

**STRATEGIES ADOPTED BY NAIROBI SECURITIES
EXCHANGE IN THE ESTABLISHMENT OF AUTOMATED
TRADING SYSTEMS IN KENYA**

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DECLARATION

This research project is my original work and has not been submitted for examination in any other university.

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DEDICATION

I dedicate this research project to my husband Geoffrey Rotich, my sons Elvis Kipkirui and Ethan Kiplangat and my dear parents Marcelly Lelei and Celline Lelei for their tireless effort and moral support during my studies.

ABSTRACT

This study was carried out to examine the strategies adopted by Nairobi Securities Exchange (NSE) in establishment of automated trading systems (ATS). The study was based on the rationale that adoption of automated trading systems does not only revolve around the benefits associated with the systems, but also the extent to which the organization is able to integrate the other factors such as human resources to the process of adoption. As such, the study therefore sought to answer the question of the extent to which strategies used to adopt automated trading systems had affected trading performance at NSE. This was in hope that the study would benefit the NSE management on addressing any challenges associated with the adoption of automated trading systems, and contribute the existing knowledge on technological research. The study used a descriptive research design. The study population was composed of top, middle and lower level of managers at NSE who were purposively selected to participate in the study. Both secondary and primary data were used in the study. Secondary data provided information of performance of NSE for different economic sectors in terms of the amount of shares traded before and after the introduction of automated trading systems. Primary data provided information on manager's view on the performance of trading at NSE since and strategies used in the adoption of automated trading systems. Both quantitative and qualitative techniques were used to analyse data and draw inferences from the study finding. A multiple regression model was used to establish whether there was any significant relationship between adoption strategies and trading performance. Test of significance was done at 95% confidence level. The study findings indicate a large discrepancy in the traded shares before and after the introduction of automated trading systems. A positive relationship was found between strategies used in the adoption of ATS and trading performance. Use of strategies such as staff training, practical demonstration, capacity building and continuous improvement would increase trading performance by coefficients of 0.213, 0.920, 0.69 and 0.65 respectively. The study established that there would be a 56.2% change in trading performance as a result of strategies used in the adoption of automated trading systems. The study recommended that NSE management continuously adopt new technology to enhance efficiency in the performance of automated trading systems, integrate different strategies so as to ensure effective adoption of new or efficient use of the existing technology and increase level of stringency as far as monitoring the trading practice is concerned. The organization could do so by increasing penalty or sanctions associated with malpractices. Further study should be carried out on the factors affecting the efficiency of automated trading systems at NSE, examine the relationship between employee training and their performance in the use of automated trading systems and the challenges affecting use of automated trading systems in the quest to readress the professional malpractices that arise from the use of Automated trading systems.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Securities markets enable firm to easily raise finance, while ensuring efficient capital allocation in an economy. They also contribute to price discovery, provide liquidity, assist in risk transfer, facilitate corporate governance, and a measure of company performance. Financial economists, investment managers and market regulatory authorities are concerned with the efficiency of securities markets because the ability of these markets to perform their critical functions depends on their level of efficiency. To this end, the development of technology has over the last decade changed how security markets operate as firms have put their trust in computer algorithms that receive, analyse and automate the trading process referred as Automatic trading (Beunza,2013). Menkveld (2011) posits that automated trading improves liquidity and makes markets more efficient. The Toronto Stock Exchange (TSE) for instance, has automated its operations through the use of an electronic trading system.

Advocates of automation suggest that execution of trades is faster and less costly under computerized trading systems. Brogaard (2010) concurs that automated trading contributes more to price discovery, mitigates volatility, reduces transaction costs for all market participants, narrow the bid-ask spreads and help unlock adverse selection problems in markets. However, this depends on the strategies of implementation, analysis and execution of automated trading system. Strategies of implementation are the ultimate

source of competitive advantage given innovation's rapid pace which the government and exchange regulation can hardly keep up with. With proper strategies used by NSE in introducing automated trading systems ethics can fill the gap between where innovation is and where governmental regulations and exchange rules suppose it to be. However, innovation's pace leaves little time for ethical reflection. As a new body of knowledge, strategies used by NSE in introducing automated trading systems to enhance ethical practices in Kenya is thus critical. Thus, no code addresses ethical responsibilities in automated trading. With regard to the latter, Boatright (2010) underlines that people believe that the task of creating and enforcing ethical rules and standards is the job of legislatures and regulators, not themselves.

NSE should therefore adopt strategies to enhance ethical practices which play a very important role in improving the operations of the market especially in the areas of efficiency, transparency and regulation. This is because a Stock Exchange that is considered as efficient and transparent naturally attracts investors, both domestic and foreign, and wins their confidence. This investors' action makes the Stock market to increase in size and in the number and quantity of securities dealings. Among the strategies suggested and implementation under automated trading systems include trade alert systems, automating the share depository, clearance and settlement system, automating the share trading system, institution of the broker back office system and installation of the automated market surveillance system. In Kenya none of the research has been done focusing on strategies used by NSE in introducing automated trading systems to enhance ethical practices. This therefore underlines the need to undertake this

study which will seek to establish the strategies used by NSE in introducing automated trading systems to enhance ethical practices in Kenya.

1.1.1. Concept of Strategy

Johnson and Scholes (1999) define strategy as the direction and scope of an organization over the long term which achieves advantage for the organization through configuration of resources within a changing environment, to meet the needs of markets and fulfil shareholders expectations. The real issues of strategy are competitive strategies and thinking strategically. Strategic decisions are based on four factors comprising of products and services, customers, market segments and geographical areas (Robert, 1993). According to Grant (2012), a company must provide products and services at low cost, while also innovating; it must deploy the massed resources of a large corporation, while showing the entrepreneurial flair of a small start-up; it must achieve high levels of reliability and consistency, while also being flexible. Strategy is an engagement between external opportunities and internal strengths, including resources and capabilities (Mintzberg, 2005).

Porter (2004) states that many firms prefer to concentrate on increasing operational excellence and making operative adjustments in a reactive manner. Operational excellence may decrease costs, improve quality and shorten lead times, but only a strategy can lead to sustainable success (Kaplan and Norton 2008; Mintzberg et al. 2005). Johnson and Scholes (2006) define strategy as the direction and scope of an organization over long-term which achieves advantages for the organization through its configuration of resources within a challenging environment, to meet the needs of markets and to fulfill stakeholders expectation.

1.1.2. Implementation of Strategy

Putting strategy into action is seen as an extension of the planning process: a strategy is first formulated and then it is implemented (Johnson, 2003). Firms offer different technologies for trading, including traditional floors and computerized auctions embodying automated trade execution (Arnold, 1999). Strategy implementation involves the process of seeing what it will take to make the strategy work and to reach the targeted performance on schedule. Strategy implementation involves the process of seeing what it will take to make the strategy work and to reach the targeted performance on schedule. This is because fitting the way the organization does things internally is what it takes for effective strategy execution and what enables the organization to deliver their strategy successfully. Strategy implementation is the most significant management challenge which all kinds of corporations face at the moment.

The survey of Strategy Implementation of Chinese Corporations in 2006 indicated that 83 percent of the surveyed companies failed to implement their strategy smoothly, and only 17 percent felt that they had a consistent strategy implementation process (Yang L., 2008). In congruence, Corboy (1999) asserts that nearly 70 percent of strategic plans and strategies are never successfully implemented. There are many factors that influence the success of strategy implementation, ranging from the people who communicate or implement the strategy to the systems or mechanisms in place for co-ordination and control, weak management roles in implementation, a lack of communication, lacking a commitment to the strategy, unawareness or misunderstanding of the strategy, unaligned organizational systems and resources, poor coordination and sharing of responsibilities,

inadequate capabilities, competing activities, and uncontrollable environmental factors (Galpin,1998), Beer and Eisenstat, (2000).

