Direct EDGE* (ECN) was created as an independent company, and then it merged with the stock exchange arm of the International Securities Exchange (ISE) in August 2008. Thereafter On Dec. 23, 2008, (ISE) became a wholly owned subsidiary of Direct Edge Holdings and gained a significant equity stake in Direct Edge (marketswiki. 2018). In 2007-2008, Smart Order Routers (SOR) proliferated in Europe, their sole

purpose consisting in capturing liquidity on lit venues, or doing an aggressive or a passive split, depending on the market data. Later the SOR systems were enhanced to cope with High Frequency Trading, to decrease latency and implement smarter algorithms, as well as work with dark pools liquidity (Wikipedia. 2018).

2. The advanced methods of trading in financial markets.

After the rapid development of the trading environment within the financial markets, traders now can use modern technologies with exceptional characteristics. The use of the Internet, algorithms and the speed of computers have given a new dimension to the trading in financial markets. In this section, we would present the latest advanced forms of trading methods in financial markets known now *The High Frequency Trading*. As a subset of *Algorithmic trading*. Later on this part we enumeration their definition, specific and common characteristics

2.1. Algorithmic Trading (AT).

2.1.1. Algorithmic trading (AT) definition.

Many academic researchers tried to explain the phenomenon of Algorithmic Trading. Hendershott and Riordan, defined (AT) as the use of computer algorithms to automatically execute trading decisions, submit orders, and manage those orders after submission (Hendershott, Riordan. 2009). Prix, Loistl, and Huetl described the (AT) as the computerized trading controlled by algorithms (Prix, Loistl & Huetl. 2007). Chaboud, Chiquoine, Hjalmarsson, and Vega called the direct action doing by computer algorithms the "Algorithmic trading", where computers directly manage the trading process at high frequency, and interface with trading platforms, placing orders without immediate human intervention (Chaboud, Chiquoine, Hjalmarsson & Vega. 2014). Domowitz, and Yegerman, generally define algorithmic trading as the automated, computer-based execution of orders via direct market-access channels (Domowitz, I., & Yegerman, H. 2005). Brownlees, Cipollini and Gallo, clarified the definition of algorithmic trading as a set of algorithms, this algorithms are designed to enhance order execution by strategically submitting orders, moreover with limited (if any) human judgment and intervention (Brownlees, Cipollini & Gallo. 2010). Foucault, Kadan, and Kandel proposed the definition of (AT) as the automation of monitoring and orders submission (Foucault, Kadan &

Kandel. 2013). However, the European Commission defines the (AT) as the use of computer programs to enter trading orders, where the computer algorithm decides on aspects of execution of the order such as the timing, quantity and price of the order (EU Commission. 2010).

Based on previous academic definitions, we propose our definition of Algorithmic Trading hereafter:

Algorithmic Trading is the outcome of merging between algorithms and computers this result gathering the different traders' strategies that must be executed automatically and via electronic trading system.

2.1.2. Algorithmic trading (AT) Characteristics.

(AT) contains many characteristics that seek to achieve intelligent execution of orders in order to minimize the impact of the market. These characteristics are as follows (Gomber, Arndt, Lutat, & Tim. Op. cit.):

1. Agent trading (substitution of human trader).
2. Minimize market impact (for large orders).
3. Goal is to achieve a particular benchmark
4. Holding periods possibly days/week/months
5. Working an order through time and across markets

2.2. High Frequency Trading (HFT).

2.2.1. High Frequency Trading (HFT) definition.

In General HFT is a subset of Algorithmic Trading, see *Figure1*.

Figure 1: HFT Position in total trading.
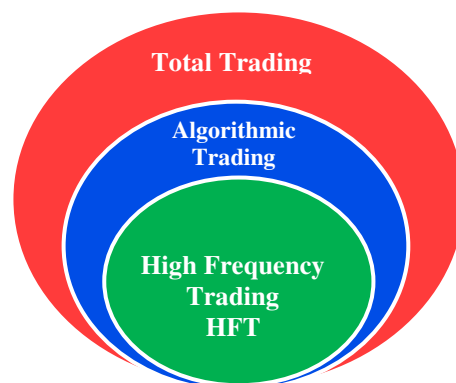
Source: Authority for the Financial Markets (AFM) (2010). P14.