1.1.3 Automated Trading Systems

According to Viet (2007), automated trading systems (ATS), is a computer program that creates orders and automatically submits them to a market centre or exchange. Automated trading systems are often used with electronic trading in automated centres, including electronic communication networks and automated exchanges. Automated trading platforms can execute repetitive tasks at speeds with orders of magnitude greater than any human equivalent (Fitchen, 2013).The use of Automated Trading systems can partly be explained as a technological revolution in stock that is relatively new but growing in popularity (Aldridge,2009). These often innovations occurring among governments and seen as a key factor for new employment opportunities and leading the country's economy close to its optimal level (Carlbon, 2008). Perhaps as a result of improvements expected as a result of new technology, Rogers (2003) indicates that organizations often possess a pro- innovation bias by neglecting to see the downsides of an innovation and hence rejecting or discontinuing developments even if it should be done.

Different perceptions revolve around innovations based on the viewpoint. For instance, an increase in effectiveness often results in increased profitability which is found positive among shareholders. However, it also implies decrease in resource commitment and employees needed (Rothwell, 1994). These kinds of effects may affect individual departments and business units negatively. This implies that an inherent resistance towards adoption and diffusion of the innovation among employees who find their

employment or work tasks at risk. One could therefore question if the negative impacts the innovation has on employees who actually implement the innovation creates an added resistance, thereby production efficiency that in turn lowers performance.

1.1.4 Importance of Automated Trading Systems

Use of automated trading system has been associated with various benefits. According to Aldridge, (2009), the largest benefits of automated trading system is that it alleviates the downside and combines the benefits of other forms of trading. Alexa, (2012) indicated that The adoption of Automated trading systems has contributed to shifts in market structures being seen across the world (Asea,2003). These shifts are in turn affecting fortunes of many participants. Automated trading systems add value to the stock market by bringing efficiency. Among the benefits of automated trading system include; alleviation of continuous monitoring of the computer to operate, which gives the trader more free time to improve his strategies or create new one.

It eliminates classic psychological errors derived from human factor to stretch on losing operations hoping they will go back up, robots manage automatically and intelligently the entering of operations, take profits, stop losses, trailing stops, pending orders and closing of orders, diversification these can be designed and applied simultaneously in different symbols because the trader doesn't need to monitor several charts at the same time, this could be impossible for him especially if the charts contain indicators.

Buy and sell signs are clear and not contaminated by the human eye. Appropriate money management strategies can be set to reach investment's goals. The trader decides when to activate a robot and when to deactivate it, as well as he can only run one of its parts (buy

or sell) depending on his needs at the time. Without a doubt, automated trading is a treasured alternative for investors and discretionary traders who don't want to miss a chance in the market. Until now, a trader could not study the market so fast and extensively and enter orders right on time; in the exact millisecond a condition takes place.

1.1.5 Nairobi Stock Exchange

In Kenya, dealing in shares and stocks started in the 1920's. There was however no formal market. Trading took place on a gentleman's agreement in which standard commissions were charged with clients being obligated to honor their contractual commitments of making good delivery, and settling relevant costs. At that time, stock broking was a sideline business conducted by accountants, auctioneers, estate agents and lawyers who met to exchange prices over a cup of coffee. In 1951, an Estate Agent by the name of Francis Drummond established the first professional stock broking firm. In 1954, the Nairobi Stock Exchange was constituted as a voluntary association of stockbrokers registered under the Societies Act. Since Africans and Asians were not permitted to trade in securities, the business of dealing in shares was then confined to the resident European community (Ngugi, 2005). Subsequent development of the market has seen an increase in the number of stockbrokers, introduction of investment banks, establishment of custodial institutions and credit rating agencies and the number of listed companies have increased over time.

Securities traded include, equities, bonds and preference shares (NSE, 2012). In September 2006 live trading on the automated trading systems of the Nairobi Securities Exchange was implemented. In July 2007 NSE reviewed the Index and announced the

companies that would constitute the NSE Share Index. The review of the NSE 20-share index was aimed at ensuring it is a true barometer of the market. In 2008, the NSE All Share Index (NASI) was introduced as an alternative index (NSE, 2012). Its measure is an overall indicator of market performance. The Index incorporates all the traded shares of the day. Its attention is therefore on the overall market capitalization rather than the price movements of select counters.

The Nairobi Securities Exchange marked the first day of automated trading in government bonds through the Automated Trading System (ATS) in November 2009. The automated trading in government bonds marked a significant step in the efforts by the NSE and CBK towards creating depth in the capital markets by providing the necessary liquidity (NSE, 2012). The ATS system has the capability to facilitate internet trading which has also improved the integrity of the Exchange trading systems facilitating greater access to our securities market (NSE, 2012).

1.2 Research Problem

The world of trading has become entirely electronic and automatic. This sets the bar for quality extremely high when considering the amount of money circulating in the financial market. With the evolution of automated trading there is a need to expand the role of ethics in security trade beyond the domain of money managers and intermediaries as only ethics can fill the gap between where innovation is and where governmental regulations and exchange rules suppose it to be. To this end, the issue of how automated trading is enhancing ethical practices in the security market is pivotal though no code addresses ethical responsibilities in automated trading. One of the problems in security markets is that people believe that the task of creating and enforcing ethical rules and standards is

the job of legislatures and regulators, not themselves (Boatright, 2010). Moreover, automated trading systems lack human judgment despite the fact that their consequences can be unethical because it brings together members from different professions, but no one automatically or routinely takes responsibility for the consequences of their joint activity (Moor, 2006).

Ramaswamy (2009) point out that automation enables unethical behavior and, furthermore, simplifying it by obscuring its source. According to Asea, (2003) the unprecedented growth of Nairobi Securities Exchange has led to new challenges. Among these challenges is diminishing level of professionalism among stock brokers as well as governance malpractices. Mukumu (2009) further underlines that the image of the local stock market has been battered by revelations that brokers have been manipulating client accounts and entering into transactions with their clients' money illegally. This has violated the widely held preposition that, participation in any stock exchange is based on ethical practices including perceived trust, confidence, reliability, accountability, transparency and governance of brokers, NSE, and other players. Though the importance of technology has been largely focused as an important prerequisite in the performance of the stock markets, concerns have been raised over market abuse as a result of technological revolution. This in other parts of the world has been found to destabilize the same markets that they are meant to improve including Knight Capital Group which lost \$440 million in less than thirty minutes (McCrank, 2012).

In the Kenyan context, little if any research has discussed the effect of automated trading in enhancing ethical practices of security trading at Nairobi Security Exchange. It is thus

against this background that the study will seek to examine the strategies used by NSE in introducing automated trading systems to enhance ethical practices in Kenya. In fact, Hendershott (2011) have maintained that the effect of changing automation within a market is an important and understudied area. This study sought to answer the question, answer the following questions: To what extent has automatic trading system enhanced ethical practices in NSE? What is the relationship between ATS strategies and Ethical performance at NSE?

1.3 Research Objective

The objective of this study was to examine the strategies used in the adoption of automated trading systems at NSE.

1.4 Value of the Study

The study was based on the rationale that there have been rapid developments and applications of new technology at NSE. This coupled with increased complexity of financial trading and markets make it difficult to understand the effects of strategies used in introducing Automated Trading Systems on enhancing ethical practices. This observation in the Kenyan context is coupled with ethical challenges faced in Nairobi securities exchange, with concerns being raised over market abuse as a result of technological revolution including scandals involving companies listed at the Nairobi Securities Exchange, boardroom wars which have resulted to negative publicity that has adversely affected investor's perception of listed companies, corporate governance issues and falsification of financial information. This study was thus being expected to benefit

the management of NSE in addressing ethical problems associated with Automated Trading Systems.

The government is likely to benefit from the study with regard to regulatory policies in the wake of increasing trend in technological adoption. This is particularly important as the government of Kenya seeks to enhance the integrity of auditing and reporting standards, strength of investor protection and the protection of minority shareholders. A report by Government Office for Science (2012) indicates that there has been lack of research evidence to inform the development of new regulations as a result of time lag between rapid technological developments, research into effects, comprehensive and consistent data.

The study formed a basis of reference for future scholars doing studies in similar area. This study was expected to provide the researcher with practical skills on solving problems through research. Future scholars would use this study as a point of reference to similar research problems.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides literature on strategies used by NSE in introducing automated trading systems to enhance ethical practices in Kenya Nairobi securities exchange. The chapter has been sectioned into; theoretical review, trading trends in securities markets, ethical performance at NSE, relationship between ATS strategies and ethical performance and empirical review.

2.2 Theoretical Review

Implementing adequate Automation strategies is essential for increasing activity and management efficiency within an organization. The implementation of automation strategies to the organization's characteristics and goals is indispensable for increasing its efficiency in specific activities and management. It is important that management strategies take into account the ATS potential in significantly enhancing ethical practices provided that it is properly designed and implemented.

2.2.1 Diffusion of Innovation Theory

Diffusion of innovation (DOI) Theory, was developed by Rogers in 1962, is one of the oldest social science theories. It originated in communication to explain how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behavior, or product. Adoption means that a person does

something differently than what they had previously including purchase or use of a new product, acquisition and performance of new behavior. The key to adoption is that the person must perceive the idea, behavior, or product as new or innovative, it is through this that diffusion is possible. Diffusion of innovation theory in the case of this study attempted to explain and describe the mechanisms of how new inventions in this case ATS is adopted and becomes successful in enhancing ethical practices at NSE (Clarke, 1995). The decision to adopt a technology innovation is based on relative advantage, compatibility, trial-ability and simplicity of the technology (Rogers, 2003).

Innovation can be defined as the implementation of an idea perceived as new, whether radical or incremental in its environment even if the idea exists somewhere else (Schilling, 2008). This definition is also applicable to technical innovations, such as new technologies, products, and services as well as administrative innovations, such as new procedures, policies, and organizational structures. This theory helped the researcher to relate it to the strategies used by NSE in introducing automated trading systems to enhance ethical practices in Nairobi securities exchange. For NSE to be productive there is need to appreciate innovation despite the constraints that may be encountered.

2.2.2 Resource Based View Theory

The resource-based view theory of the firm (RBV) involves the use of different combinations of a firm's rare and valuable resource as a prerequisite for the achievement of competitive and strategic advantage (Wernerfelt, 1984). Resources are fundamental drivers of performance of an organization in this case enhancing the ethical practices of the firm (Conner, 1991). Wernerfelt, (1984) indicates that the unique use of a firm's

resources, such as competencies, assets, know-how, and capabilities, can lead to a specific combination of these that is difficult for others to imitate, and thus leading the firm to achieve competitive and strategic advantages. Barney (1991) concurs that resources controlled by a firm enable the firm to conceive of and implement strategies that improve the firm's efficiency and effectiveness (Barney, 1991).

This theory considers companies as bundles of resources that can be controlled and managed in such a way so that competitive advantages can be achieved. Competitive advantage in the case of this study defined in terms of the value gained when NSE employs ATS with results indicating greater benefit with the lower costs (Barney, 2007). The RBV contention is that the possession of such key resources like ATS technologies and their effective development and deployment provide unique synthesis of elements that allows the firm to achieve and sustain competitive advantage. The resource-based view of the firm attributes firm's performance to organizational resources and capabilities.

2.2.3 Adaptive Market Efficiency

The evolving nature of return predictability can be rationalized in the framework of Lo's (2004) adaptive markets hypothesis (AMH). With investor rationality at the heart of the controversy between advocates of the efficient market hypothesis and its behavioral critics, Lo (2004) provides reconciliation through the AMH in which market efficiency is explained from an evolutionary perspective. It is an application of the evolutionary principle to financial markets, which argues that constantly changing market conditions govern key market features such as return predictability. Therefore, the market efficiency

cannot be evaluated in a vacuum, but is highly context dependent and dynamic environment (Lo, 2007). Among others, the AMH implies that return predictability and investment profitability do arise from time to time due to changes in the demographics of investors, financial institutions and market conditions. Empirically, there is an expanding literature that reports evidence of time-varying stock return predictability, which is consistent with the prediction of AMH (Lim and Brooks, 2011). In view of Lo (2007), AMH is highly likely that the degree of return distribution and independency are driven by such dynamic market conditions.

The CMA and NSE have been instrumental in implementing policy and institutional changes in the Kenyan securities market. For example, in 2006, CMA together with the NSE oversaw the automation of the trading system in order to fully computerize the operations of the securities market. This has significant implication on improved market liquidity and operational efficiency of the market. The various market institutional and infrastructure reforms have led to increased participation from local and institutional investors evident in the increasing number of CDS accounts opened due to growing number of listed firms with heavy oversubscription and securities investors (CMA, 2012).

2.2.4 Trust Behavior Theory

This theory was championed by Stout's (2009) who stated that humans despite their own interest tend to trust the other investors in especially in the financial market. Stout further states that trust extensively influence the investment decision in the financial markets. Thus, ethical practices in the security market are of significant importance. Stout (2009)

also made a trust game in order to evaluate the confidence individuals had in financial markets. Stout state that the majority of humans have confidence for their family, other investors and also computers and institutions on markets indicating the necessity of Automated trading in enhancing the ethical practices of ATS. However, the confidence is heavily influenced by earlier experience on markets according (Stout, 2009).

Investors' confidence is higher in fully regulated markets with legal control and deposit guarantees than on less regulated. People have always known that trust can explain investor's behavior and some investors may take advantage of that (Stout, 2002). Tu et al (2009) analyze the relation between trust, market participation and economic outcome.

The authors state in the absence to trust that investors must protect themselves against moral hazard and manipulations through costly initiatives such as monitoring and supervisions. It is of significant importance to evaluate which factors that contributes to different levels of trust and to stimulate them in order to restore confidences in market. Ernst (2009) investigates this further and uses a biological perspective and defines trust as a behavior. According to Ernst (2009) theory, the concept of trust does not only cover risk preferences but also social preferences and betrayal aversion, which both play a significant role in confidence level (Ernst, 2009).

2.4 Relationship between ATS strategies and performance at NSE

Algorithmic trading (AT) can be explained as an investment strategy where stocks are traded by programmed computers and hold for short time periods, usually no longer than a second or sometimes milliseconds (Tse et al, 2012). Algorithmic trading is widely used

by hedge funds, for speculative profits, and by institutional investors, for well-organized implementation of large orders. Advocates of these trading platforms claim they are adding liquidity into the market or making the financial markets more efficient while critics believe this practice is unethical and destroying capital market structure (Liz Moyer, 2009).

Automated trading poses the challenges of harmonizing of competing objectives such as business ethics and competitive advantage. The regulatory authority and its members are frequently examining and assessing their industry-wide responsibility to create an ethical environment, develop fair market climate, and conduct themselves in a way that eventually benefits society and helps to create confidence in the markets.