Iren Aldridge defined High Frequency trading (HFT) as all activity utilizing fast algorithmic execution. This Algorithmic activity can make decision, initiate and generate orders. It executes each individual transaction without human direction. Moreover, (HFT) is designed with low-latency technology that minimize response times, and the implementation of their strategy needs to be in proximity and co-located with the markets, that provide high speed connections for order entry; and high message rates (orders, quotes or cancellations) (Aldridge. 2013). Jovanovic & Menkveld, indicated in their study, that High Frequency trading (HFT) is the use of the computer algorithms, to automate trading decisions at high speed (Jovanovic, Menkveld. 2016). In addition, Cvitanic, Kirilenko, Andrei, 2010, claimed that HFT is typically referred to trading activity that employs extremely fast-automated programs for generating, routing, canceling, and executing orders in electronic markets (Cvitanic & Kirilenko. 2010). Moreover, the regulatory side of the financial markets gave his own interpretation of the High Frequency Trading in many issues. In 2010, the (SEC) said: "*The term is relatively new and is not yet clearly defined*", and describes it as a method generally used by professional traders acting in a proprietary capacity that engage in strategies that generate a large number of trades on a daily basis (Securities and Exchange Commission.2010). In the same year, the European Commission specified High Frequency Trading as a type of automated or algorithmic trading but not a strategy in itself, and added in its description that (HFT) use of very sophisticated technology to implement traditional trading strategies. Although the Commission debated about the final definition of (HFT), it proposed that (HFT) can be best defined as trading that uses sophisticated technology to try to interpret signals from the market and, in response, executes high volume automated trading strategies (EU Commission. 2010). However, the definition of HFT still attract more regulatory agency, like the Authority for the Financial Markets (AFM). In 2010, AFM defined (HFT) as a form of automated trading based on mathematical algorithms, but is not a trading strategy in itself (AFM. 2010). After this brief presentation about the definition of High Frequency Trading from several sources, we suggest our general definition of HFT as follow:

High Frequency Trading is a subset of Algorithmic Trading; it uses a very sophisticated technology to implement traders' strategies at a high-speed level, electronically and without human' intervention.

2.2.2. High Frequency Trading (HFT) Characteristics.

The U.S. Securities and Exchanges Commission (SEC) attributes to (HFT) certain specific characteristics, including (Agarwal, Op. cit.).

1. (HFT) uses an extremely sophisticated and high-speed computer programs for creating, transmitting, and implementing orders.
2. (HFT) minimizes network and other types of latencies by using the individual data feeds from exchanges as well as co-located servers in order.
3. (HFT) establishes and liquidates position in a very short timeframes resulting in the frequent turnover of many small positions in one or more financial instruments.
4. (HFT) Submits and cancels a number of orders submission, maintaining very few, if any, overnight positions.
5. (HFT) traders typically use their own capital investment, design many strategies and generate a huge number of trades every day.

2.3 Common Characteristics of AT and HFT.

On the other hand, there are common characteristics between AT and HFT, which seek to reduce market risk, these characteristics are as follows (Gomber, Arndt, Lutat, & Tim. Op. cit.):

1. Pre-designed trading decisions.
2. Used by professional traders.
3. Observing market data in real-time.
4. Automated order submission.
5. Automated order management.
6. Without human intervention.
7. Use of direct market access.

3. High frequency trading strategies and types of execution algorithms.

There are many different strategies to profit from (HFT) and the trader can use it despite their own nuances and complexity. We will reveal some of the most popular (HFT) strategies in the following sub-section (Markets Committee. 2011, Agarwal, Op. cit.).