There is no single code of ethics addressing firms or the industry's responsibilities to other investors and external stakeholders in these new markets of automated finance. Since, automated trading is complex, no one is able to fully understand all quantitative methods, all advancements in technologies or every single strategy that can or might create a good environment for ethical practices or competitive advantage (Davis et al, 2012). The ability to develop a focused strategy for the utilization and deployment of resources is critical. To this end, the NSE Director General and her crew have been working relentlessly towards improving the operations of the market ethical practices (Okereke, 2006).

2.5 Empirical Literature

This section will look at several studies done both locally and internationally on the strategies used by NSE in introducing automated trading systems to enhance ethical practices in securities exchange.

2.5.1 International evidence

According to Griffinet al. (2007) strategies used in introducing automated trading systems have played a critical role in making financial markets more transparent since trading rules are uniformly applied; also, they are more flexible and cheaper since they allow traders to trade from desks in their offices rather than on an exchange. Researchers such as Adenuga (2010) support the fact that, there is a positive relationship between ATS implementation and ethical practices. Hendershott (2011) studied the New York stock exchange during a 5 year timeframe from 2001 – 2005 and stated that algorithmic trading (AT) revolutionized the way financial assets are traded in that every step from order to venue and back are highly automated, decreasing the involvement of people and intermediaries hence enhancing transparency in the security market. In addition, by cutting the transaction process, the friction and cost of trading also reduced, enabled technology to be more efficient risk sharing, facilitate hedging, prices more efficient and improved liquidity, which all contributed to reduction of the cost of capital. The AT accounts for 73% of the total trading volume in the United State during 2009.

However, on automation and ethical practices, Griffin et al. (2007) explains that, advancement in technology can result to dangerous episodes and painful consequences. He observes that, in the last two decades two major market disruptions were facilitated by technology with the intended need to boost up liquidity. The first one was the market crash of 1987 where program trades intended to protect investors from large losses actually caused investors huge loses and specialists, who are supposed to provide liquidity failed. Precisely, when the liquidity was needed, it dried up and with no buyers,

the market went down causing most of the participant to lose their confidence and trust in stock markets.

The second event was the Asian contagion in 1997, where liquidity which was created by connecting traders from all over the world in far-flung trading networks was almost instantly withdrawn, causing major market dislocations that can still be felt and observed in some affected countries today. Leading up to 1997, developing economies in the Asian-pacific region benefited greatly from the extension of the traders ability to place trades anywhere in the world (Griffin et al., 2007). Foreign capital flowed in countries such as Thailand, South Korea and Indonesia at unprecedented rates. Flush with the new investments, businesses flourished in these countries. The situation continued until the situation entered a dangerous tipping point; when the foreign investors started withdrawing their funds, in effect, closing off liquidity in the system due to loss of confidence and trust.

Thirdly in the Swedish financial markets participants believed that the effects of HFT and AT were limited (FI-Report, 2012). Even though, some indications were made that liquidity depreciated and that the markets was more volatile, the effects of trading are small in that there is still significant fear about market abuse. The majority of the participants in the survey expressed fear that many of the ATS players used their strategies to manipulate and abuse the market. The whole financial market in the Sweden are currently facing a lack of trust, and people feel that market abuse are more frequently used today as a result of the complexity to identify the abuse, and the increased number of trades and orders (FI-Report, 2012).

2.5.2 Local Evidence

Muli, (2008) examined the relationship between Electronic Trading and Stock Market Efficiency at the Nairobi Securities Exchange and found out that the automated trading system brought about reduction in fraud, increased overall market efficiency and reduction in transaction cost and that the efficiency of the stock/securities market is based on fraud detection, efficiency in price reporting and regulation of market. In overall terms she found significance relationship between electronic trading and stock market efficiency. Market efficiency asserts that NSE is weak-form efficient (Michoki, 2013).

Kaberia (2009) did a research project on assessment of the perceived benefits and limitations of the automated trading system at the NSE. The objective of the study was to assess and appraise the perception of the MBA students at the University of Nairobi with regard to the Automated Trading System (ATS) being used at the NSE. The specific objective was to establish the level of investors' satisfaction with the ATS and to assess the perceived benefits and limitations associated with the introduction of the ATS at the NSE. The sample population was 100 MBA students who were investors at the NSE. Descriptive statistical measures such as percentage frequency distributions, frequency tables, bar graphs and pie charts were used to analyze the data. The conclusion was that the introduction of the ATS at the NSE was a step in the right direction towards having a world class stock exchange. The introduction of the ATS had advantages such as lower trading costs, lower trade execution times and increase market liquidity. However, it also had limitations such as lack of transparency in trading, unethical trading practices and difficulty in audit transactions.

Finally, in a study on the perceived benefits and limitations of the automated trading systems at the NSE, Kirema (2013) indicated that the introduction of ATS at NSE had increase market liquidity, reduced time taken to execute trade, lowered trading costs and standardized NSE to international market standards. The study however established that ATS had brought several limitations including difficult auditing transactions, unethical practices, unauthorized trading in clients shares among others. The integrity and the professionalism of the market players were put into question with recommendations made to put in place stringent regulatory framework.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discussed the research approach that the researcher used to accomplish the research objectives. The chapter has been sectioned into; research design, population, sample, data collection, and data analysis.

3.2 Research Design

The study adopted a descriptive design. According to Cooper and Schindler (2003), descriptive studies are more formalized and typically structured with clearly stated hypotheses or investigative questions. It serves a variety of research objective such as descriptions of phenomenon or characteristics associated with a subject population, estimates of proportions of a population that have these characteristics and discovery of associations among different variables. Descriptive research design sought to explain things as they exist in their natural phenomenon. The approach was suitable in the proposed study in the sense that it enabled the researcher to examine strategies used by NSE in introducing automated trading systems to enhance ethical practices as well as provide an in depth analysis of the situation through qualitative methods of data collection such as interviews.

3.3 Population

The unit of analysis for the study was Nairobi Securities Exchange (NSE). The population of focus was therefore NSE managers at top, middle and lower levels of management.

3.4 Sampling

Sampling refers to a method of selecting a subset of individuals from within statistical population to estimate characteristics of the whole population (Chandran, 2004). It reduces the cost of data collection and is a faster method than measuring the entire population. Chandran (2004) further notes that sampling is suitable in cases where the population under investigation is too large to be handled. In the case of this study, the researcher used purposive sampling to select NSE managers to participate in the study.

3.5 Data Collection

The study utilized both secondary and primary data. Secondary data is information that has previously been collected that is utilized by a person other than the one who collected the data and it can be obtained from books, journals and electronic materials (Mugenda, 2003). In the case of the proposed study, the researcher used both primary and secondary data. Under primary data, an interview guide was prepared for different strategies that have been used in the adoption of automated trading systems. In case of secondary data, the performance of NSE since the introduction of automated trading systems against adoption strategies was assessed.

3.6 Data Analysis preparation and presentation

Data analysis is described as classifying, coding and tabulating information needed to perform quantitative or qualitative analyses Mosby (2009). Under quantitative analysis, numeric form of data was analyzed and inferences drawn from the resultant figures. Under qualitative analysis, data was grouped in to common themes and description derived from these themes based on research objective. Data analysis was aided by analytical software's that's Statistical Package for Social Science (SPSS) version 21 and Microsoft excel. Further, a Likert scale and a multiple regression model indicated below was used to determine strategies used by NSE in introducing automated trading systems to enhance ethical practices in Kenya.

3.6.1 Analytical model

A multiple regression model was used to establish the relationship between strategies of introducing ATS and ethical practices. A multiple regression model establishes a relationship between one dependent variable and several independent variables. The results obtained from the model were presented in tables to aid analysis and ease of interpretation. Inferential statistics was drawn from the model in order to determine the nature and significance of relationship between changes in the dependent variable and independent variables. The regression model that was used in analysing this relationship effect was as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Where:

Y= Trading performance at NSE

X₁= Training

X_2 = Employee involvement

X_3 = Continuous improvement

α = Regression constant

$\beta_1\beta_3...B_n$ = coefficients of variables in the regression model

ε = Error term normally distributed about the mean of zero

3.6.2 Test of Significance

The study test of significance was done at 95% level of confidence using Analysis of Variance (ANOVA) and F test and coefficient of determination the models fitness in predicting performance of the dependent variable (Y). Based on the model is trading performance at NSE, β_0 is the regression. $\beta_1\beta_3...B_n$ was the coefficients of the variables in regression model. The β values provide the strength of the coefficients as far adoption strategies and trading performance at NSE is concerned.

CHAPTER FOUR:

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter provides a discussion on data analysis for the study on strategies adopted by NSE in the establishment of automated trading systems in Kenya. The findings have been discussed with reference to background information, trading performance and strategies used in the adoption of automated trading systems.

4.2 Background Information

The background information about the study covers the study response rate and characteristics of the respondents in terms of gender and period of work at Nairobi Securities Exchange.

4.2.1 Response Rate

The study sampled 15 respondents at NSE top, middle and lower levels of management. Out of this targeted, 12 of them participated in the interview. The findings on the response rate are as indicated on figure 4.1.

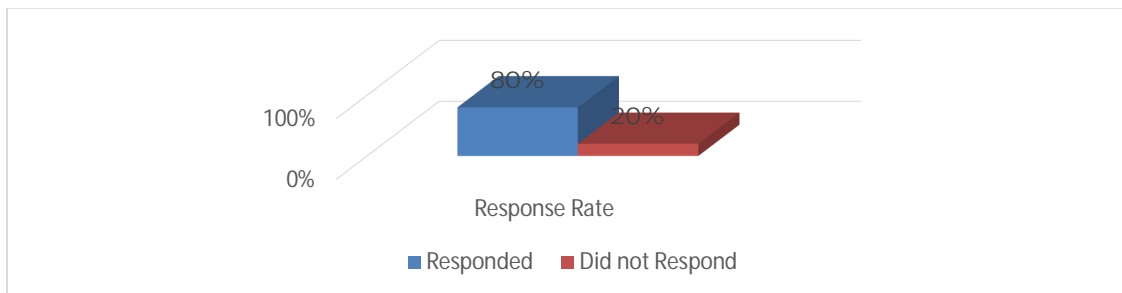


Figure 4.1: Study Response Rate

From the study findings on figure 4.1, 80% of the respondents responded to the study while 20% did not respond. The study response rate was judged as very good given recommendations from Kothari (2010), Mugenda (2010) who indicate that a response rate over 50% in a social science study is considered adequate and good.

4.2.2 Period of work at NSE

In the quest to understand the extent of respondents understanding of the strategies adopted by NSE in introducing automated trading systems, respondents were asked to indicate the length of time within which they had worked at NSE. The findings were as indicated.

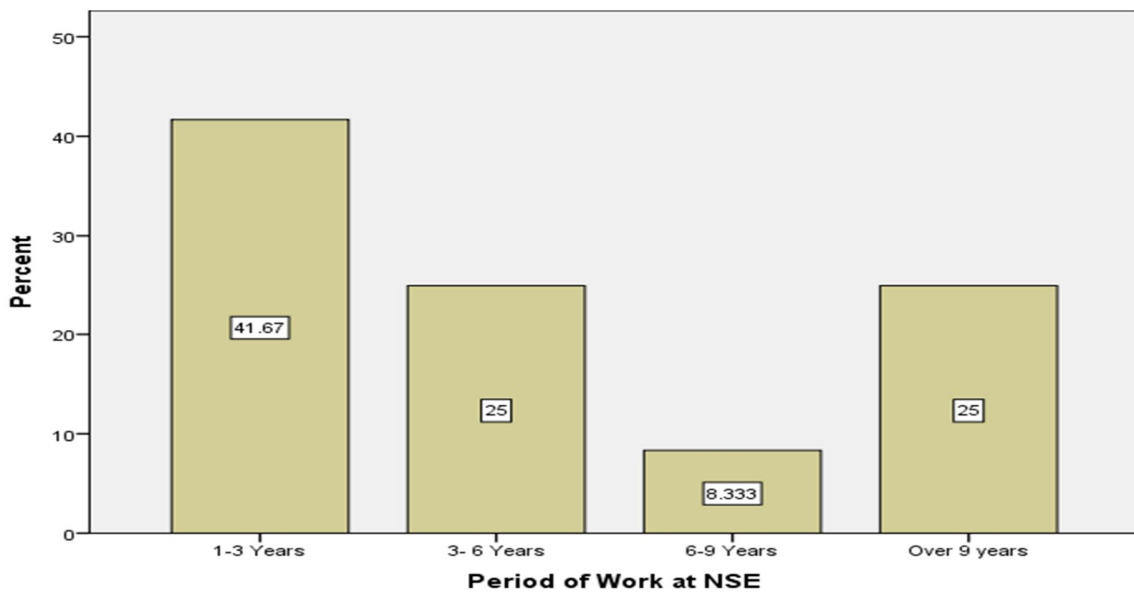


Figure 4.2: Period of work at NSE

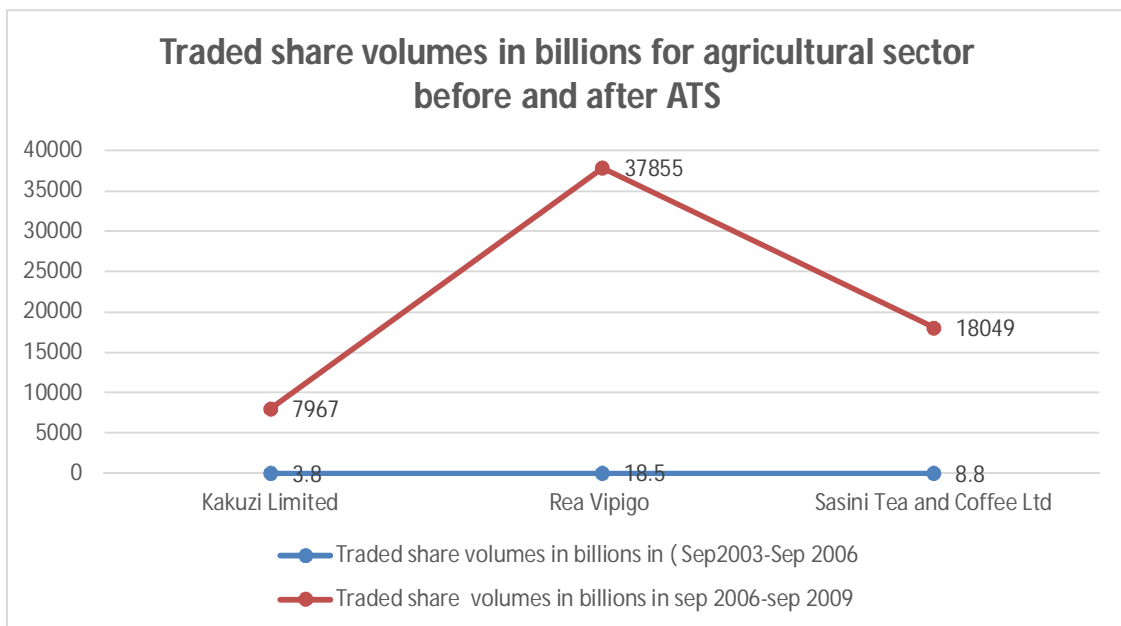
Most of the managers examined in this study had stayed at NSE for a period of between 1-3 years. Other periods of stay included 3-6 years (25%), 6-9 years (8.3%) and over 9 years (25%). The study findings indicate that at least over half (50%) of the respondents have worked over 3 years at NSE. This could be an indication respondents were well

aware of the strategies used by the organization in adoption of automated trading systems.