3.1. High frequency trading strategies.

There are many strategies used in financial markets but most of them to be performant and productive it must be coupled with algorithmic programs, therefore in the recent years many traders has developed such as strategies, they performed, tested and adapted it to be more competitive and profitable. here after we denote six type of strategies most used in markets:

3.1.1.Market making strategy: With this strategy, firms make money on the bid-ask spread.

3.1.2.Liquidity providing: This strategies aim to identify order book discrepancies for a particular currency pair and pricing imbalances across trading platforms.

3.1.3.Statistical Arbitrage: With this strategy, (HFTers) aim to make profits from market arbitrage by exploiting momentary inconsistencies in factors such as rates, prices and other conditions between different exchanges or asset classes.

3.1.4.Momentum Ignition: This strategy includes the initiation and cancellation of numerous orders of certain security (in a particular direction) which may trigger a rapid market price movement. The fast execution of this orders leads to attraction of other traders' algorithms resulting in buying or selling the security.

3.1.5.Leveraging Structural Differences: Through this strategy, some (HFTers) obtain market data earlier than other participants who receive consolidated data feeds by leveraging co-location arrangements with exchanges or by receiving individual data feeds from many ECNs and exchanges. Therefore, they take advantage of their faster access to data and they execute orders accordingly.

3.1.6.Complex event processing: With this strategy, (HFTers) aim to detect profit opportunities by including a number of different strategies with different properties of currency prices.

3.2 Type of Algorithms used for trading strategies implementation.

There are many type of algorithms used in trading, which will implement different strategies of traders within the financial markets, and these types are in the following:

1. Percentage of Volume (PVOL) Algorithms.
2. Time Weighted Average Price (TWAP) Algorithms.
3. Volume Weighted Average Price (VWAP) Algorithms.

4. Implementation shortfall algorithms (IMSH) Algorithms.
5. Adaptive Algorithms.
6. Liquidity Seeking Algorithms.
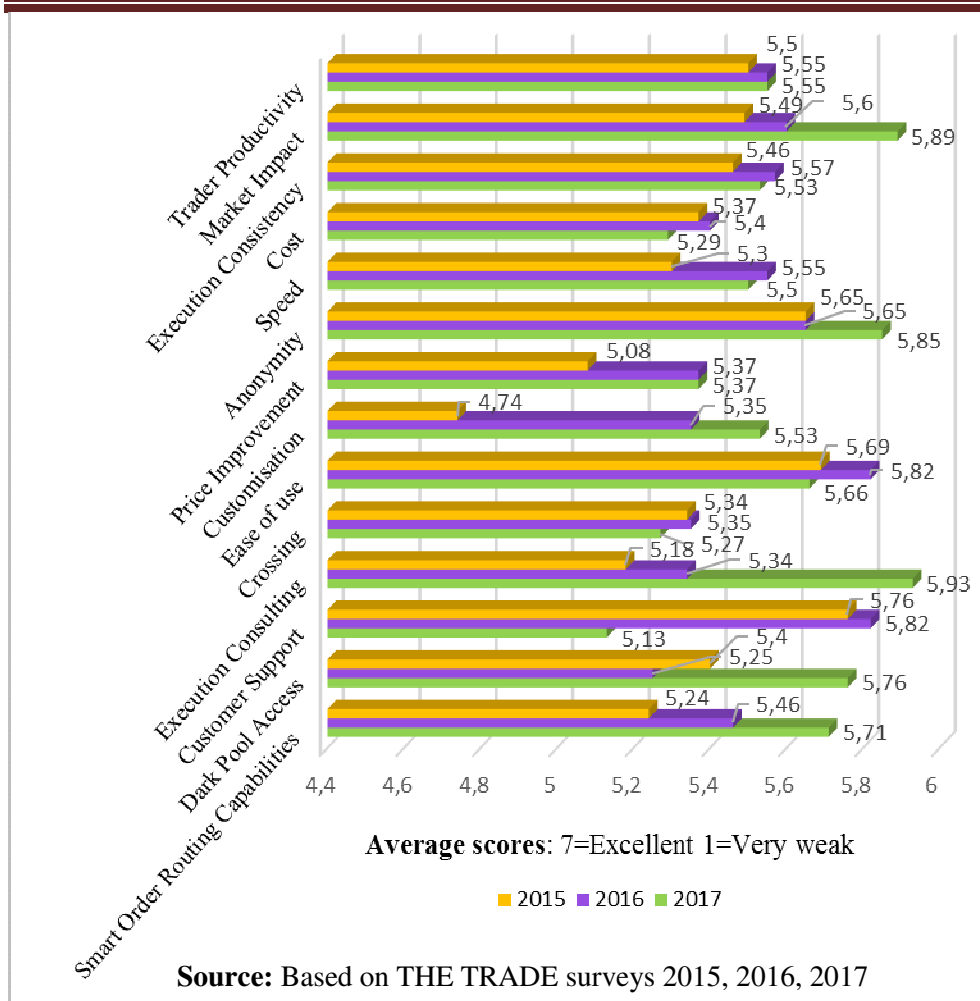7. Newsreader Algorithms.