4.3 Trading Performance

Trading performance was measured in terms of traded volumes for different sectors of the economy before and after the introduction of automated trading systems. The findings have been presented and discussed below.

4.3.1 Trading performance for the agricultural sector before and after ATS



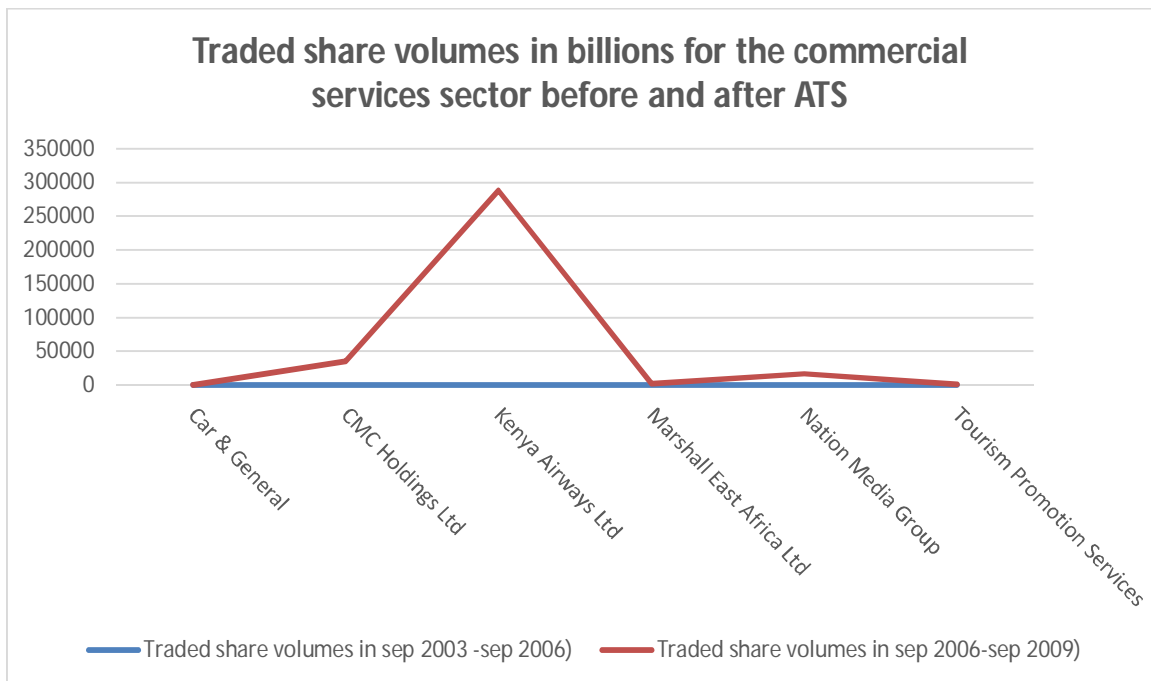
Source: NSE 2012

Figure 4.3 Traded share volumes before and after ATS for agricultural sector

Within the agricultural sector, there was limited amount of shares traded for firms within the agricultural sector in the period September 2003 to September 2006. After the

introduction of automated trading systems, share volumes increased exponentially for all the firms. With Rea Vipingo registering the highest among of shares traded. There is an indication that the introduction of ATS led to a peak in the amount of shares traded after which there was a decline.

4.3.2 Trading performance for commercial service sector before and after ATS



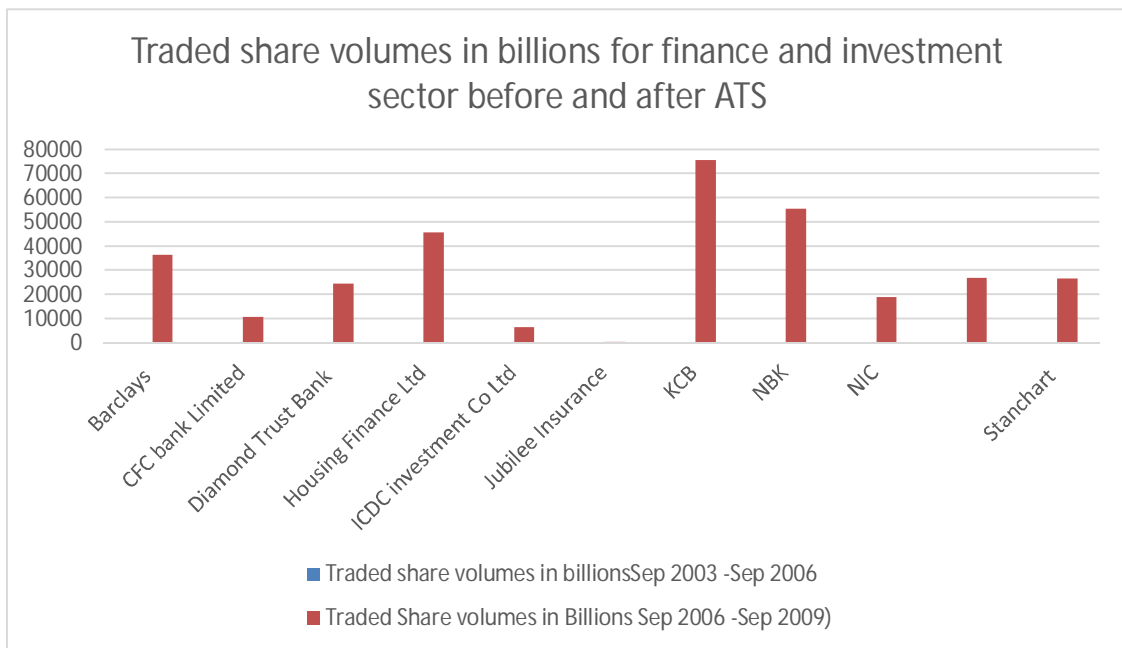
Source: NSE 2012

Figure 4.4 Traded share volumes before and after ATS for commercial service sector

For the commercial services sector, low levels of shares were traded for all the firms. The highest amount of shares traded before the introduction of ATS was from Kenya Airways which traded 111.6 billion shares. After the introduction of ATS in the period of September 2006 to September 2009, the volume of traded shares exponentially increased for some time then there was a sharp decline. Though there is a notable difference in the amount of shares traded before and after the introduction of automated trading systems. A

sharp decline on the number of traded volumes at a time when NSE was still using automated traded systems could be an indicator that other factors may be playing a significant role in influencing the volume of shares traded.