4. Evaluation of High Frequency Trading in financial markets.

In this section, we will propose two approach for evaluating the High Frequency Trading In financial markets, the first one, is exposing of the average rating of (HFT) features provided from the survey results conducted by the TRADE Magazine. The second one is highlighting the most relevant reasons that attract traders for using Algorithmic-trading programs to implement their strategies in markets.

4.1. High Frequency Trading performance.

Beginning with the average ratings the traders have given their algorithm providers, *Figure 2* reveals some interesting developments in 2017. We can see that both market impact and anonymity have risen up the list in 2017. Market impact received the second highest average score at 5.89 while anonymity followed close behind with the third highest average score of 5.85. There are a couple of potential reasons for this. Many brokers have in recent years been censured by regulators for failing to properly protect their clients' order information and for indulging HFT firms over their clients. The effect could be that they are taking more care to ensure they properly protect client order information as much as possible, due to pressure from both clients and regulators. However, the area which received the highest score was execution consulting. A relatively new term in the investment bank lexicon, execution consulting is essentially the process of helping clients to better understand their execution process and outcomes, analyse all the transaction cost analysis (TCA) data their receive, and use that knowledge to achieve the best possible execution. Again, regulatory and client pressures are thought to be largely responsible.
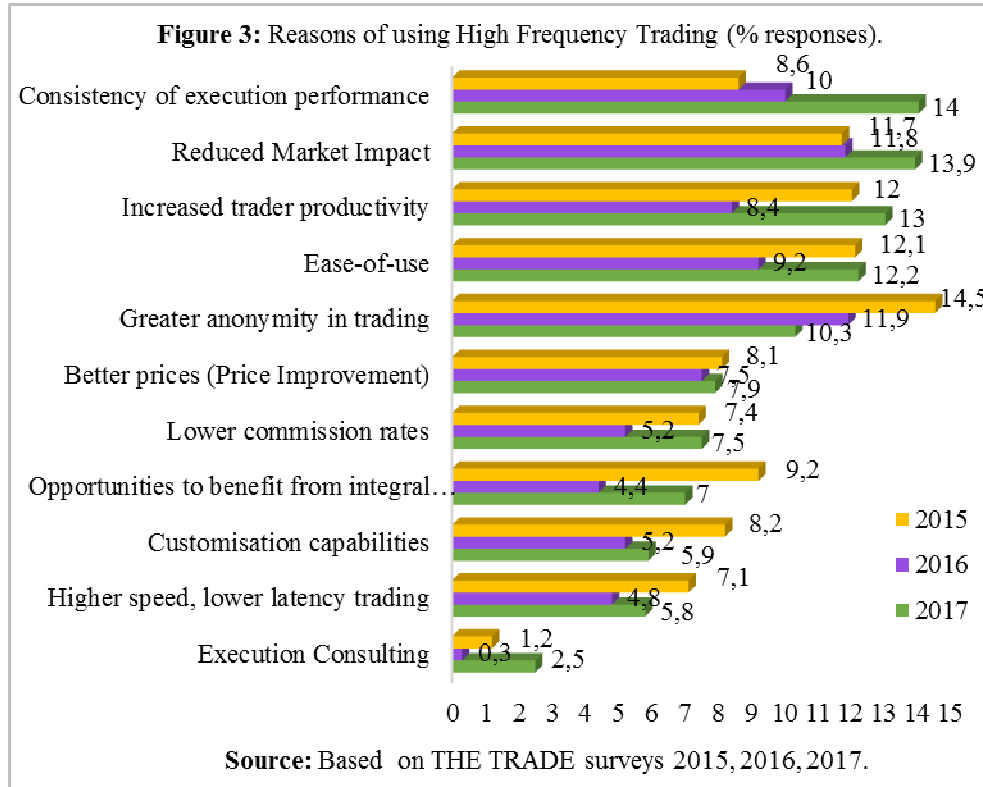
Figure 2: Average score by product feature