4.3.3 Trading performance for Finance and service sector before and after introduction of ATS



Source NSE (2012)

Figure 4.5 Traded share volumes before and after ATS for investment and finance sector

Within the finance and investment sector, there is a notable low volumes of shares traded before the introduction of automated trading systems for all the firms. After automation in September 2006, the volume of traded shares increased sharply with Kenya commercial bank having the highest increase of 75642 billion shares traded. The finance and investment sector like the previously mentioned economic sectors had notable growth as far as the volume of shares traded was concerned. The trend in all sectors of the economy indicate an exponential growth of the volume of traded shares after the

introduction of automated trading systems, there is however notable decrease in the volumes for all firms particularly in the second year of using automated trading systems. This could be an implication that there are other underlying factors that could be attributed to the decline in the expected growth as a result of use of automated trading systems.

4.4 Strategies used in the introduction of automated trading systems

The study examined the strategies used in the introduction of automated trading systems. Respondents were asked to indicate various ways in which NSE had introduced automated trading systems, the extent of empowerment practices that NSE was using, the methods that were used to undertake continuous improvement and ways that would better the adoption of automated trading systems. Respondents provided more than one option for their opinions in the aforementioned aspects. A multiple response analysis was carried out with the findings indicated in the following subsections.

4.4.1 Ways in which NSE has used to Introduce ATS

Findings on different ways NSE used to introduced ATS in the organization. The findings are as indicated below.

Table 4.1: Strategy of Introducing ATS

| Strategy of introducing ATS | Frequency | Percentage |
|------------------------------------|------------------|-------------------|
| Listing of new IPO | 4 | 16 |
| Trading using Bloomberg online | 3 | 12 |
| Training | 8 | 32 |
| Automation of various processes | 10 | 40 |
| Total | 25 | 100 |

Source: Researcher (2015)

Automation of various processes is the most popular ways in which NSE introduced automated trading systems as indicated by 40% of the respondents, the second most popular strategy was training as noted by 32% of the respondents. Other methods included; listing of new IPO and consultations with brokerage firms, (16%) and trading using Bloomberg online 12%.

4.4.2 Empowerment practices used to motivate staff

Table 4.2: Employee empowerment practices

| Strategy of introducing ATS | Frequency | Percentage |
|--|-----------|------------|
| Training | 11 | 44 |
| Authority delegation | 5 | 20 |
| Encouraging cross learning | 4 | 16 |
| Site visits where exchange are automated | 5 | 20 |
| Total | 25 | 100 |

The study findings indicate that training is the most commonly used employee empowerment strategy for introducing ATS at NSE. This is according to 44% of the respondents. Other empowerment strategies as indicated by the respondents include authority delegation (20%), encouraging cross learning (16%) and site visits where exchange is being automated (20%).

4.4.3. Continuous improvement strategies used to enhance performance of ATS

Table 4.3: Various continuous improvement strategies used by respondents

| Continuous improvement strategies | Frequency | Percentage |
|-----------------------------------|-----------|------------|
| Systems Upgrade | 8 | 53.3 |

| | | |
|--|-----------|------------|
| Interface with other back office systems | 4 | 26.7 |
| Capacity Building | 3 | 20 |
| Total | 15 | 100 |

Based on the study findings on table 4.3, systems upgrade was found to be the mostly common used way of continuous improvement at NSE. This was as indicated by 53.3% of the respondents. 26.7% of the respondents indicated that interface with other back office systems was used as a method of continuous improvement while 20% indicated capacity building .

4.5 Regression Analysis between trading performance and adoption of ATS strategies

In establishing the relationship between trading performance and ATS strategies used, a regression analysis was undertaken. The findings are as presented below.

Table 4.4 Summary of the regression model.

| Model Summary | | | | |
|----------------------|-------------------|----------|-------------------|----------------------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .749 ^a | .562 | .311 | .96932 |

a. Predictors: (Constant), Recommended Strategies for adopting ATS , Staff motivation strategies, Methods of introducing ATS, continuous improvement methods used for the last five years

The R squared value is the coefficient of determination which tells the variation in the dependent variable (Financial performance) due to changes in the strategies used to adopt ATS was 0.311. This indicated that traded share volume will change at a rate of 56.2 % as a result of changes in ATS adoption strategies that includes use of recommended strategies for adoption, staff motivation strategies methods of introducing ATS and

continuous improvement methods for the last five years at 95% confidence level. On the relationship between the study variables, an R value of 74.9% was established indicating that the variables examined in the study had a strong positive correlation.

Table 4.5: Anova

| ANOVA ^a | | | | | | |
|--------------------|------------|----------------|----|-------------|-------|-------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 8.423 | 4 | 2.106 | 2.241 | .001 ^b |
| | Residual | 6.577 | 7 | .940 | | |
| | Total | 15.000 | 11 | | | |

a. Dependent Variable: Trading Performance at NSE

b. Predictors: (a. Predictors: (Constant), Recommended Strategies for adopting ATS , Staff motivation strategies, Methods of introducing ATS, continuous improvement methods used for the last five years

From the Anova Statistics in table above, the processed data which is the population parameter, had a significance level of 0.01 which shows that the data is ideal for making a conclusion on the population parameters as the value of significance (value) is less than 5% .

4.6 Regression Coefficients

| Model | | Coefficients | | | t | Sig. |
|-------|--|-----------------------------|---------------------------|-------|--------|------|
| | | Unstandardized Coefficients | Standardized Coefficients | | | |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 1.631 | 1.062 | | 1.535 | .169 |
| | Ways in which ATS was introduced | .213 | .275 | .203 | .775 | .464 |
| | Strategies to motivate staff on the use of new technology | .920 | .375 | .657 | 2.455 | .044 |
| | Continuous improvement methods that NSE has used for the last five years | .693 | .307 | -.620 | -2.258 | .058 |
| | Ways for improving adoption of ATS | .065 | .405 | .043 | .160 | .877 |

a. Dependent Variable: Rating About Trading Performance at NSE

Dependent Variable Financial Performance (measured by return on investment)

The established regression equation was $Y = 1.631 + 0.213X_1 + 0.920X_2 + 0.693X_3 + 0.065$ from the above regression equation, it was noted that trading performance would be constant at 1.631 if strategies for adoption of ATS technology were not used. Use of various strategies such as recommended Strategies for adopting ATS, Staff motivation strategies, Methods of introducing ATS, Continuous improvement methods used for the last five years, would however increase trading performance by coefficient of ; 0.213, 0.920, 0.69 and 0.65. The study therefore found that there was significant influence of ATS adoption strategies on trading performance of ATS.

4.7 Discussion of the Findings

The study was carried out to examine the strategies adopted by NSE in establishment of automated trading systems. Owing to the the presumption that performance of ATS was not only influenced by the the technical efficiency of the system but also other human resource factors. Based on the study findings, the trend in performance indicate that there was low levels of shares traded before the introduction of automated trading systems within the agricultural, commercial, investment and finance sectors of the economy. In the period of September 2003 to September 2006, the agricultural sector recorded traded shares between 3.8 billion to 18.5 billion. On the introduction of automated trading systems, the sector recorded traded shares volumes of 7967 billion to 37855 billion. This trend went down to 18049 billion later. Within the commercial services sector, the introduction of automated trading system similiary led to an increase and later decrease. A similar trend was observed in the finance and investment sector which showed low

volumes of shares traded during non automization period while high amounts of shares were traded after automization.

Among the key observations of occurrence after automization is the decline in traded volume of shares for all the sectors of the economy studied. While the study findings indicate that automization of the trading process had revolutionised the way trading process was carried out at Nairobi Securities Exchange, there are several indications that performance of the ATS systems was influenced by other factors outside the automization process. The findings on the upsurge of traded volumes immediately after the introduction of automated trading systems concur with Aldrige (2009) who indicated that the use of automated trading system had created a shift in the performance of trading systems and that ATS was a key factor in new development opportunities.