Average scores: 7=Excellent 1=Very weak

■ 2015 ■ 2016 ■ 2017

Source: Based on THE TRADE surveys 2015, 2016, 2017

4.2. Reasons of using High Frequency Trading.

Accordingly, we can observe through *Figure 3* the results of the survey conducted by the TRADE Magazine about the most important reasons of using algorithm in trading, when the area which topped was "consistency of execution performance" which was one of the lowest priorities back in 2015. Again, a regulatory focus on ensuring the buy-side achieve best execution from their clients is altering industry behavior and increasing the need of firms to develop a more consistent and professional approach to their trading activity. Reducing market impact has always been a highly valued feature of algo usage and is becoming even more important it seems, with 13.9% citing this as their reason for using algorithms, while increased

trader productivity, which dipped in 2016, has returned to being one of the key reasons to use automated trading.

Figure 3: Reasons of using High Frequency Trading (% responses).

Reason	2015	2016	2017
Consistency of execution performance	8,6	10	14
Reduced Market Impact	11,7	11,8	13,9
Increased trader productivity	12	8,4	13
Ease-of-use	12,1	9,2	12,2
Greater anonymity in trading	14,5	10,3	11,9
Better prices (Price Improvement)	8,1	7,5	7,9
Lower commission rates	7,4	5,2	7,5
Opportunities to benefit from integral…	9,2	4,4	7
Customisation capabilities	8,2	5,2	5,9
Higher speed, lower latency trading	7,1	4,8	5,8
Execution Consulting	0,3	1,2	2,5

Source: Based on THE TRADE surveys 2015, 2016, 2017.

Areas of declining significance include the ability to trade at speed. While 7.1% cited this as their main reason for using algos in 2015, just 5.8% think it important in 2017. This perhaps reflects technological advances meaning that, in most instances, the speed at which algorithms can help trade has reached its apex. The benefits of internal crossing have also fallen down the priority list, with just 7% citing it this year, up from 4.4% last year but down from 9.2% in 2015.

5. Conclusion

As a conclusion, one can say that the technological development in trading carries a long history of achievements and inventions that contribute to emerge innovative methods. Since the early 21st century, these methods have grown and were able to adopt with the economic conditions. The

traditional trading methods in the past were natural and simple. They reflected traders' desires and ambitions. They made them experience the feelings of winning and losing. However, presently, the current trading methods are more innovative and more developed ones. They are free from feelings and fears; apply orders without hesitation whatever are the results. These methods are the Algorithmic trading and the High Frequency Trading, they represent the advanced face of trading methods. Their main advantage is the trading at high speed and executing orders in millisecond. Moreover, the scope of the adoption of (HFT) was larger and faster. With a variety characteristics and features (HFT) attract more traders and given them the topnotch strategies execution. These characteristics has led to promote the financial markets with more fairness and security.

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