The notable decrease in the volume of shares traded while still using automated trading system may partly be associated with the extent and efficiency of the systems. Among the possible reasons for the decline could be the perceptions that surround the use of the new technology. According to Roger, (2003) different perceptions revolve around innovations based on the view point. For instance, increase in the effectiveness of results in profitability which is found to bring a positive perception among stakeholders.

A positive relationship between ATS adoption strategies and performance of Automated Trading systems was established. Slightly over 50% variation in trading performance as a result of adoption of automated trading systems indicates the significance of adoption strategies and the extent of their effectiveness as far as achieving technological results is concerned.

These findings concur with Gliffienet et al (2007) who indicated that strategies used in introducing ATS played a key role in making financial markets more transparent since trading rules were more uniformly applied. Further , Grieffiel noted that the advancement in technology could result in dangerous episodes if a check in the way technology was adopted was not put in place. Use of Automated trading systems as observed by Muli (2008) led to reduced fraud, increased overall market efficiency and reduction in transaction costs . Kimena observed that that unchecked adoption of ATS could lead to several limitations including difficulty in auditing transactions, unethical practices, and unauthorised trading of shares.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter provides findings to the study, strategies adopted by NSE in establishment of automated trading systems. The chapter provides summary of research findings, conclusion, recommendations for policy, limitations of the study and recommendations for further studies.

5.2 Summary of the Finding

The study findings on strategies for adoption of ATS and adoption of automated trading systems indicate a large discrepancy in trading performance before and after the introduction of automated trading systems. Within the Agricultural, Commercial services, Finance and investment sectors of the economy, the amount of shares traded were low before the introduction of automated trading systems. After the introduction of the systems, amount of traded shares increased exponentially before declining steadily.

The strategies used in the adoption of ATS technology positively correlates with trading performance. The study established that trading performance established in the equation Y (Trading performance) = 1.631+ 213X₁ + 0.920 X₂ + 0.693 X₃+ 0.065 indicating that trading performance would be at a constant 1.631 if strategies for adoption of ATS technology were not used. Use of various strategies such as recommended Strategies for adopting ATS, Staff motivation strategies, Methods of introducing ATS, Continuous

improvement methods, would however increase trading performance by coefficient of ; 0.213, 0.920, 0.69 and 0.65 respectively.

5.3. Conclusions

The study was carried out to examine strategies used by NSE in adoption of Automated trading systems. Based on the study finding, it can be concluded that NSE used different strategies to introduce automated trading systems. Among the strategies commonly used include employee training, automization of processes, continuous upgrade of technology and continuous improvement. It is notable that adoption of new technology such as Automated trading system can revolutionize the way business is carried out as observed in this study.

The strategies used in adoption ATS affect the performance of traded volumes. This could be probable explanation why at the initial stage of introducing automated trading system there is an upsurge of the amount of shares traded. The consecutive decline experience could be as a result of the adoption challenges and well as ineffectiveness in the use of adoption strategies. Training of employees, automization of process, continuous improvement as well as practical demonstration of new technology among employees are important adoption strategies that can affect the performance of automated trading systems.

5.4. Recommendations for Policy

Successful completion of the study, strategies used in the adoption of Automated trading system, the following policy recommendations were made ; Automated trading systems like any other technological innovation keeps on changing. This could lead to decreased efficiency and even redundancy of the technology therefore compromising the core objective in which the technology was adopted. In order to continue enhancing the efficiency of technology, it is important for NSE management to continuously adopt new or upgrade the existing technological systems.

The strategies used in the adoption of new technology plays a critical role on the success or failure of technology adopted. In the case of Automated trading systems, it is important for NSE management to integrate different strategies so as to ensure effective adoption of new or efficient use of the existing technology. For instance, NSE could combine training of employees with practical demonstration on use of technology. Employee empowerment practices such as capacity building and job rotation could increase employee level of understanding on the new technology.

The likelihood of technological misuse is high as observed in the findings of this study. As a results, NSE management should increase their level of stringency as far as

monitoring the trending practice is concerned. The Organization could do so by increasing penalty or sanctions associated with malpractices.

5.5. Limitations of the Study

The study was limited to Nairobi Securities Exchange and the extent to which strategies for adoption of Automated trading systems was used. Thus the information provided in this study was limited to the practice at NSE and not other brokerage firms. The researcher used both primary and secondary data. The primary data used was limited to the extent of experience and the understanding of the interviewee about the subject matter. The secondary data used in this study was earlier documented and collected for different reasons from which the researcher undertook this study. The study constructs in the secondary data was collected and categorised differently from how the researcher could have done it. The secondary data was limited to the extent of reliability and validity achieved during the data collection process, this is because the researcher did not participate in the planning and execution of the data collection process. It was therefore impossible for the researcher to take into account all aspects of validating the process used in the collection of secondary data.

5.6. Suggestions for Further Research

The study established that there was a declining trend in the volume of shares traded immediately after the adoption of automated trading systems for all economic sectors examined. While the strategies used in the adoption of ATS could have a significant influence on the performance of automated trading systems, it is important that a further

study be carried out on the factors affecting the efficiency of automated trading systems at NSE.

Employees play a critical role in the success of technological innovation. While NSE indicated to have used various strategies to educate, empower and motivate employees, the study has not established the extent to which training programmes enhance employee effectiveness in the use of Automated trading systems. A further study should therefore be carried out to examine the relationship between employee training and their performance in the use of automated trading systems.

Despite the introduction of automated trading systems, it is notable from the literature findings that there exists malpractices that compromise the objectives of systems. It is therefore important to examine the challenges affecting use of Automated trading systems in the quest to re address the professional practices that arise from the use of Automated trading systems.

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APPENDICES

Appendix I: Introduction Letter

Dear Sir / Madam,

INTRODUCTION AND REQUEST FOR ASSISTANCE

I am a bona fide continuing student Master of Business Administration (MBA) degree program in the University of Nairobi. As per the university's requirements and to enable me complete my studies and to qualify for the award of the degree, I am required to identify and undertake a research project report in the area of my speciality. My approved research concentration is thus on Strategic Management and the broad objective of the study is on "strategies used by Nairobi Securities Exchange in the establishment of automated trading systems in Kenya. I kindly request for your assistance in providing information to be asked in this interview.

Yours faithfully,

Caroline Chepngetich

Appendix II: INTERVIEW GUIDE

Dear Respondent

This interview is aimed at providing information on the strategies used by NSE in adoption of automated trading systems. You are kindly requested to participate in this study by providing responses to the questions provided. Kindly note that there is no right or wrong answers. Put a tick (✓) on the answer.

1. Kindly Indicate your sex
2. How long have your worked at NSE?
3. How do you rate trading performance at NSE, please explain your rating
4. Does your company train employees during listing of new IPO?
5. How often do you undergo training on the use of new systems?
6. Do you think the training that you undergo is adequate?
7. Does the management of NSE delegate duties to employees, if yes, please explain?
8. Do you have practical demonstrations on the usage of automated trading systems?
9. Has the demonstration helped you improve your understanding on automated trading systems?
10. Has there been any systems upgrade in the last 12 months, if yes, please explain
11. Do you think that NSE has provided you with necessary capacity to enhance trading? If yes, please explain how?
12. What other employee empowerment practices are carried out by NSE to motivate staff during introduction of new technology?
13. What methods of improvement has NSE been using in the last five years to ensure there is continuous performance?

14. Please indicate ways in which you would think NSE would make adoption of automated trading systems better?
15. What in your opinion could be done to enhance trading at NSE?

End: Thank you for participating in this interview